Powering Up: Bringing Standards to Life

A Moonshot Institute

Objectives

to explore ways to build interdisciplinary units guided by essential questions, big ideas, and key standards

to build a “maker space” in classrooms involving engineering and design thinking

to understand how inquiry can drive learning

to participate in a range of strategies for inspiring and developing fluent readers

Qualities Most Essential for Today's Workforce

critical thinking and problem solving
collaboration
agility and adaptability
initiative and entrepreneurialism
communication skills
the ability to analyze information
curiosity and imagination

Tony Wagner, 2008

CRISIS OF SIGNIFICANCE

“Education has become a relatively meaningless game of grades more than an important and meaningful exploration of the world in which we live and co-create.”

Michael Wesch

meaningful application

What does meaningful application look like?

Here is what it doesn’t look like!

LAFS.1.RI.1.2 Identify the main topic and retell key details of a text.

Name _____ Date _____

Think About It

Read and answer the questions.

1. Why don't the firefighters make their beds or put away the hoses?

_____

_____

_____

2. Why do the firefighters do their own jobs now?

_____

_____

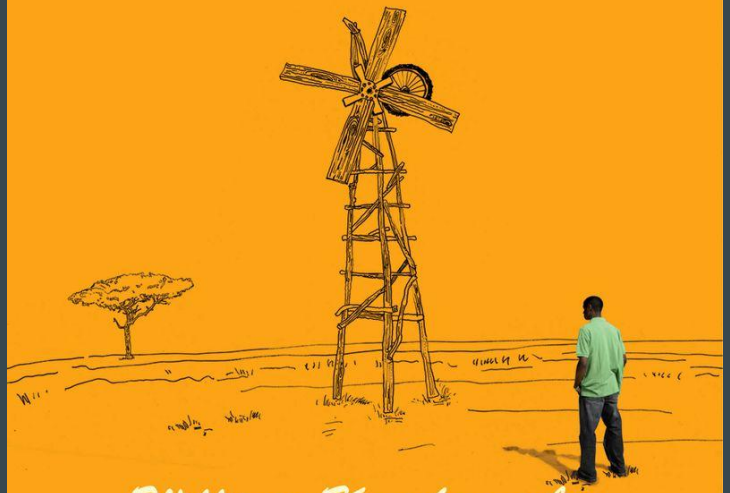
_____

3. Why do you think firefighters would want to have a pet at the firehouse? Explain your answer.

What does meaningful application look like?

[creating currents of electricity & hope]

THE BOY WHO HARNESSED THE WIND



William Kamkwamba
AND BRYAN MEALER

Essential Question

How can energy create change?

Focus Standards

LAFS.3.RI.1.2 Determine the main idea of a text; recount the key details and explain how they support the main idea.

SC.3.P.10.2 Recognize that energy has the ability to cause motion or create change.

Powering Up: Three Chapters

Chapter 1: A Boy's Dream

Chapter 2: Electrifying a Nation

Chapter 3: A Young Tinkerer

Chapter 1: A Boy's Dream

a humanities experience

Foundational Practices

build community, activate content, reinforce background knowledge, and introduce essential vocabulary

based on Robert Marzano, 2015

Foundational Practice 1

Microstorytelling

Purposes: neural priming, building community, creating a safe space for learning, personalizing content

Tell a story about a powerful personal learning experience.

Tell a story about a time when your life changed for the better.

Tell a story about a time when you built something (concrete or abstract).

Foundational Practice 2

Call and Response

Purposes: fluency, prediction, neural priming, building background knowledge

Foundational Practice 3

Activating Vocabulary

Purposes: textual embodiment, kinesthetic learning, building community, open-ended interpretation, fluency

dream

electricity

pitch-black

hungry

build

magic

Reflection: I/Q

Write insights and questions about one or both of the ideas below.

