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SC-14: *NGSS* Meets the Outdoors: Teaching Elementary Science Outside

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Colleges of Education, Natural Science, Engineering, and Lyman Briggs
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Introductions/Walking BINGO

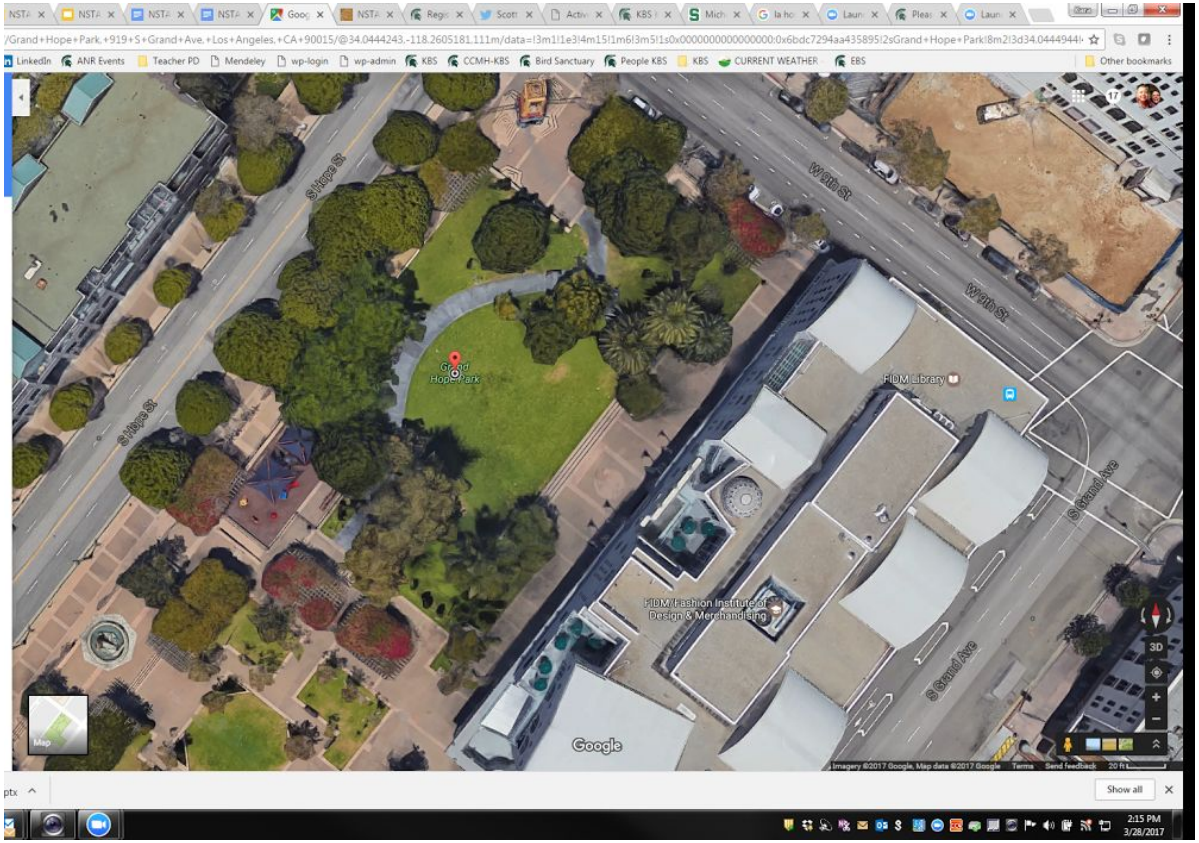
As you walk,

- Find out:
  a. what grade level?
  b. do you teach outdoors?
  c. which state do you teach in?

- Talk about NGSS adoption and how far their school is in process
  a. not adopted
  b. adopted but no curriculum changes yet
  c. adopted/trained, assessments (school, district or state)

Grand Hope Park

- Part of the LA Parks
- 919 S Grand Ave, Los Angeles, CA 90015



Directions to the Park

Pico/Figueroa

Head southeast on W. Pico Blvd toward S. Figueroa St.

Turn Left on S. Figueroa St.

