

The Language of STEM Questions that Support Children's Cognitive Development

Presented by:

Sandra Ampudia

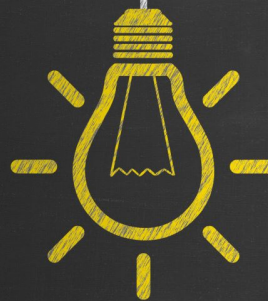
David Scahill



1

Agenda

- Cognitive Development & STEM
- Why Questions help
- The Art of Questioning
- Key Ideas to Enhance Questioning



2

What is in it for me?



WHAT ARE YOUR
EXPECTATIONS FOR THIS
SESSION?



WHAT WOULD YOU LIKE TO
GET OUT OF THIS TIME
TOGETHER?

3

Cognitive Development in Young Children

"They use chemistry, physics, and math to figure out the best way to create new things or to improve a product"

Is this a description of a child's day of an engineer's job?

4







Reasoning & Problem Solving

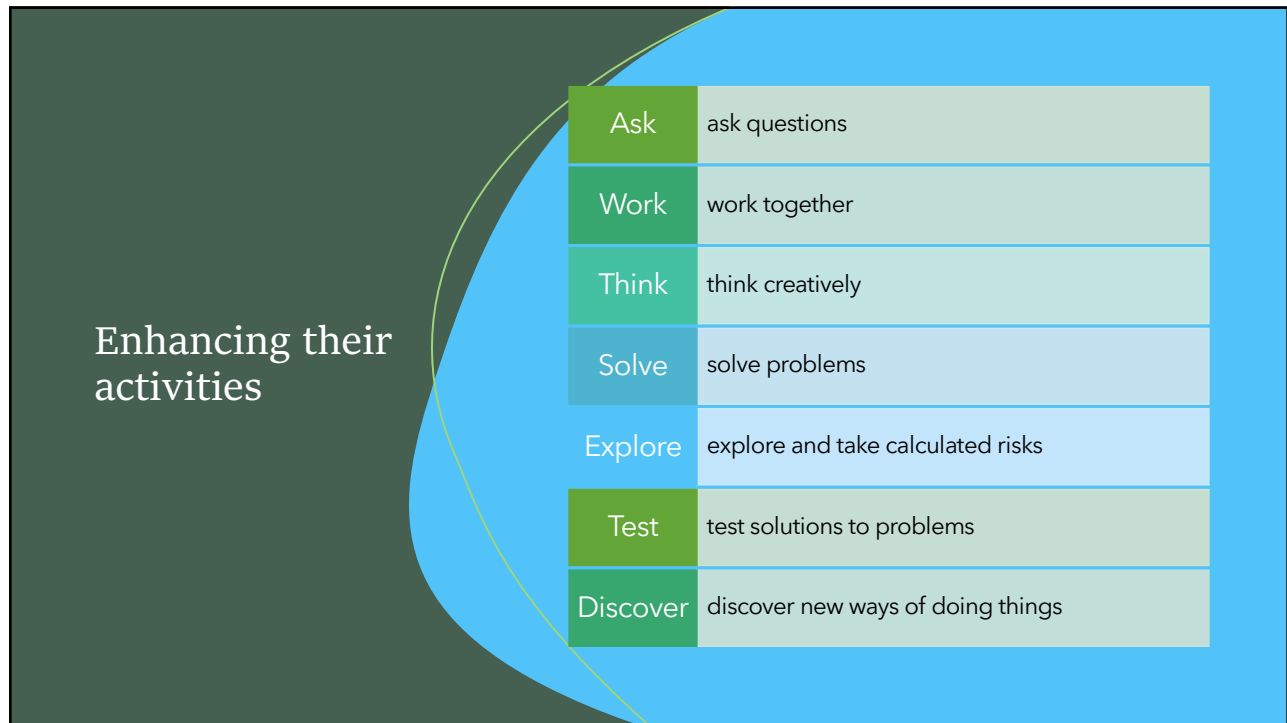
- Approaches that offer opportunities for children to
 - Use their minds and hands to
 - Play
 - Explore
 - Learn

