Engineering is Elementary

Developed by the Museum of Science, Boston

EiE Engineering is Elementary
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Agricultural Engineering: Designing Hand Pollinators

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http://www.eie.org/engineering-elementary/resources/were-going-make-hand-pollinator

Julie Mock
Grade 1
Lake Elmo, MN

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Children CAN engineer . . .

in fact, children SHOULD engineer.

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Mission

Make engineering education relevant, accessible, and inclusive.

Core Commitments

- Create problem-solvers
- Engage ALL students

- Classroom-tested
- Scalable
- Research-based

Engaging ALL Children

Under { represented / served / performing }

Gender

Race

Ethnicity

Income

English Learners

Disability

Special Education

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EiE's Engineering Habits of Mind

Children who develop engineering habits of mind . . .

Develop and use processes to solve problems	Investigate properties and uses of materials
Consider problems in context	Construct models and prototypes
Envision multiple solutions	Make evidence-based decisions
Innovate processes, methods, and designs	Persist and learn from failure
Make tradeoffs between criteria and constraints	Assess the implications of solutions
Use systems thinking	Work effectively in teams
Apply math knowledge to problem solving	Communicate effectively
Apply science knowledge to problem solving	See themselves as engineers

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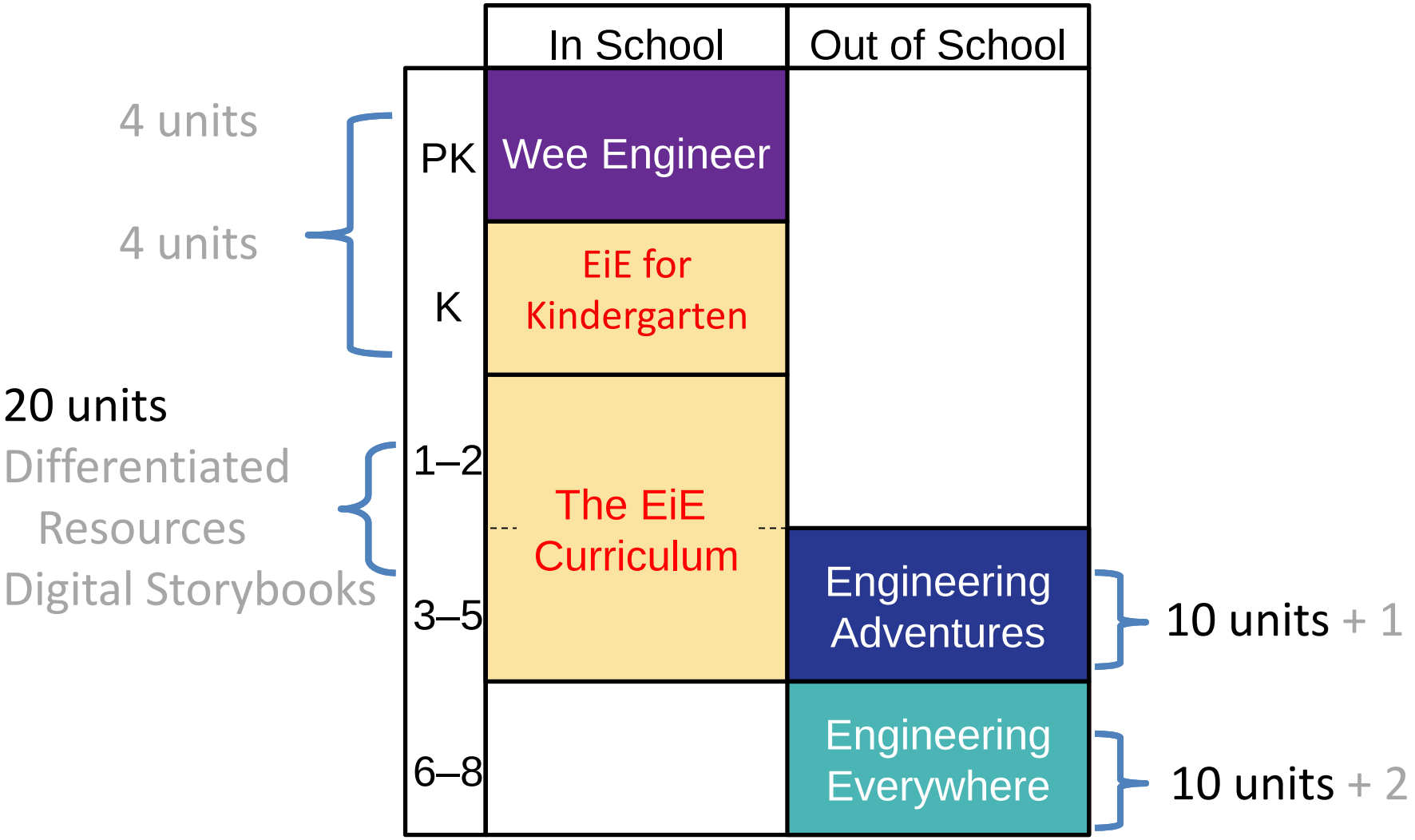
EiE's Portfolio