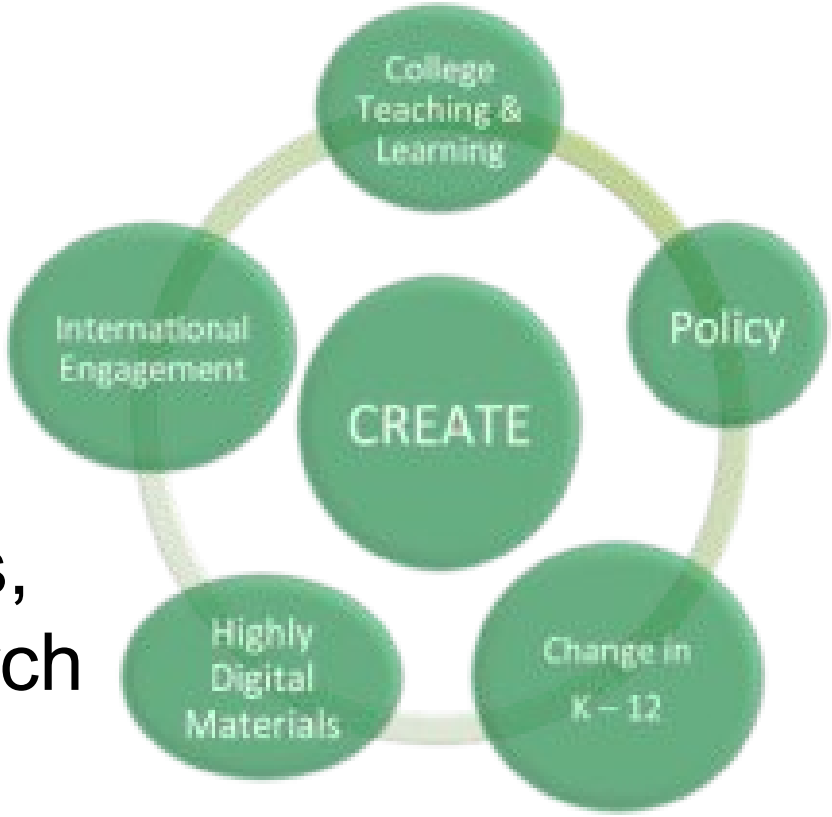
Turn Right onto W. Olympic Blvd.

Turn Left on S. Hope St.

Grand Hope Park, 919 Grand Ave. Los Angeles, CA 90015

CREATE for STEM Institute

- COLLABORATIVE research and innovation projects
- Curriculum, teaching strategies, assessment development
- Partners in K-12 schools, higher education, research institutes, community organizations



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- MSU's largest off-campus research and education complex.
- Over 3200 acres of forest, agricultural fields, wetland, lake and prairie habitat.
  - Kellogg Bird Sanctuary
  - Kellogg Farm and Pasture Dairy
  - Manor House and Conference Center
- 13 faculty research in ecology, evolutionary biology, agriculture and conservation biology

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Teaching Science Outdoors

- A week long professional development program for K-5 Teachers
- Focused on building confidence and creativity with content

What will we do today?

- Participate in activities that can be used in any schoolyard

- Relate to Next Generation Science Standards (NGSS)

- Discuss the framework:
  Hands On, Heads On, Hearts On

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How to tweet observations

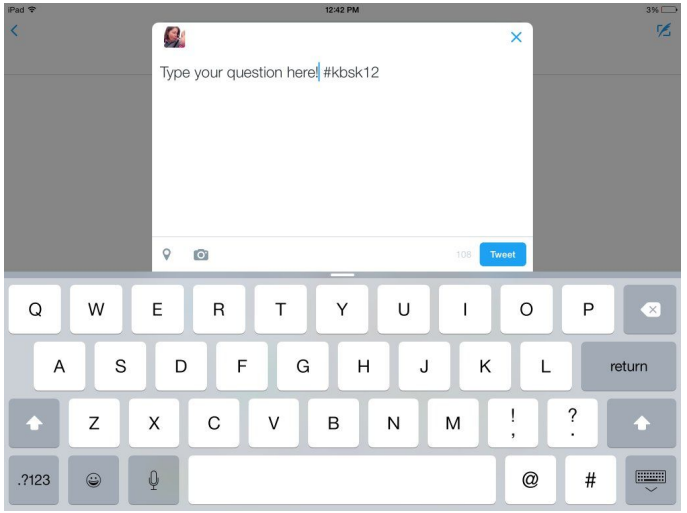
1. Press the 

2. Press the 

3. Take photo of observation!

4. Type question or description

5. @outdoorsteach, #KBSK12



Quiet Observation

Spread out in the park, each person will sit or stand quietly for five minutes.

