Increasing STEM Understanding and Engagement Through Engineering Learning Activities

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Research Goal

Identify science, math and technology concepts integrated into engineering problem-based activities.

Practical Challenges

Engineering problems require the application of knowledge and skills from different subject areas.

Students are challenged to apply their knowledge beyond classroom tasks, even within a single subject area.

Methods

Design-based research
Expert teacher surveys

References

Honey, M., Pearson, G., & Schweingruber, H. (2014).

Research and Development

Phase 1:
Selecting, adapting, and creating lessons (Prototyping)
Phase 2:
Eliciting input and modifying/ enhancing lessons
Phase 3:
Piloting (Testing the lessons)

Lesson Prototype

Minds On
Activate prior knowledge of relevant concepts and vocabulary.

Hands On
Engage students in hands-on exploration and problem-solving tasks assigned by *Charlie the Charger.*

Thoughts Out
Debrief concepts applied in solving the problem and extend to other applications and engineering work.

Concepts, Disciplines, & Applications

Charlie Needs a Boat!

- Formulas, expressions, equations
- Physics, math
- Mechanical engineering

Charlie Needs a Table!

- Force, math practices –problem solving, quantitative reasoning
- Physics, algebra, geometry
- Civil, structural engineering

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