- meaningful application
- transfer to your classroom

Comprehension

ALIVE Reading

Purposes: experience reading as a social act, visualization of text, fluency, word recognition, building a “story world”

NEWS HEADLINES

1. Malawian boy uses wind to power hope, electrify village
2. Teen’s DIY Energy Hacking Gives African Village New Hope
3. Malawi windmill boy with big fans
4. The Boy Who Harnessed the Wind Teaches Perseverance
5. Boy's dream to build windmill transforms lives in Malawi
6. 'Tilting at windmills: the boy who harnessed the wind'
7. The Power of One
8. A Young Tinkerer Builds a Windmill, Electrifying a Nation
9. School dropout with a streak of genius

Focus Standard

LAFS.3.RI.1.2 Determine the main idea of a text; recount the key details and explain how they support the main idea.

Performance Task: CENTRAL IDEA AND DETAILS

1. Individually, choose the headline you think best represents the “central idea” of William’s story.
2. If you were a reporter writing this story, what key details from his life are most important to include?
3. Meet in pairs and share your story in 2 minutes with another journalist including key details.

Focus Standard

LAFS.3.RI.1.2 Determine the main idea of a text; recount the key details and explain how they support the main idea.

Reflection: I/Q

Write insights and questions about one or both of the ideas below.

- meaningful application
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Chapter 2: Electrifying a Nation

an inquiry-based science experience

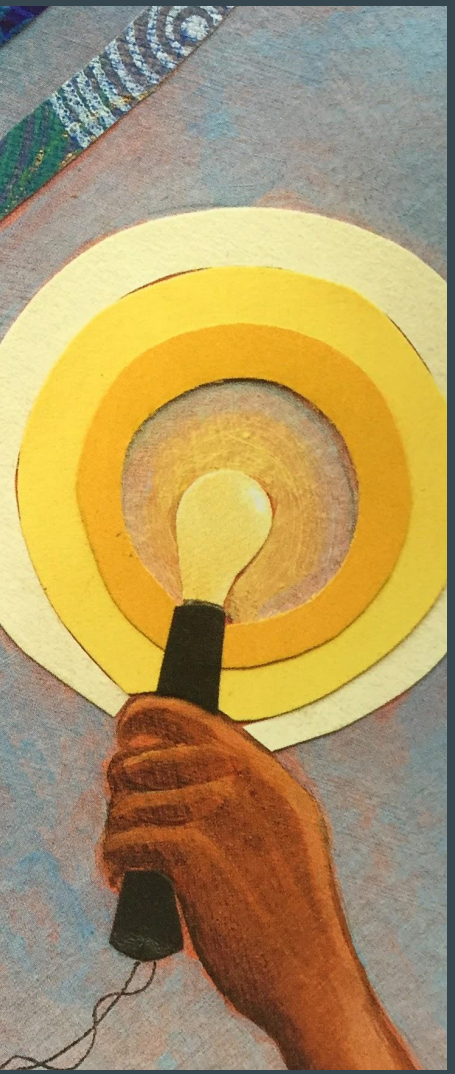
science as inquiry

And of course there's some teacher guidance, but the idea is to have the children think it through.

These children learn not only something about seeds and what makes things grow; but also about how to discover. They're learning the joy of discovery and creation, and that's what carries you on independently, outside the classroom.