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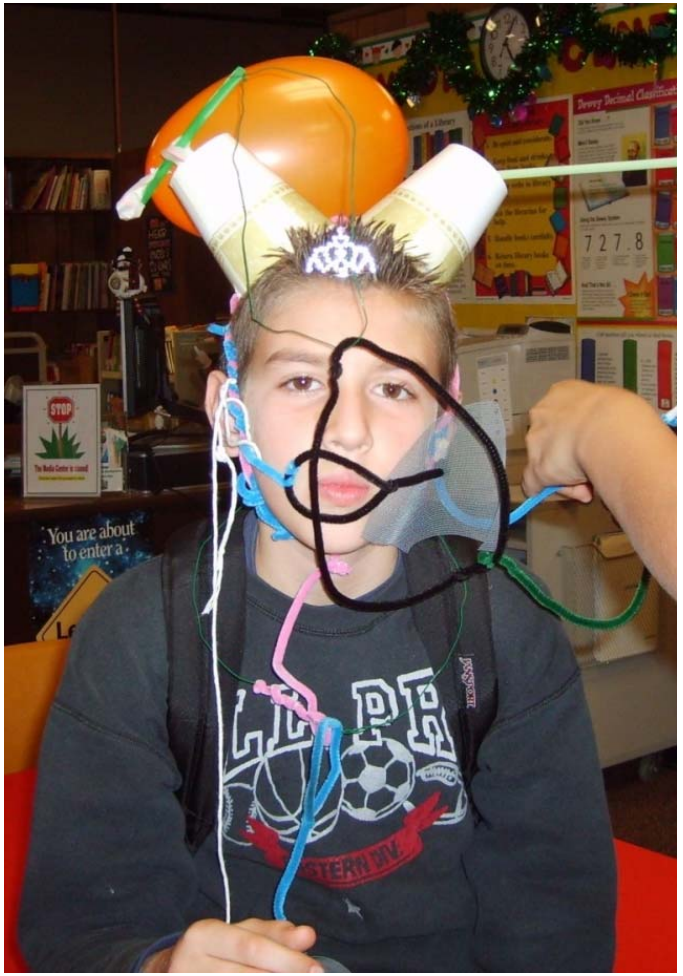
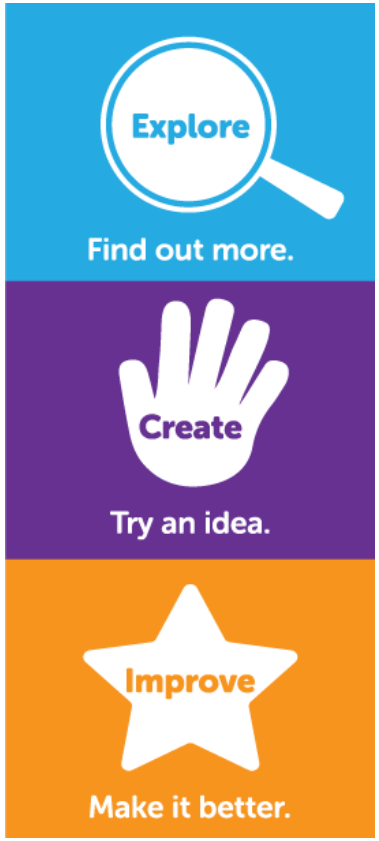
Habits of Mind

