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Agenda

- Introductions
- Our Learning Goals
- What do you know about STEM?
- Can a STEM mindset support ELLs?
- How is STEM learning meaningful for ELLs?
- Using Our Best STEM strategies in action
- Thoughts and Reflections

Our Learning Goals

- Can a STEM mindset support ELLs?
- How does STEM foster multiple approaches to learning for ELLs?

What do you know about STEM?

How Do You Define STEM?

Take a few minutes to consider your definition of STEM.

Write it down ...

How we define STEM

STEM education is an approach or mindset which removes traditional barriers separating the four disciplines of science, technology, engineering, and mathematics, and integrates them into real world, rigorous and relevant learning experiences for ALL students.

STEM Experiences Should …

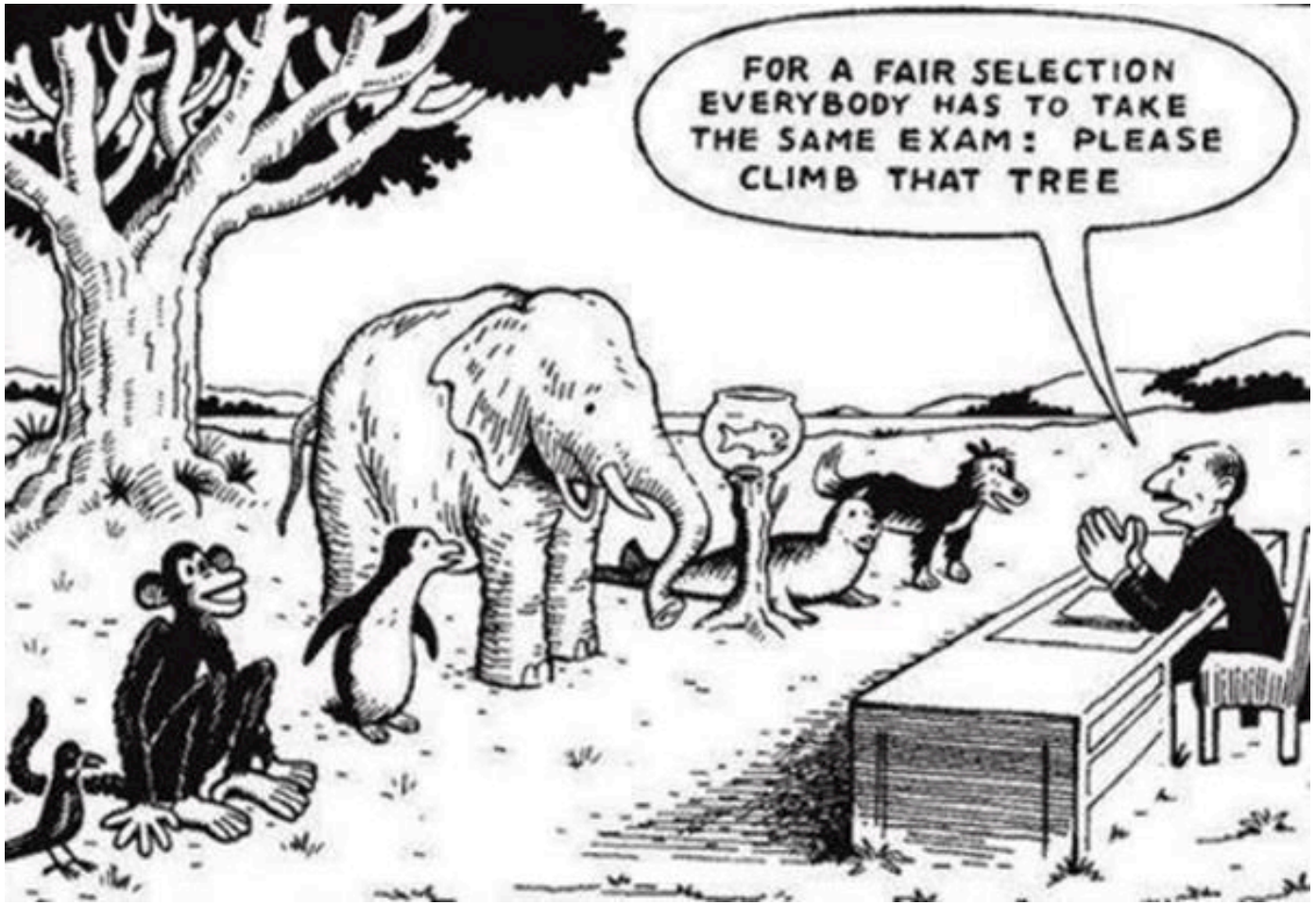
- Build Children's Experiences
- Be Hands-on
- Use authentic materials
- Provide *repeated experiences over time*
- Expose students to rich, academic vocabulary
- Promote collaboration
- Provide opportunities for oral language practice