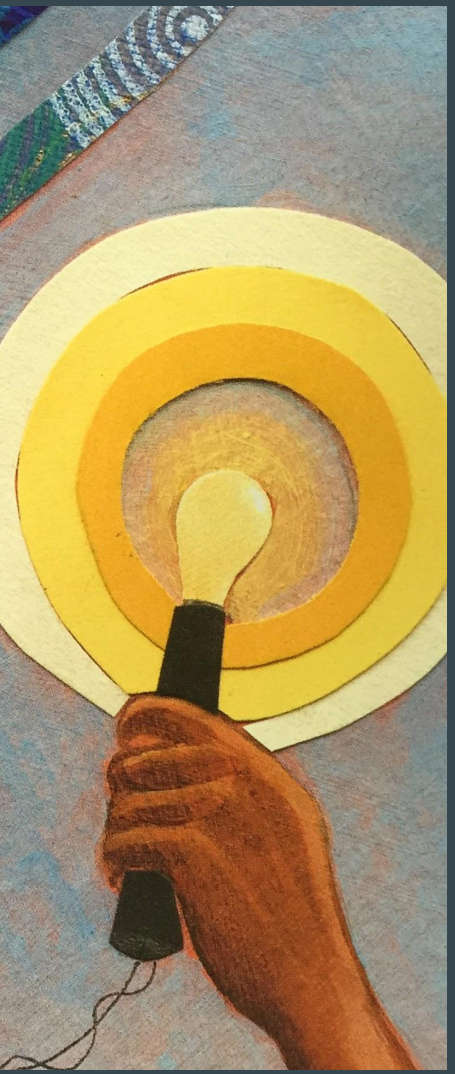
Noam Chomsky

the joy of discovery and creation



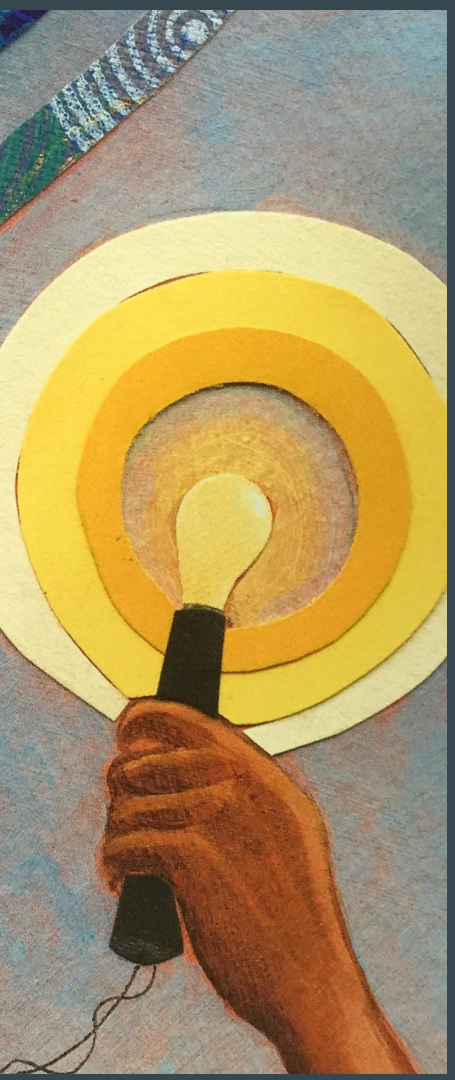
Essential Question

How can energy create change?



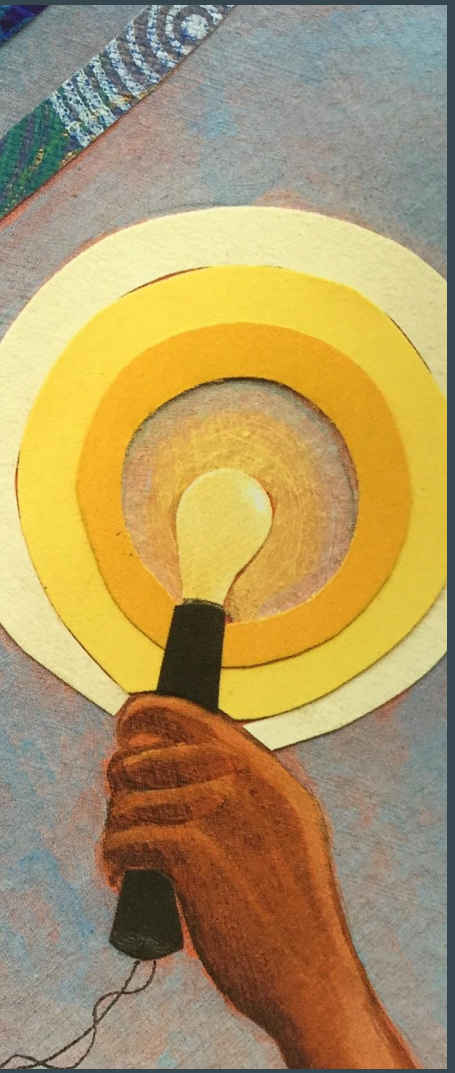
Think-Puzzle-Explore

1. What do you THINK you know about this topic?
2. What questions or PUZZLES do you have?
3. How can you further EXPLORE this topic?