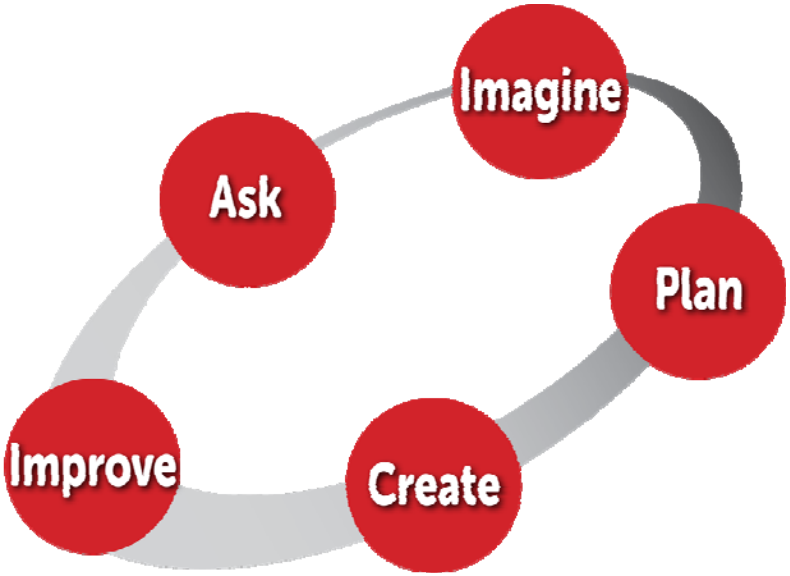
Problem-solving

Innovation



Engineering Design Process

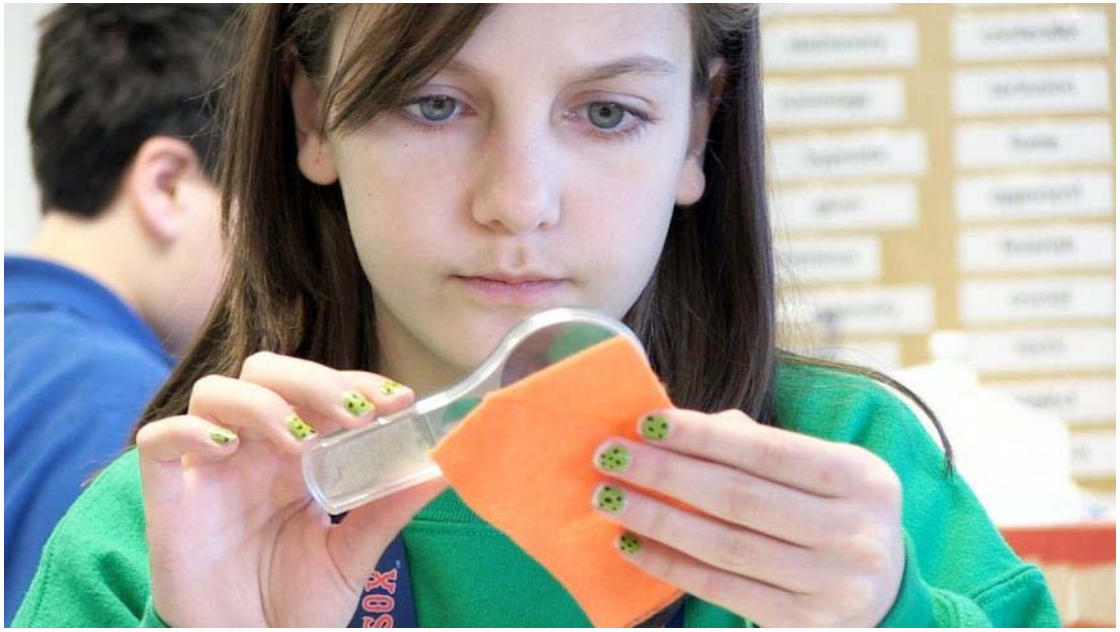




Habits of Mind

Apply science

Apply math



Engineering Integrates with Science

	SCIENCE TOPIC	*ENGINEERING FIELD*
Earth Science	Water	*Environmental*
	Air & Weather	*Mechanical*
	Earth Materials	*Materials*
	Landforms	*Geotechnical*
	Astronomy	*Aerospace*
	Rocks	*Materials*
Life Science	Insects/Plants	*Agricultural*
	Human Body	*Biomedical*
	Plants	*Package*
