



Versatile Lessons for Versatile Classrooms™

# Bridging Skills and Content:

Connect the Practices and Recurring Themes and Concepts with Discourse

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University of Texas at San Antonio



## Booth 214

Thursday, November 9, 11 a.m. – 5 p.m.  
Friday, November 10, 9 a.m. – 5 p.m.  
Saturday, November 11, 8 a.m. – 12 p.m.

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## Booth 214

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# Workshops

## The Multilingual Scientist: Nurturing Inquiry and Language Development With ELPS in Diverse Classrooms

Thursday, 11/9 | 11:30 am - 12:30 pm | Room 332CF

 Angie Maxey | Unlock the potential of emergent bilingual students as multilingual scientists through immersive strategies aligned with ELPS that promote inquiry-based learning and language growth.

## Bridging Skills and Content: Connect the Practices and Recurring Themes and Concepts With Discourse

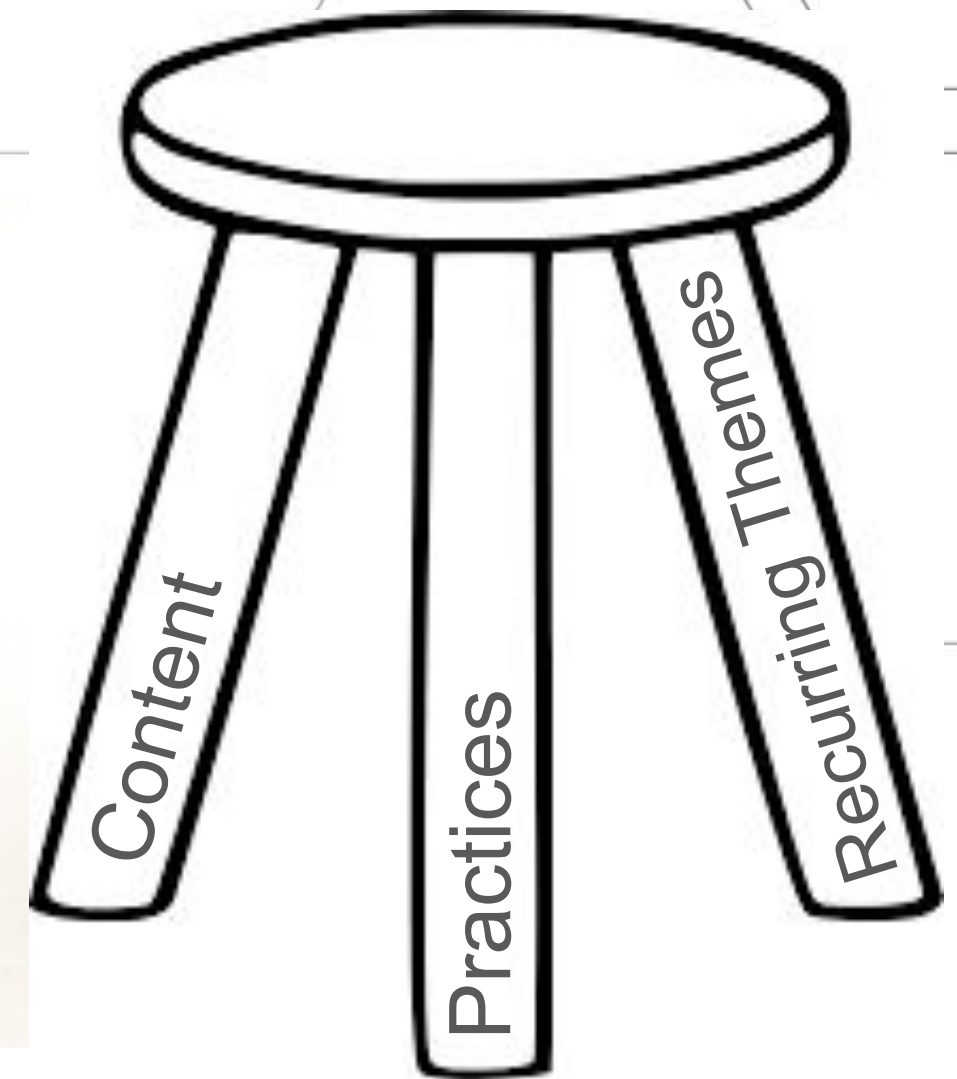
Friday, 11/10 | 2:00 pm - 3:00 pm | Room 372BE