5

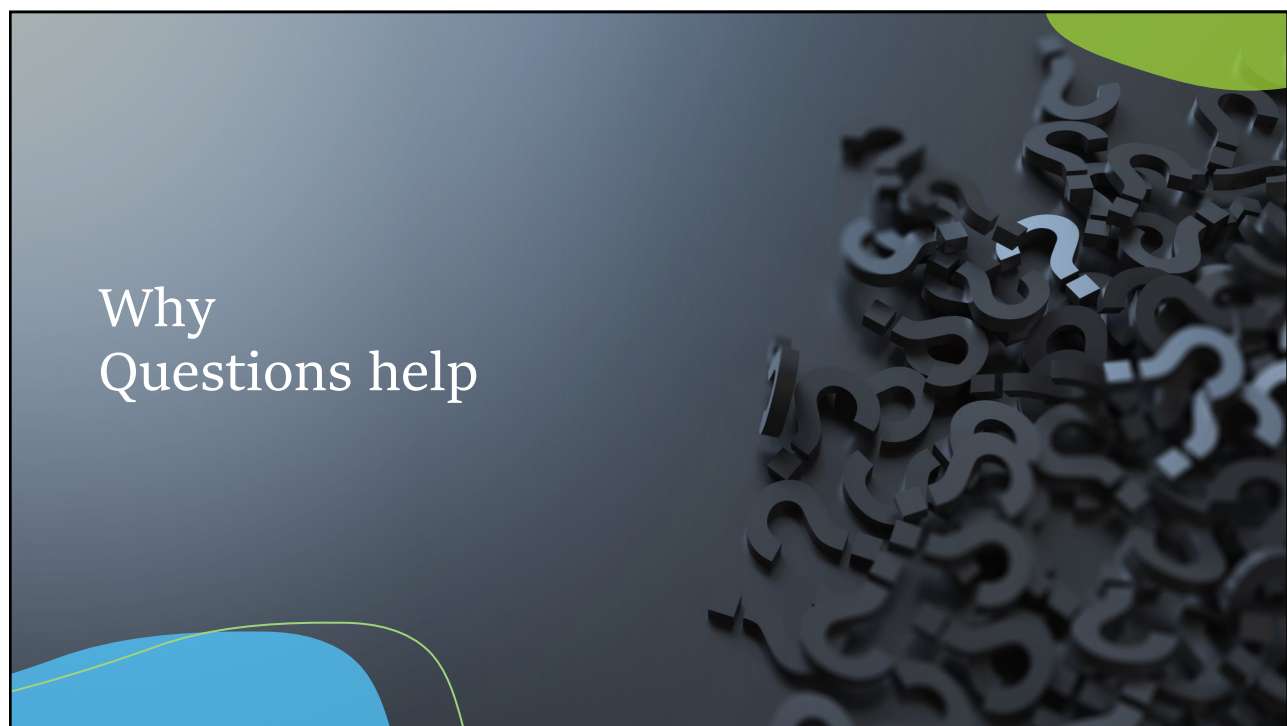
Looking at a children's day

	<p>Science: search, select, sense, solve, shift, show</p>		<p>Technology: talk, target, test, think, touch, turn,</p>
	<p>Engineering: explore, extend, experiment, embed, elaborate, engage</p>		<p>Math: make, manage, manipulate, match, measure, mix, move</p>