	Ecosystems	*Environmental*
	Organisms/ Basic Needs	*Bioengineering*

	SCIENCE TOPIC	*ENGINEERING FIELD*
Physical Science	Simple Machines	*Industrial*
	Balance & Forces	*Civil*
	Sound	*Acoustical*
	Electricity	*Electrical*
	Solids & Liquids	*Chemical*
	Magnetism	*Transportation*
	Energy	*Green*
	Floating & Sinking	*Ocean*
	Light	*Optical*

Transportation Engineering: Designing a Maglev System

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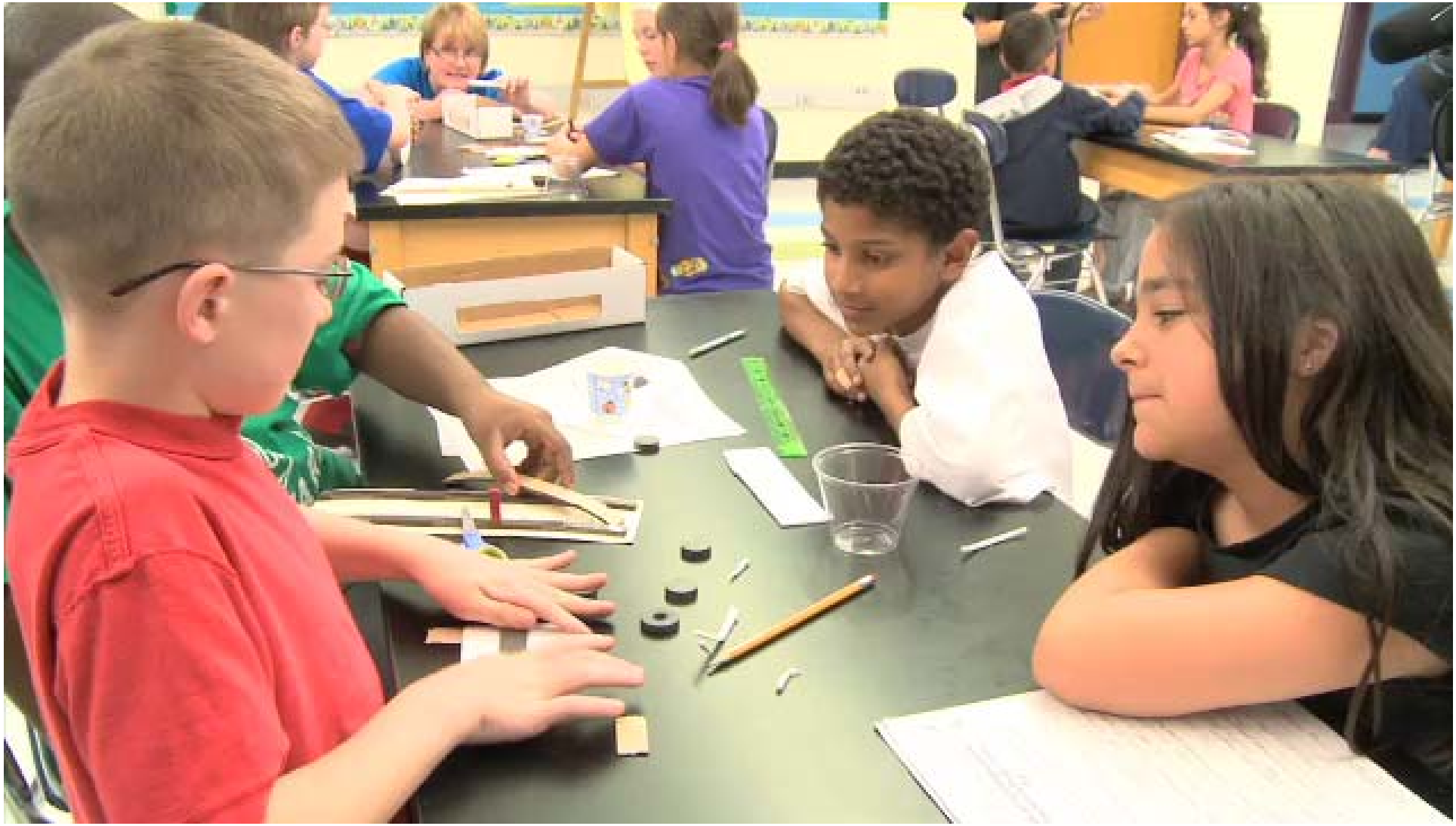