“At the time I had no idea what a windmill was. All I saw were tall white towers with three blades spinning like a giant fan. They looked like the pinwheel toys Geoffrey and I once made as kids when we were bored. We’d find old water bottles people threw away in the trading center, cut the plastic into blades like a fan, then put a nail through the center attached to a stick. When the wind blew, they would spin.”


What the event were in the exprement.
it does what the
the light to
it through.
The evidence is
because it exactly
the guiding question.
When we analyze
analyzed
our data, we assumed
the following guiding

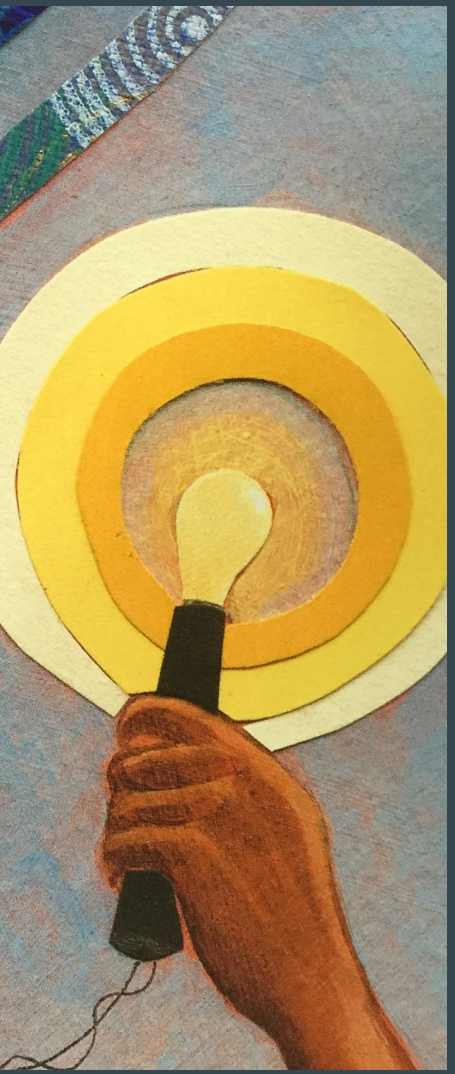