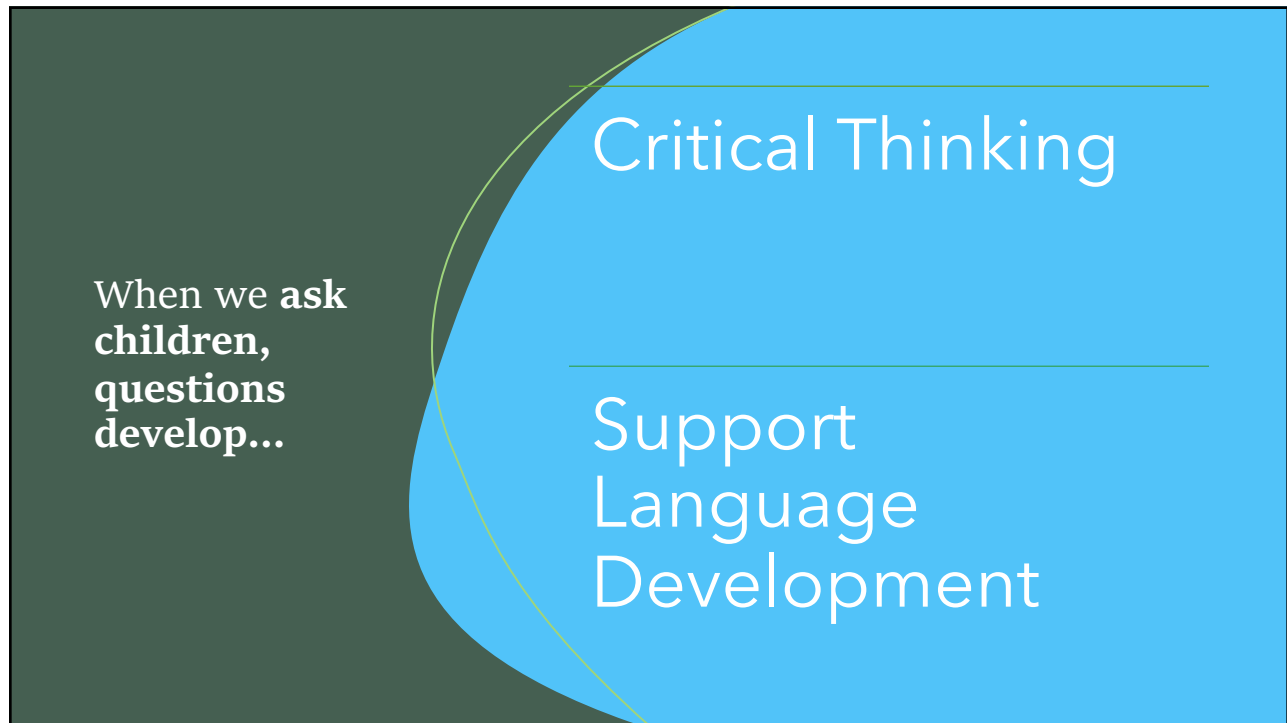
6



7



8

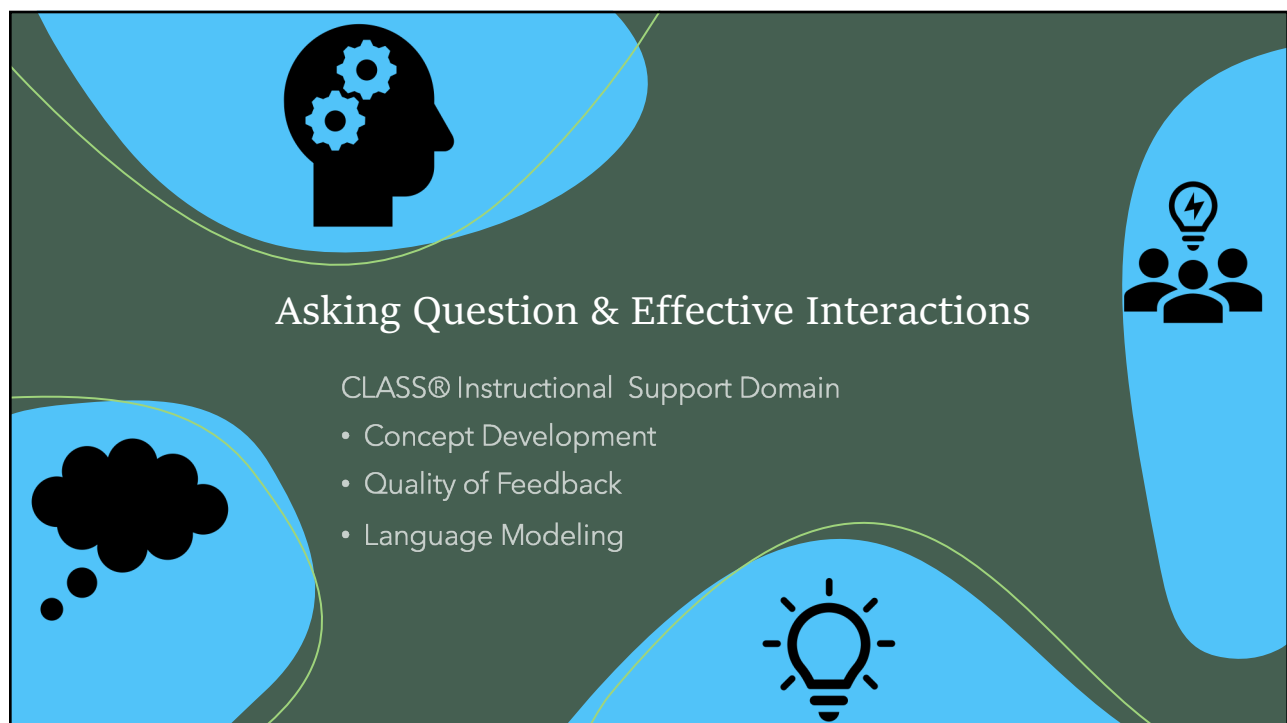


When we ask children, questions develop...

Critical Thinking

Support Language Development

9



Asking Question & Effective Interactions

CLASS® Instructional Support Domain


- Concept Development
- Quality of Feedback
- Language Modeling

10




11


Prior Knowledge
What are you asking ?




REGULAR
QUESTIONS



CONVERSATIONAL
QUESTIONS



OPEN-ENDED
QUESTIONS



FACILITATION
QUESTION

12



Let's practice
Activity : Mixing colors

What could you ask?

13



From the Basics to the Higher levels

Mixing Colors Activity

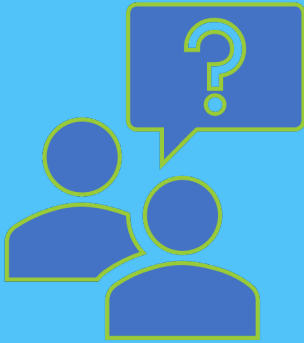
- What color is that?
- Why did you choose?
- What just happened?