Can a STEM mindset support ELLs?

Teachers Become Researchers

- Become keen observers
- Build understanding through experiences
- Retell their stories
- STEM supports Best Practices for ELLs

Meets the Needs of Each Child



How is STEM learning meaningful for ELLs? Our Best Practices ...

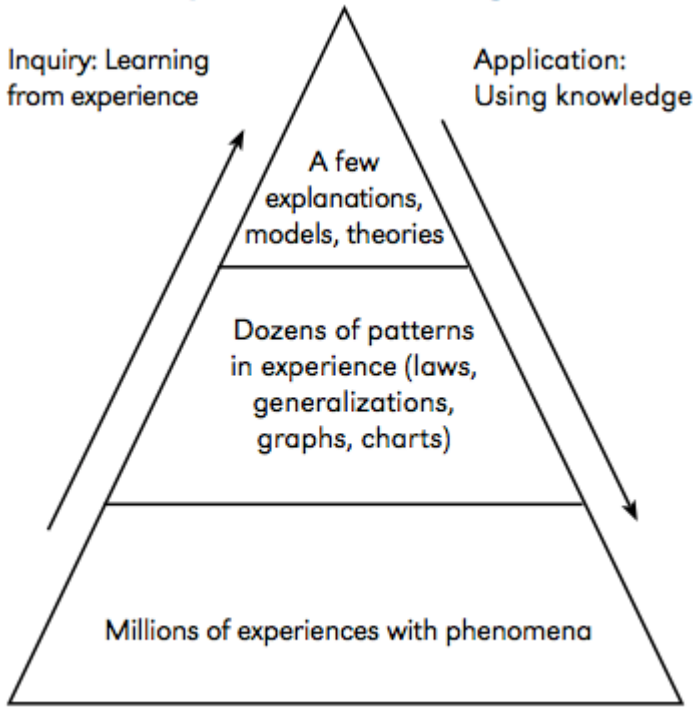
Think Outside the “Box”

First, Think About Your Thinking

What do you **KNOW**?

- What **experiences** have you had with the phenomena?
- What **patterns** have you noticed?
- What **explanations** do you have?

What do you need?

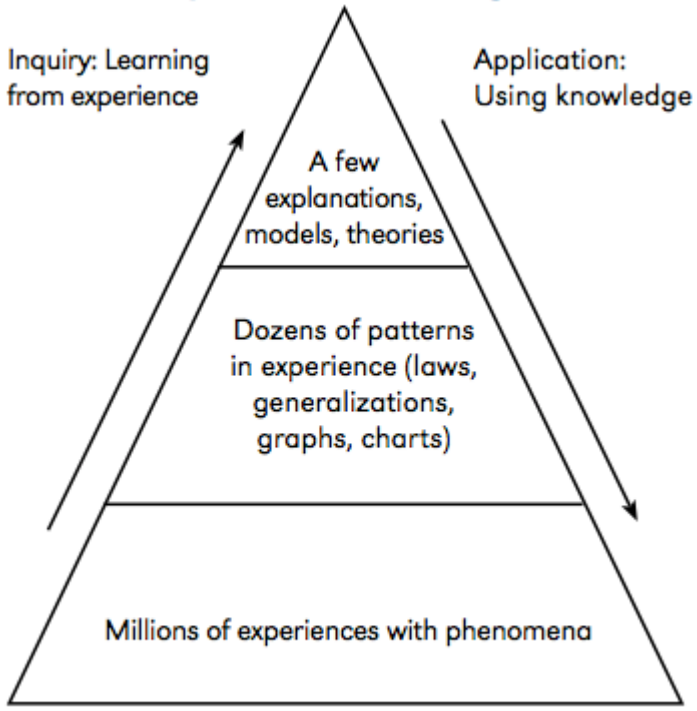


(ANDERSON 2003; SHARMA AND ANDERSON 2009)