QUESTIONS TO CONSIDER

1. What materials are more effective? Why do you think those materials are more effective?

2. What problems/obstacles did you encounter?

3. What solutions do you propose to solve the problems/obstacles?



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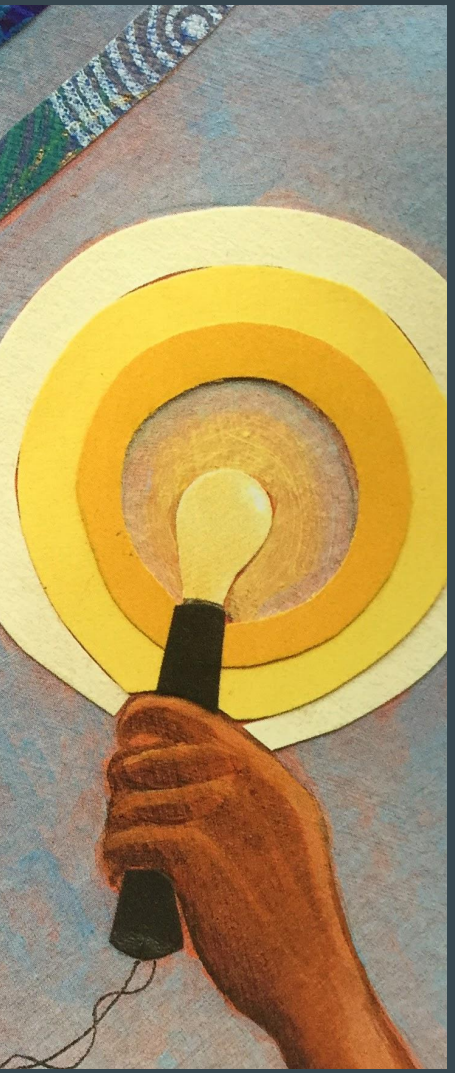
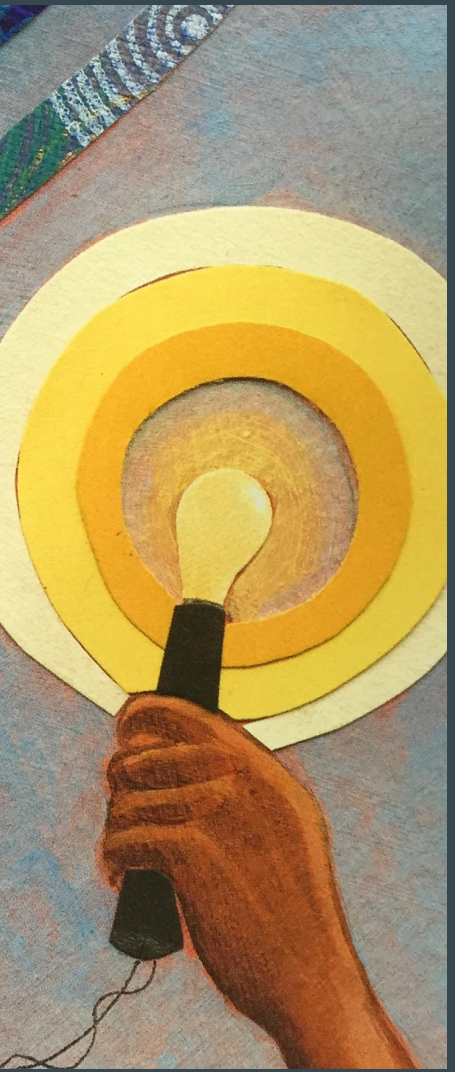


ENERGY: ENGAGE

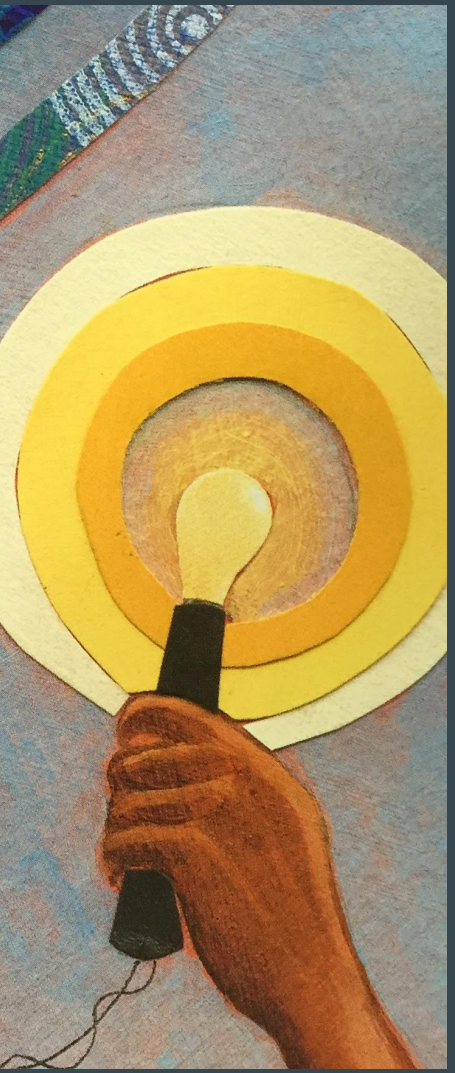
“The wind would spin the blades of the windmill, rotate the magnets in a dynamo, and create electricity.”



ENERGY: EXPLAIN

Working individually, in pairs, or as a table, read the selection from the book.