Use the time to observe the world around you. Allow yourself to be curious and ask questions.

Kara will keep time and call the group back to a central location when it is up. When we gather together we'll share out and write down questions.

Write down your questions

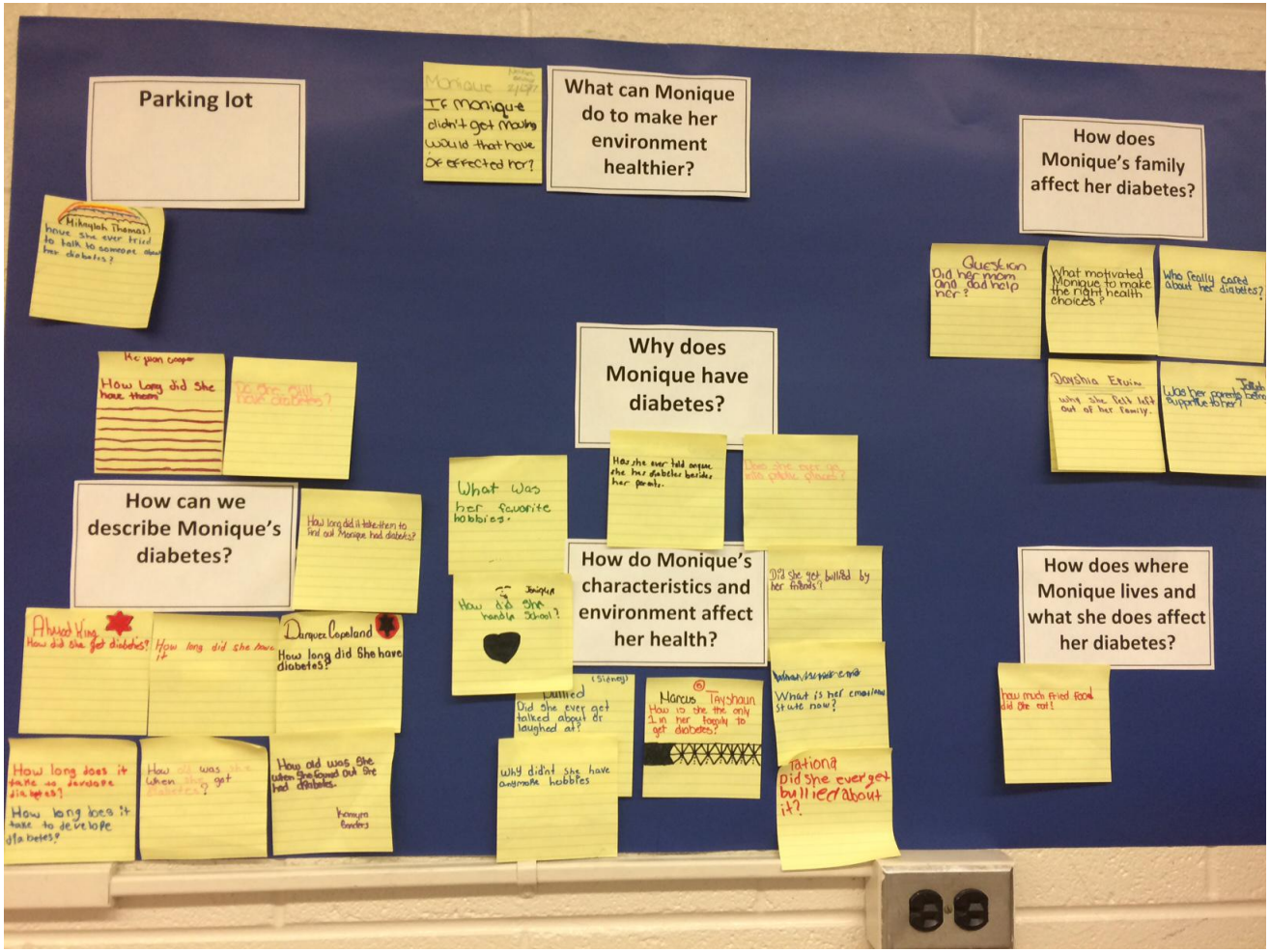
Natural Scavenger Hunt

1. Find evidence of living things in Grand Hope Park.
2. Collect or take pictures of items.
3. Categorize items within your group.
4. Share categories with whole group.
5. Ask questions!

