Engaging Young Minds:

Hands-On Approaches to Integrated STEM in PreK-12 Education

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Introductions

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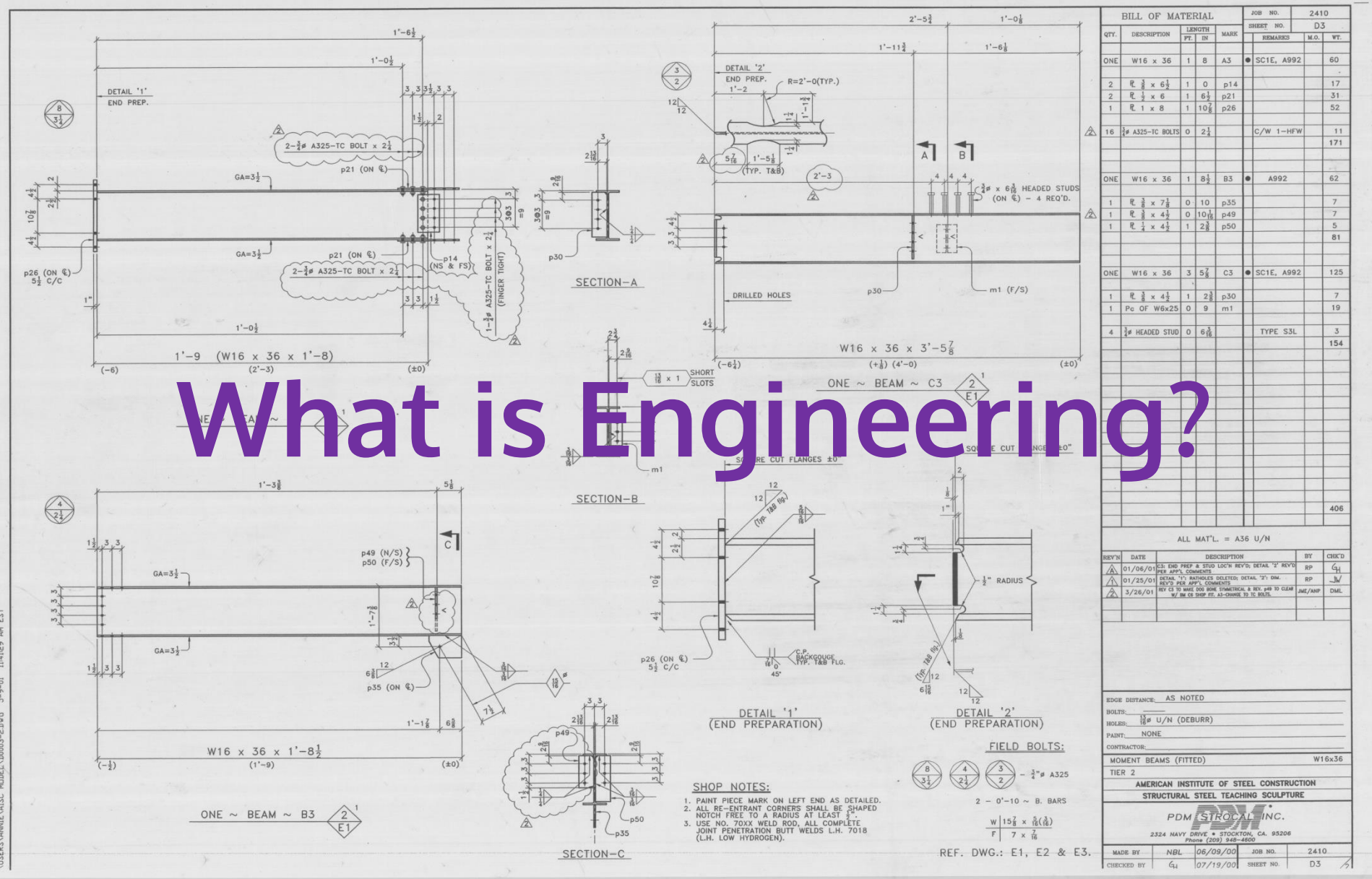