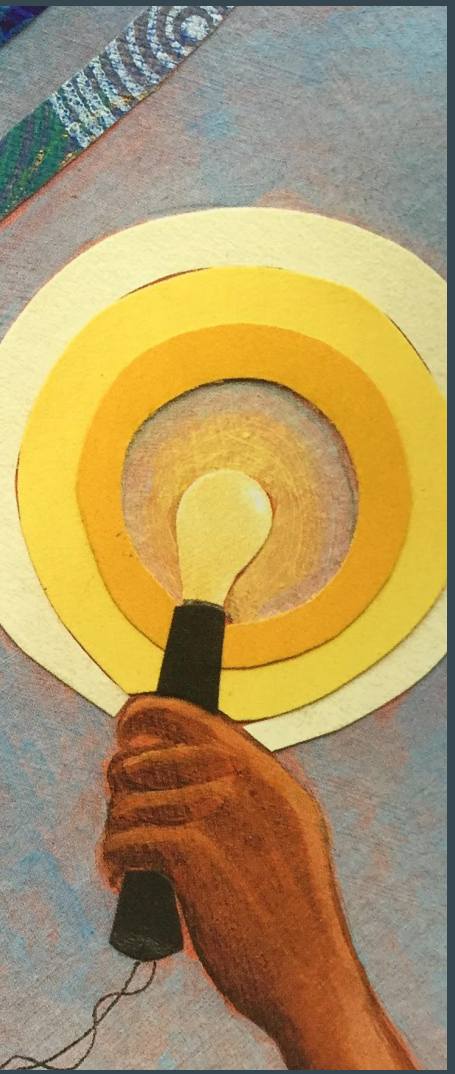
Add to your THINK-PUZZLE-EXPLORE sheet.



ENERGY: ELABORATE

Watch the TED talk “Hack a banana, make a keyboard!”

While you watch continue to THINK, PUZZLE, EXPLORE.



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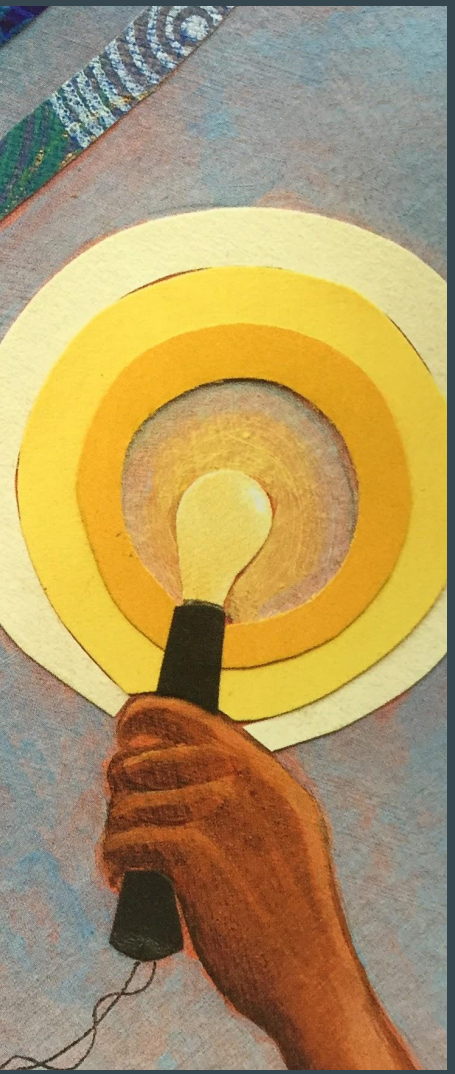
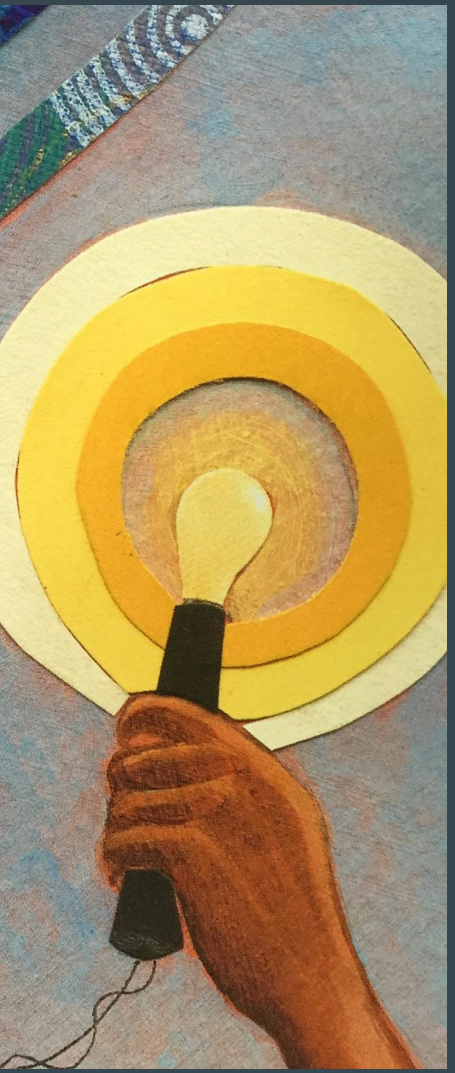


