Getting Students Engaged in Engineering Design

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HCPSS Vision

Translating Vision into Reality: Implementing the MD College and Career-Ready Standards

Vision
Every student is inspired to learn and empowered to excel.

Mission
We cultivate a vibrant learning community that prepares students to thrive in a dynamic world.

Goal 1: Every student achieves academic excellence in an inspiring, engaging, and supportive environment.
Goal 2: Every staff member is engaged, supported, and successful.
Goal 3: Families and the community are engaged and supported as partners in education.
Goal 4: Schools are supported by world-class organizational practices.

HCPSS Elementary Science Office
Every student (PK-5) receives rigorous and engaging science and engineering instruction that prepares them to be scientifically literate citizens in a global community.
Ready at Five

Ready At Five is dedicated to elevating school readiness for all Maryland children.

Helping young children enter school with the skills needed to succeed.

Working at the state, local, and community levels to increase knowledge and skills, raise awareness, and bolster statewide efforts to invest in the early years.
Next Generation Science Standards (NGSS)
Next Generation Science Standards

WHO
THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine

WHAT
A FRAMEWORK FOR K-12 SCIENCE EDUCATION
Practices, Crosscutting Concepts, and Core Ideas

WHEN
July 2011

Achieve

NEXT GENERATION SCIENCE STANDARDS
For States, By States

April 2013
A Framework for K-12 Science Education

Three-Dimensions:

● Science and Engineering Practices
● Disciplinary Core Ideas
● Crosscutting Concepts
Kindergarten NGS Standards

STUDENTS who demonstrate understanding can:

K-PS2-2. Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.*
Principles of the Framework

1. Children are born investigators
2. Focus on Core Ideas and Practices
3. Understanding develops over time
4. Science and Engineering require both knowledge and practice
5. Connect to students’ interests and experiences
6. Promote equity
Engineering Design Process (EDP)
Kindergarten NGSS Standards

STUDENTS who demonstrate understanding can:

● **K-PS2-1.** Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

● **K-PS2-2.** Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.*
The Engineering Design Process

Ask
What is the problem? What have others done?

Imagine
What are some solutions? Choose the best idea.

Create
Build my design. Test it out.

Plan
Draw a diagram. Decide what materials I will need.

Improve
How can I make my design better? Try again!
WHY Engineering Design?
What did you observe (hear and see)?

What might the benefits be of engaging young learners in the Engineering Design Process?
WHY Engineering Design?

- The process is flexible, engineers will repeat steps as many times as needed
- Rarely smooth, allowing for students to solve problems in real time
- Hands on learning in groups that promote teamwork
- Teamwork => Design solutions for open ended problems
- Learn through experiences that allow creativity and differences in thinking
- Problem solving that teaches young learners to establish goals, monitor progress, and persevere
Defining "Success"
POSTER TALK

What did you observe (hear and see)?

Work with the small group at a poster to define “success” in regards to Engineering Design; how would you know that your young learners have been successful?

Be prepared to share out
Defining “Success”

- No single “right” answer-allowing all students to see themselves as successful
- Being flexible to different approaches
- No stigma for failure. Failure is important to the design process
- Everyone will get there in their own time/be ok with students not mastering their design as long as they get the key takeaways
- Learning is enhanced when children feel the freedom to manage it themselves
ALL Students Are Engineers
ALL Students Can Be Successful Engineers
What did you observe (hear and see)?

How have your young learners demonstrated the skills of an engineer, or have been engaged in engineering?
Fostering Engineers, Birth-5

"We are currently preparing students for jobs that don't yet exist, using technologies that haven't been invented, in order to solve problems we don't even know are problems yet." - Karl Fisch

- Encourage
- Let them explore
- Remember they are naturally curious/filled with questions
- Each child has strengths or interests that contribute to the overall functioning of the group
- Use flexible grouping
- Give children the opportunities to play together, work on projects in small groups, and talk with other children; their own development and learning is enhanced
- Celebrate mistakes and failures, they help us learn
Questions?
Doorprizes!

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