- Can you make it again?
- Is there another way to mix colors?
- What do you think will happen if...

Vocabulary?

Mix, mixture, textures, shiny, melt, solid,

14

Understanding Different Types of Questions



ALL questions have value

Remember Q's

Children need to remember information before they can understand it
Is the foundation to answer more complex questions
Has mostly one-word answers

Create Q's

Invites use of the imagination and answers that are complex and unique to each child

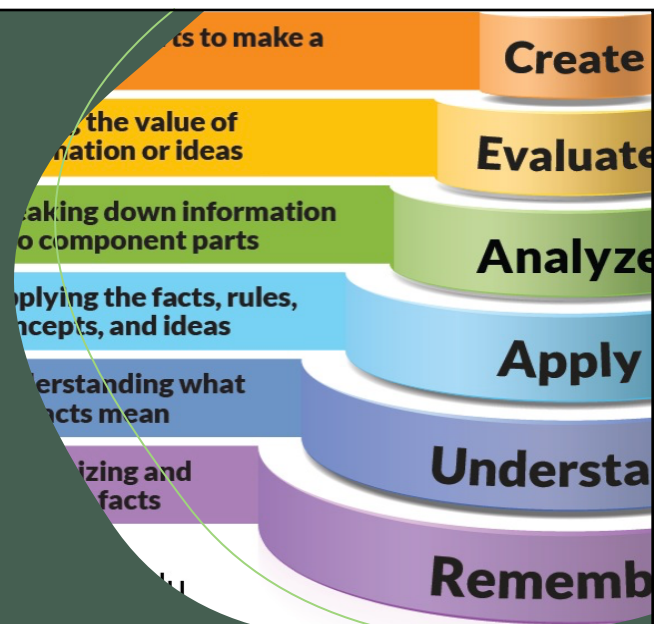
15

Making Connections

Bloom's Taxonomy

The classification system used to define and distinguish different levels of human cognition

Teachers tool to measure and organize what they're teaching.