Questions

1. Share your questions around the table.
2. Choose one burning question that your group has about energy.
3. Share out with the rest of the room.

Focus Standard

SC.3.P.10.2 Recognize that energy has the ability to cause motion or create change.



Reflection: I/Q

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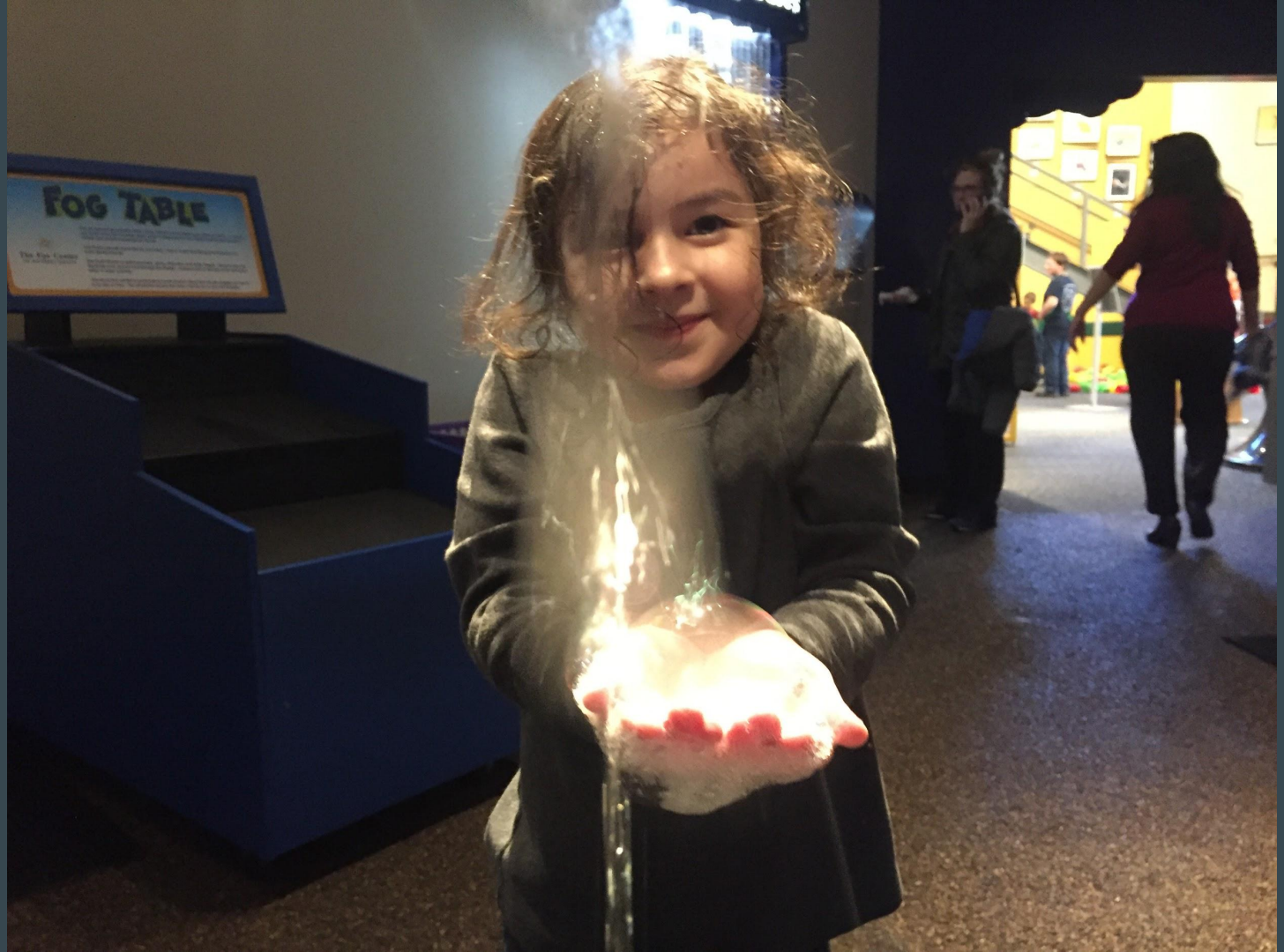
Chapter 3: A Young Tinkerer