Then, Think About Their Thinking

What do they **KNOW**?

- What **experiences** have they had with the phenomena?
- What **patterns** have they noticed?
- What **explanations** do they have?



(ANDERSON 2003; SHARMA AND ANDERSON 2009)

Craft Meaningful Studies

What will the children be **LEARNING?**

- STEM Lesson Development
  - 5Es
  - Learning Standards
  - EPE - Experiences, Patterns, Explanation

What is your **EVIDENCE?**

- STEM Study Tools
  - KLEW
  - CER - Claims, Evidence, Reasoning
- STEM Study Approaches
  - PBLs
  - Design Challenges

What are you still **WONDERING?**

Celebrate Children's Learning

- Make Learning Visible
  - Bulletin Boards
  - Documentation Panels
- Maker Faire
- Science Fair
- Show Case
- Communicate and Share

Our STEM strategies in action

Engage

Last week, the Schwinn Bicycle Company contacted you. They need your help to design the bicycle of the future.

On-Road Bicycle

Off-Road Bicycle

Engage – Background Knowledge

What the Teacher Does

- Creates interest
- Generates curiosity
- Raises questions
- Uncovers what students know or think about the concept/topic

What the Student Does

- Asks questions
- Shows interest

Explore – Build Experiences

Bring in a real bicycle and/or bicycle parts for the students to explore ...

Explore – Build Experiences

What the Teacher Does

- Encourages students to work together
- Observes and listens to interactions
- Asks probing questions to redirect the investigation when necessary
- Provides time for students to puzzle through problems

What the Student Does

- Thinks freely but within the limits of the activity
- Tests predictions and hypothesis
- Forms new predictions and hypotheses
- Tries alternatives and discusses them
- Records observations and ideas

Explain – Make Connections

- Make a Model of a Bicycle
- Have Learning Groups Meetings
  - Use Mini-lessons
  - Develop Vocabulary
- Have Whole Group Science Talks
  - Bring Your Science Journals

Explain – Make Connections

What the Teacher Does

- Encourage students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

What the Student Does

- Explains possible solutions or answers to others
- Listens critically to one another's explanations
- Questions on another's explanations
- Listens to and tries to comprehend explanations
- Refers to previous activities
- Uses recorded observation in explanations

Elaborate - Challenge Understanding

- Engage in Socratic Dialogue
- Share Experiences
- Celebrate Learning!

Elaborate - Challenge Understanding

What the Teacher Does

- Expects students to use formal labels, definitions, and explanations Encourages students to apply or extend the concepts and skills
- Remind students of alternative explanations
- Refer students to existing data and evidence

What the Student Does

- Apply new labels, definitions, explanations, and skills
- Use previous information to ask questions, propose solutions, make decisions, design experiments
- Draws reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

Evaluate Growth

What the Teacher Does

- Observes students as they apply new concepts and skills
- Accesses students' knowledge and/or skills
- Looks for evidence students have changed their thinking or behaviors
- Allows students to access their own learning
- Asks questions like … Why do you think...? What evidence do you have? What do you know about it? How would you explain it?

What the Student Does

- Answers open-ended questions using observations, evidence, and previously accepted explanations
- Demonstrates understanding or knowledge of the concept or skill
- Evaluates his/her own progress and knowledge
- Asks related questions that encourage future investigations

Thoughts and Reflections

Meeting Our Learning Goals

- Can a STEM mindset support ELLs?
- How does STEM foster multiple approaches to learning for ELLs?

Thank You!!!