16



NAEYC Adaptation

Remember
identify, name, count, repeat, recall

Understand
describe, discuss, explain, summarize

Apply
explain why, dramatize, identify with/relate to

Analyze
recognize change, experiment, infer, compare, contrast

Evaluate
express opinion, judge, defend/criticize

Create
make, construct, design, author

Excerpt From: "Big Questions for Young Minds: Extending Children's Thinking."

17



Be Intentional, Be Smart, Keep a target in mind!

© Mark Smicklas, Digital Strategist, IntersectionConsulting.com
 "Bar Graph" icon by Scott Lewis, from the NounProject.com collection
 "Calendar", "People" and "Target" icons from the NounProject.com collection

18



Key Ideas to Enhance Questioning

- Wait Time
- Active Listening
- Demonstrate interest
- Make a Comments
- Ask more

19



Wait Time

Allow time for children to process what you are saying, think about it, and answer

Pause, give them a few seconds to respond

20

Active Listening

- Eye contact
- Verbal affirmations
- Non-verbal interest
- Summarize

"Alternating asking questions with listening attentively will help you determine the appropriate time to ask a thoughtful question"

-Nurturing Creativity: An Essential Mindset for Young Children's Learning-



21

Demonstrate interest



Make an observational statement about a child's work before you ask a question



Acknowledge what the child has already worked on and encourage them to extend their thinking



Openness to possibilities vs. right answer

22



Let's Practice

Sink & Float Activity

What would you ask?

Questions:

Words you could use?

Vocabulary:

23

From the Basics to Higher levels

Questions:

- I wonder...
- What's your prediction? What do you know about...?
- Tell me about what you observed
- What do you notice?

Vocabulary:

Discover, observe, predict, sink, solid, liquid, weight

24

Keep Practicing !!

Sink & Float

Extended Activity

Add a "T" graphic organizer on a chart paper (Sink & Float)

Questions:

What is your prediction?

What do you think is causing...What might you try instead?

In what ways are they the same/different?

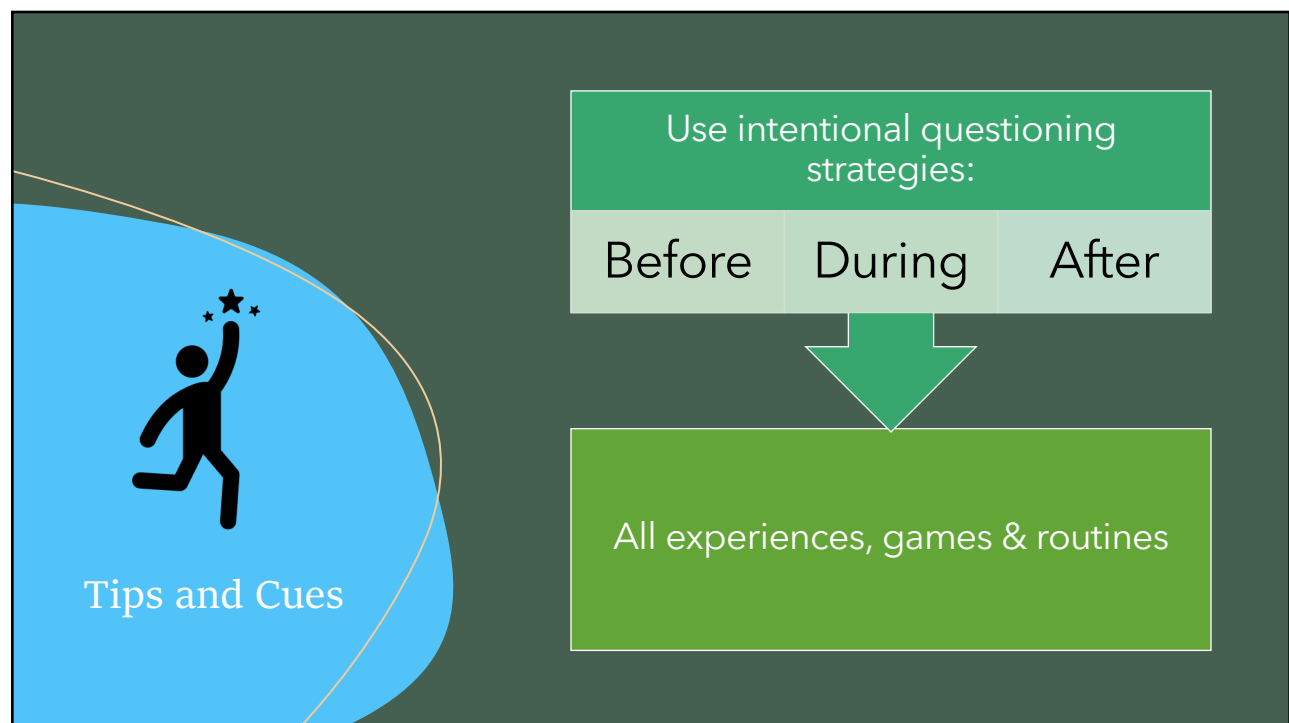
Will the same thing happen every time ?