http://www.eie.org/engineering-elementary/resources/we-made-it

Kathleen Murphy Garcia
Grade 4
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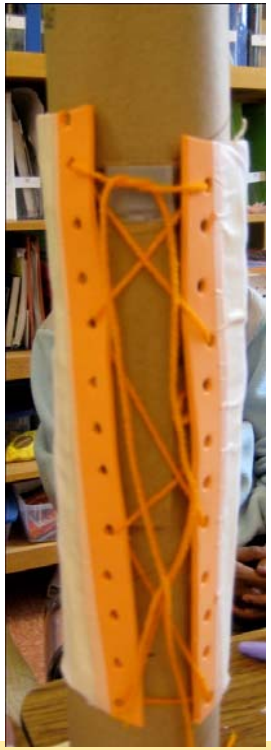
Habits of Mind

Multiple solutions

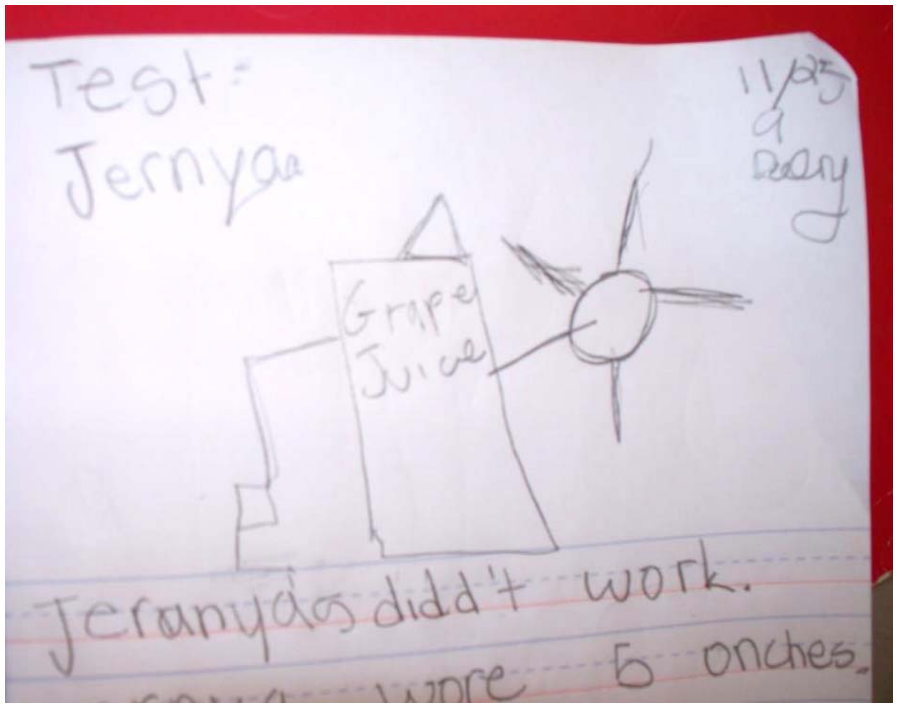




Habits of Mind

Failure

Persistence



"Now I know how engineers feel when things they design don't work the first time, but I still want to be one."

