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Benjamin O. Davis High School/Aldine ISD
Computer Engineering Grade 10-12
Instructional Days - 10 days

Summary

Students are challenged to design, build and test a Go/No Go test platforms of their choice, pending approval, while they learn and follow the steps of the engineering design process. For this event, the teams must come up with a finish product that demonstrated their understanding of Go/No Go testing. For example, the students will use Fusions360 to design a prototype model of Go/No Go platform; whereas, the Go/No Go test refers to a pass/fail test using two boundary condition; for example the student can create a no/no go 3D model of a CPU/CPU slot, a PCI Card/PCI slot, memory/memory slot, or a screw/bolt.

The teams will first learn about defining the problem and the why each step of the process is important. The teams develop solutions and determine which is the best based on design requirements. After making drawings, constructing and testing prototypes, they will evaluate the results and make recommendation for future go/no go applications.

Education Standards:

- interpret appropriate documentation such as schematics, drawings, charts, diagrams, technical manuals, and bulletins.[CM.3D]
- solve problems and think critically;[1.C]
- demonstrate planning and time-management skills such as project management, including initiating, planning, executing, monitoring
- and controlling, and closing a project.[1.G]
- identify new and emerging technologies that may affect the field of computer technology.[4.J]

Learning Objectives

After this activity, students should be able to:

- Identify and describe the parts of the engineering design process.
- Use Fusion360 to design and create several go/no products and they should be able to generate associate stl files.
- Utilize the engineering design process to develop solutions to the assigned problems.
- Explain the reasons for their selected designs and material choices.

Materials List

Each team needs:

- Access to Fusion360 Software

- Engineering Design Worksheet
- Each team need a access to a 3D printer
- Dialup caliper, ruler and a height gage

Procedure

The Engineering Design Process:

- Requirement, identify the problem and understand the need to solve it. This includes developing a problem statement.
- Research, gather information about the problem, brainstorm as many solutions as possible.
- Analysis of possible solutions leads to the selection of one design, and create a plan
- After construction, the prototype design is tested and evaluated.
- In the redesign step, improvements are made to the design (or recommended), and revised prototype solutions are tested again. The redesign, retest, analysis cycle is iterated as many times as necessary.

See additional information about the engineering design process at <https://www.teachengineering.org/engrdesignprocess.php>.

Before the Activity

- Gather materials and make copies of the
- Divide the class into groups of four students.
- Hand out the Engineering Design Worksheet

With the Students

- Hand out drawing paper to the students,rulers, and pencils.
- Ask each student to create an illustration/diagram of an engineer.
- Have 4 students share their illustrations with the class.
- Discuss the preconceived notions the students have regarding engineers. Introduce students to the materials available to design launcher prototypes.
- Have students use the packet to guide them through the process, composing their own descriptions of the problem statement, function, objective and any constraints for this challenge.
- Have each student develop two possible solutions to share with his/her group.
- Have groups review each design idea and brainstorm further, weighing the positives and negatives, choosing the most promising design. Help them determine which potential design is the "best" based on the design requirements.
- Debrief with each group to help them understand and reflect upon how what they did was part of the cyclical engineering design process.

Attachments

[Engineering Design Process Worksheet \(docx\)](#)

Assessment

Pre-Activity Assessment

Pre/Post Unit Engineer Sketch: First thing (before opening the topic and challenge), give students five minutes to each make a sketch of an engineer. Save and set aside the sketches.

Class Discussion: During the introduction to the topic and the engineering design process, informally evaluate students' prior knowledge about engineering and the design process. Ask the students:

- What is the engineering design process?
- How does the engineering design process work?
- Why use the engineering design process?
- What are the parts of the engineering design process?

Activity

EDP Steps: Have students use the attached [Engineering Design Worksheet](#) to aid them in understanding the steps of the engineering design process as a problem-solving tool. Complete the circular diagram (page 2) together, through class discussion. Then, in class or as homework, have students individually compose definitions to the page 1 vocabulary terms. Evaluate these descriptions to gauge their understanding of key design process components. For answers, refer to the Background and Vocabulary sections.

Post-Activity Assessment

Go/No GO Steps: Evaluate students' completed Go/No-Go Project to gauge their understanding of and ability to follow the engineering design process steps to create their product. Make the assessment focus on each student's correct use of the engineering design process

Acknowledgements

Dr. Hung

Comments

<https://www.teachengineering.org>