Write down your questions

Driving Question Board

Share, sort and categorize questions.



Create a Biodiversity Map

- Maps are representations of an area as seen from above.
- Draw a quick sketch of our park.
- Don't worry if you map is not to scale and is more conceptual!
- What evidence should we put on the map to answer our Driving Question?

Quiet Observation - Habitat

We need to gather more evidence about the habitats that are in the park. We'll spread out to quietly observe different areas of the park.

What is in your habitat to support what lives there?

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Add observations to Biodiversity Map

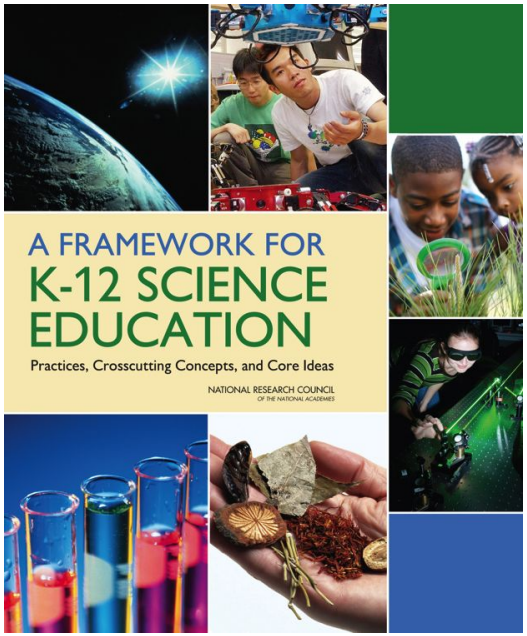
Central Role of Phenomena

- Phenomena spark questions
- A sequence of investigations is required to figure out part of the story
- An investigation often leads to further questions about phenomena, so each lesson builds on the previous one and enhances students' explanations in a stepwise manner
- The focus of 3-dimensional learning

EXAMPLES FROM OUR ACTIVITIES?

What's new in the Next Generation Science Standards and Framework

NEXT GENERATION SCIENCE STANDARDS
For States, By States



1. Focus on explaining phenomena or designing solutions to problems
2. 3-Dimensional Learning
    1. Organized around disciplinary core explanatory ideas
    2. Central role of scientific and engineering practices
    3. Use of crosscutting concepts
3. Instruction builds towards performance expectations
4. Coherence: building and applying ideas across time

Criteria for Phenomenon

The phenomenon…

1. addresses the targeted DCI element
2. is observable to students, either through firsthand experiences or through someone else's experiences (such as a recording or set of measurements).
3. is likely comprehensible to students.
4. is attention-getting and thought-provoking, and requires some explanation so that it is likely to engage **all** students and motivate them to focus on the DCI element.
5. is efficient in that the benefits justify any financial costs and time devoted to using the phenomenon with students.

Why Core Ideas??

- Scientists and experts structure knowledge around conceptual frameworks
  - guide how they solve problems, make observations, and organize and structure new information
- Core ideas provide the anchor to create frameworks for integrating related concepts and principles for meaningful understanding
- Serve as conceptual tools

A core idea in K-12 science…

- Disciplinary significance
  - –Has broad importance across multiple science or engineering disciplines, a key organizing concept of a single discipline
- Explanatory Power
  - –Can be used to explain a host of phenomena
- *Generative*
  - –Provides a key tool for understanding or investigating more complex ideas and solving problems

A core idea in K-12 science…cont.