Habits of Mind

Identifying as an engineer

Materials Engineering: Designing Walls

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http://www.eie.org/engineering-elementary/resources/im-ready-engineer

Chentel Neat
Grade 2
Hollywood, FL

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http://www.eie.org/engineering-elementary/resources/who-can-be-engineer-you-can

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Grade 2
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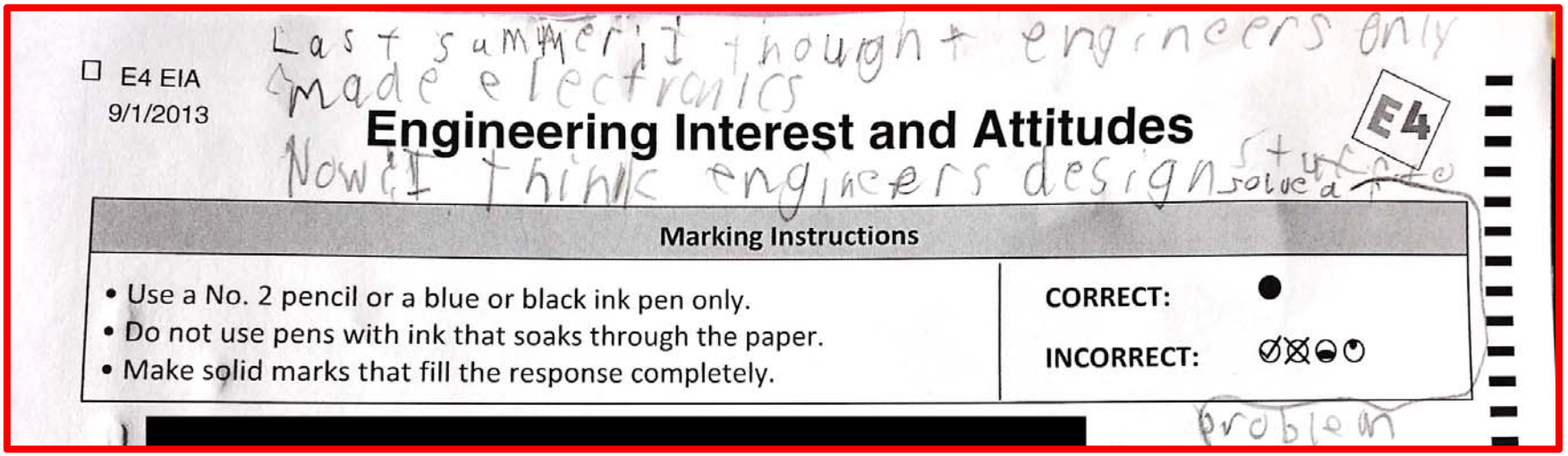
Children learn STEM subjects better when classroom instruction includes engineering

Research Results

Children who use EiE perform significantly better than control students on questions about:

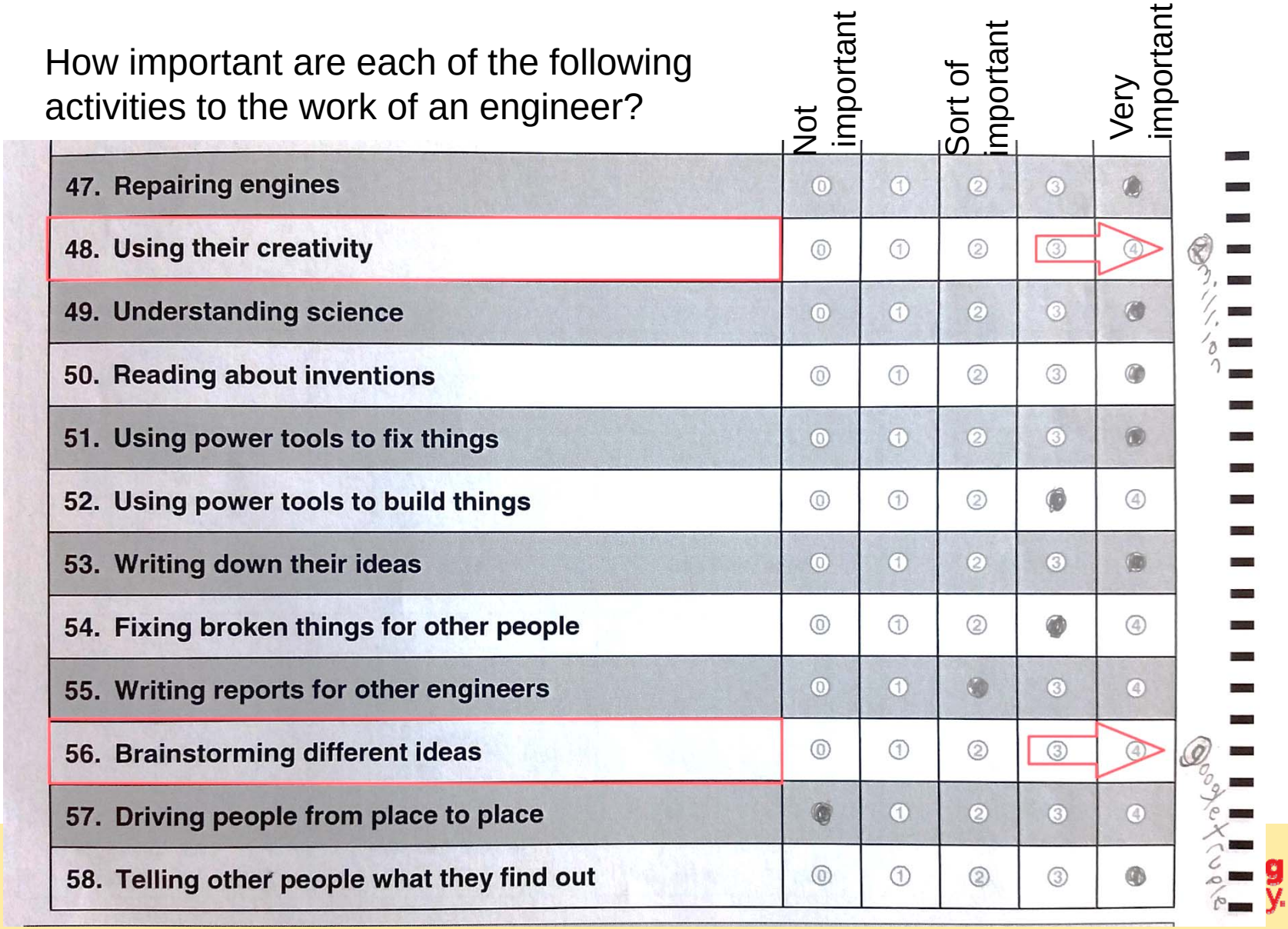
- engineering
- technology
- science



"Last summer I thought engineers only made electronics. Now I think engineers design stuff to solve a problem."

Thinking outside the bubble…

How important are each of the following activities to the work of an engineer?



	Not important		Sort of important		Very important
47. Repairing engines	0	1	2	3	4
48. Using their creativity	0	1	2	3	4
49. Understanding science	0	1	2	3	4
50. Reading about inventions	0	1	2	3	4
51. Using power tools to fix things	0	1	2	3	4
52. Using power tools to build things	0	1	2	3	4
53. Writing down their ideas	0	1	2	3	4
54. Fixing broken things for other people	0	1	2	3	4
55. Writing reports for other engineers	0	1	2	3	4
56. Brainstorming different ideas	0	1	2	3	4
57. Driving people from place to place	0	1	2	3	4
58. Telling other people what they find out	0	1	2	3	4

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Research Results

Children who use EiE are more likely than control students to indicate that they are interested in engineering as a career.

Research Results: Underrepresented

Students from underrepresented groups . . .

- Females
- English-language learners
- Low-income
- Students with an IEP
- Minorities underrepresented in engineering

showed increased . . .

- Interest
- Engagement
- Performance

when using EiE compared to when they worked with their. . .

- Science curriculum
- School in general

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