Vocabulary:

Record, similar, sink, characteristics predictions, materials, cause



25



26

Key Points to consider:

- Listen to children's conversations
- Make a list of new questions, "sentences starts"
- Create a list of vocabulary for the activity
- Use visual cues



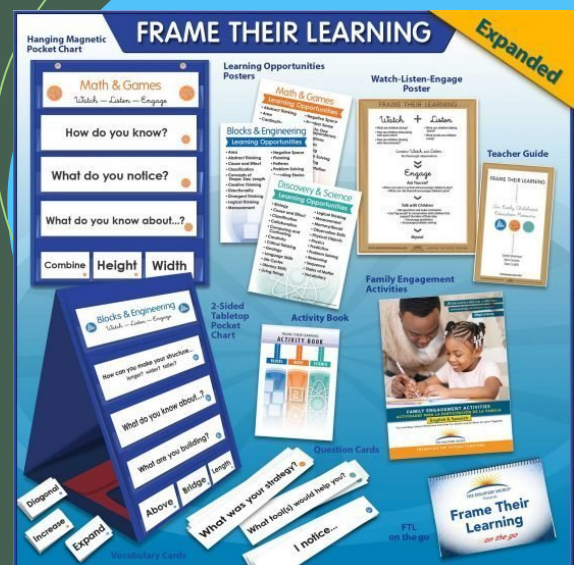
27



Resources and Materials

This kit includes :

- visual supports for teachers to see and use questions and words
- Cues to practice advanced language (math, science, engineering)
- Ideas to keep interactions and engaging children in conversations and learning.



28



Keep in mind:

Children are natural scientists; we just need to “Frame Their Learning”



29



The Discovery Source

www.thediscoverysource.com

Creates innovative, effective, and affordable solutions to meet the unique opportunities and challenges that come with nurturing the social emotional and cognitive development of young learners.



30

Questions & Comments

31

Thank you !!

Dave Scahill - President
ds@thediscoverysource.com
Davejscahill@gmail.com
760-212-3358

Sandy Ampudia - Presenter
sabiamoran@gmail.com
786-355-5881



Inventive Solutions for Education

32

References

- J. Strasser, L. Mufson Bresson. National Association for the Education of Young Children Washington, DC. Big Questions for Young Minds: Extending Children's Thinking.
<https://www.naeyc.org/resources/pubs/tyc/>
- The Discovery Source
<https://thediscoverysource.com>
- Teachstone
<https://info.teachstone.com/blog/tips-for-instructional-support>