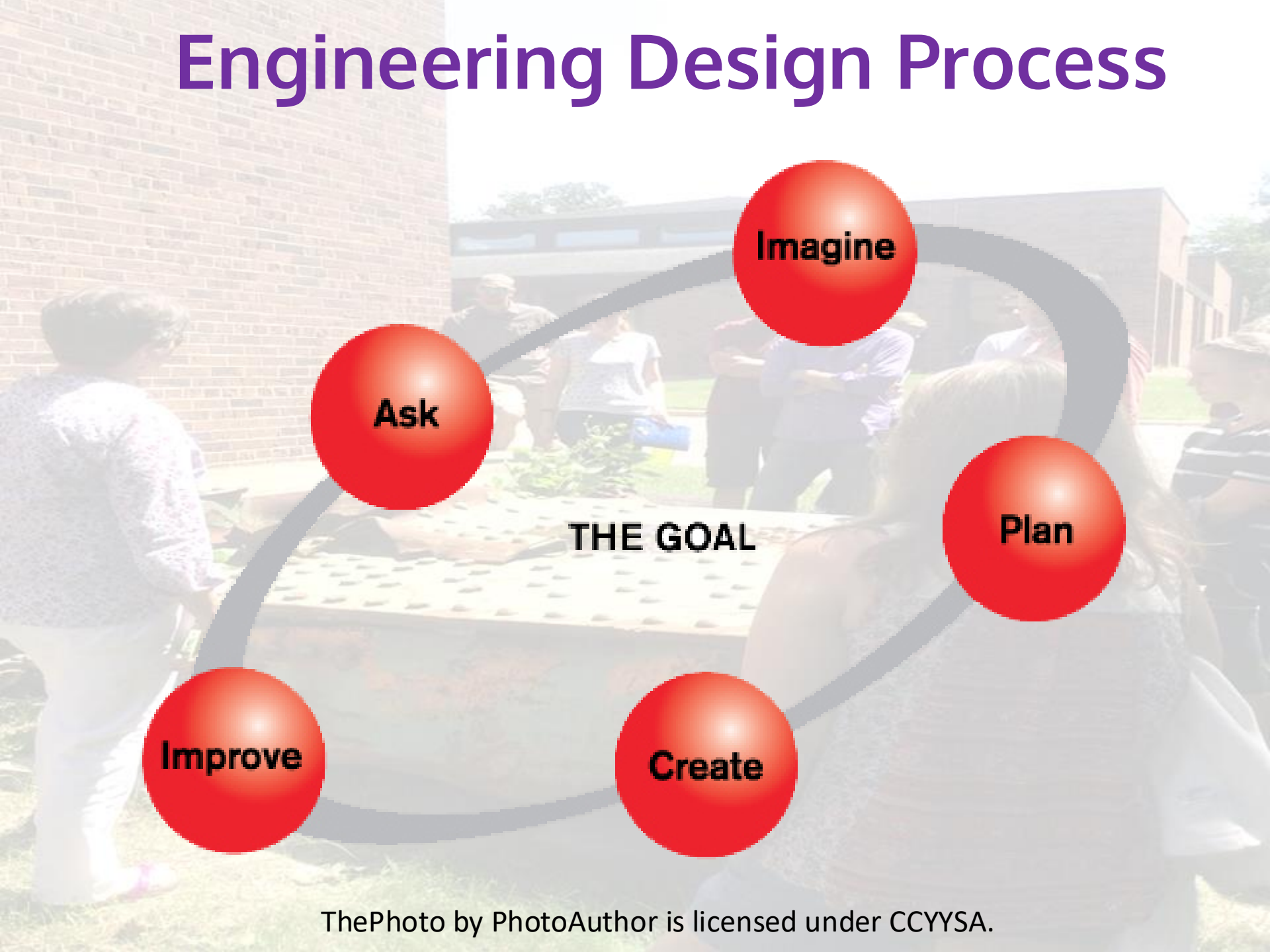
What is Engineering?

Engineering is…

A major difference between science and engineering is that scientists deal with the world that is, while engineers envision the world that could be.

Theodore von Kármán

Engineering Design Process



Integrated STEM – Why Teach It?

- Combining more than one subject into one learning experience.
- Teaches the 4 Cs and helps students identify as engineers.

Collaboration	Critical Thinking
Communication	Creativity

Why Integrate STEM through Engineering

- Solving a problem or need
- Using design constraints
- Competition vs. Challenge
- Why is failure important?
- As teachers, we can use low-cost materials to teach these concepts

Rocket Challenge

Step 1:

- In 3 minutes you must create a rocket that will launch as far as possible given the following materials:
- 1 straw
- 1/2 piece of paper
- 3 inches of tape
- [You may use a scissors to help you create your rocket]

Rocket Challenge

Step 2:

- As a group, we will launch our rockets. During this phase, we are also collecting data!! After all rockets have been launched, make a table that documents the distance each rocket traveled. You should also make notes about those rockets that were the most successful.

Flight 1	Flight 2	Notes:

Rocket Challenge

Step 3:

- Now you have 3 minutes to redesign your rocket. Use your notes and observations to create an even better rocket. You will be given new materials (since your others were burned upon re-entry to the atmosphere).

Rocket Challenge

Step 4:

- Launch your new (and hopefully improved) rocket. Again record and graph the distance data for each rocket in the group.

What mathematics questions might you ask your students?

Rocket Challenge: The Mathematics

Integrate into Math:

- What is the mean distance traveled by the rockets during the first trial?
- What is the mean distance traveled by the rockets during the second trial?
- What is the median distance traveled by the rockets during the first trial?
- What is the median distance traveled by the rockets during the second trial?
- Does one of these measures of center (mean or median) better reflect the "average" rocket launch distance? Why?
- Make a number line plot of the data from the first trial.
- Make a number line plot of the data from the second trial.
- Make a box plot of the data from the first trial.
- Make a box plot of the data from the second trial.
- How do the box plots compare?
- How do the box plots and number line plots compare?

Engineering Design

Answer the questions on the worksheet about the engineering design process you used to create and redesign your rocket.

Reflect

- What did you learn from this challenge?
- What connections can you make to other content/concepts/challenges?

Want to Learn More?

Graduate Certificate in Engineering Education

- 4 courses (12 credits)
- Offered at a discounted price
- Funding available
- Blended model with option to Zoom
- Fall registration open

Learn more about the program here

MA in Educational Studies

- 4 core courses (Assessment, Curriculum, Equity, Technology)

Concentrations:

- Engineering
- Learning Technology
- Mathematics
- K-12 Reading
- Hispanic Culture and Language
- Special Education
- Teaching College English
- Mental Health

SCHOOL OF EDUCATION

Learn more about this program here

Thank You!

Questions?
Please contact us

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