STEM in the Classroom

“the hands are the instruments of man’s intelligence”

Maria Montessori


FOG TABLE

“When the young lose the opportunity to represent and to make things with their hands, they lose the opportunity for creativity - for imaginative thought itself.”

Shirley Brice Heath

“to understand is to invent”

Jean Piaget

So many of the designers that we interview don't know how to make stuff.

Jonathan Ive, Apple's head designer

maker


FREE!

“tinkering supports science learning by providing opportunities to deepen engagement, intentionality, innovation, collaboration, and understanding”

KINETIC SCULPTURES

Focus Standard

SC.3.P.10.2 Recognize that energy has the ability to cause motion or create change.

Performance Task: KINETIC SCULPTURES

1. In trios look over the materials and hypothesize around which will work best.
2. Build a KINETIC SCULPTURE with three elements

   a) movement in the wind
   b) solid foundation
   c) aesthetically engaging
3. When you finish complete the Institute of Design reflection sheet.

Focus Standard

SC.3.P.10.2 Recognize that energy has the ability to cause motion or create change.

“My family couldn’t imagine that the little windmill I built during the famine would change their lives in every way, and they saw this as a gift from heaven.”

I Am Poem

1. As a group discuss how the energy your sculpture creates could be used to make your world a better place.
2. As a group, write an “I Am” poem from the perspective of your sculpture.

“If you want to make it, all you have to do is try.”


Regina Davis
Queen Chaos


BLOCK
2X28W T5
BLOCK
2X28W T5

Focus Standards

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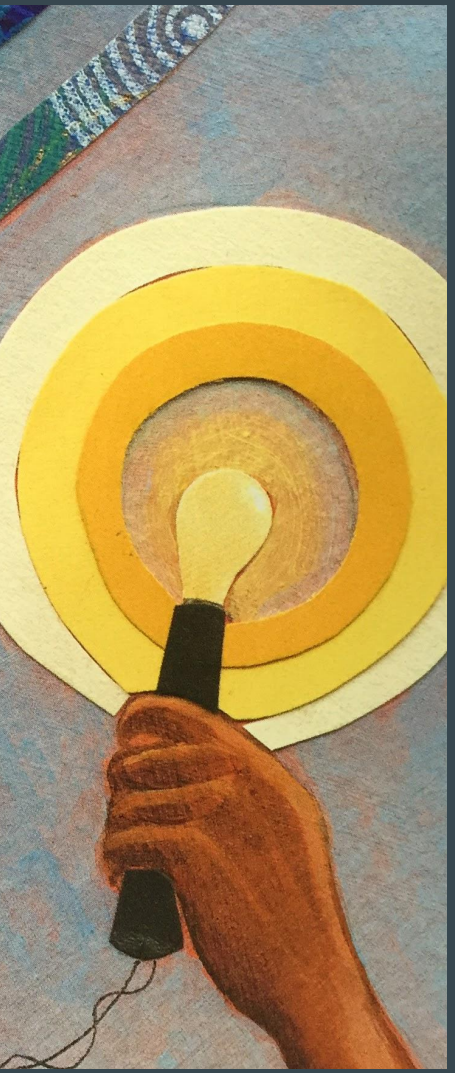

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Thank you for powering UP!