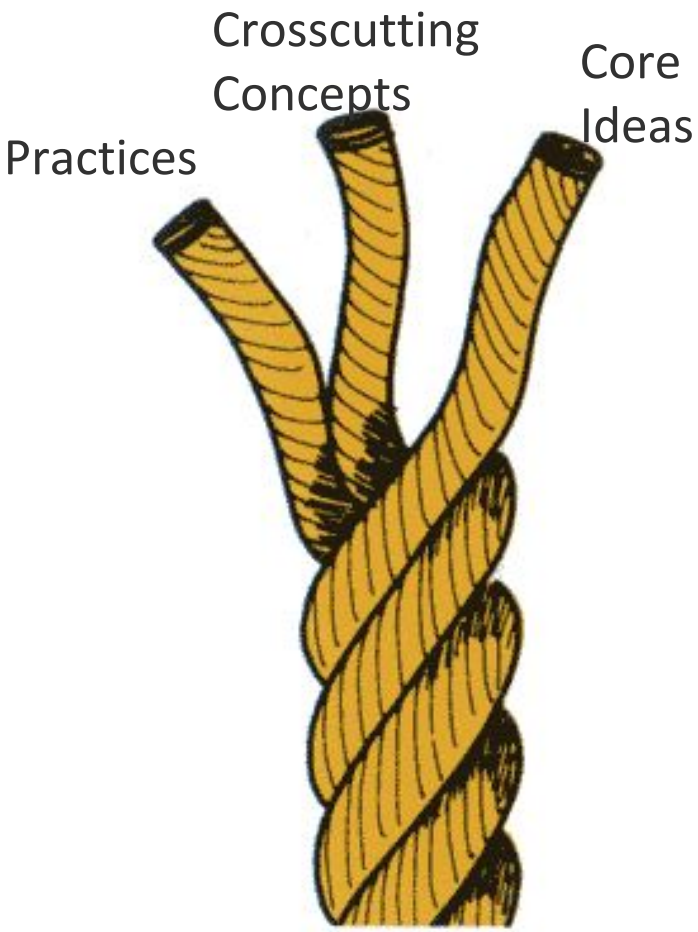
- *Relevant to peoples' lives:*
  - Relates to the interests and life experiences of students, connected to societal or personal concerns
- *Usable from K to 12*
  - Is teachable and learnable over multiple grades at increasing levels of depth and sophistication

What's so special about crosscutting concepts

- Various ways to look at phenomena
- Important ideas related to what science is all about
- Threads the various disciplines together
- Reflect important habits of mind

Content and Practice Work together to Build Understanding

- Scientific ideas are best learned when students engage in practices
- To form useable understanding, knowing and doing cannot be separated, but rather must be learned together
- Allows for problem-solving, decisions making, explaining real-world phenomena, and integrating new ideas



What is different about 3-dimensional learning

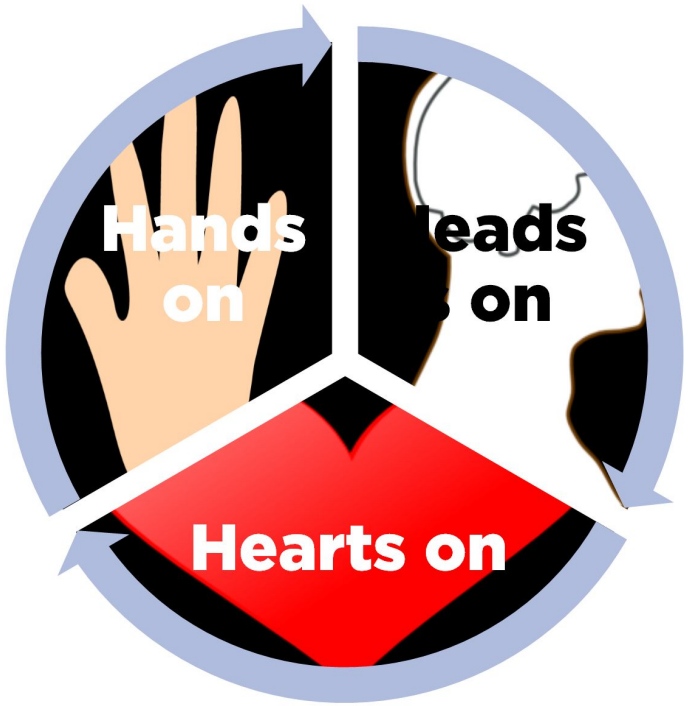
- Focus on making sense of phenomena or designing solutions to problems
- Students don't explore the science idea; rather, they use the science ideas, science and engineering practices and CCCs to make sense of the phenomena or solve problems

Break out into Grade Level Teams

Refer to the Performance Expectations (PEs) for your grade level to talk about how you would use the schoolyard for science.

- What PEs lend themselves to instruction outside?
- What schoolyard improvements could support instruction?
- What might you try out this school year?

Wrap up/reflection



Hands on, Heads on, Hearts on

- How were your hands, head and heart engaged in this activity?
- For your grade level, how do you envision your students' hands, heads and hearts would be engaged?

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Thanks for coming!

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