 Elizabeth "Liz" McMillan | Explore how to guide students through active connections of science concepts with Scientific and Engineering Practices and Recurring Themes & Concepts. Join us for a research-based, collaborative workshop to authentically proceed through a 3D lesson, complete with active learning and teacher actions for enhanced classroom discussions.



# Phenomena, Inquiry, & Investigations

3-Dimensional Science Instruction





Versatile Lessons for Versatile Classrooms™

# TREK Framework & Segments

**Recall**

Review Prior Knowledge

**Practice A**

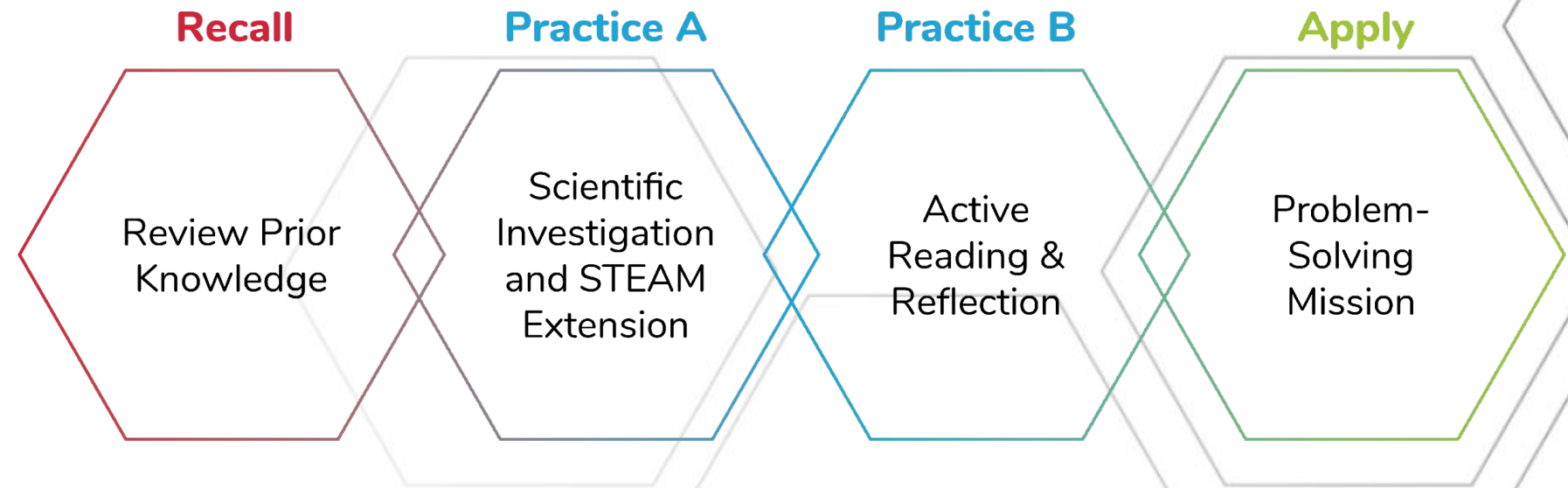
Scientific Investigation and STEAM Extension

**Practice B**

Active Reading & Reflection

**Apply**

Problem-Solving Mission



## Recall

Review  
Prior Knowledge

- ✓ Activates schema
- ✓ Reviews previous vocabulary in context
- ✓ Connects self to content

# TREK Goals

## 5.12A: Interdependence

Observe and describe how a variety of organisms survive by interacting with biotic and abiotic factors in a healthy ecosystem.

Recall

Review:  
What Do Living  
Things Need?

I can identify  
the basic needs of  
living organisms.



# What Is Happening?

**Instructions:** Describe what you think is happening in this picture. What do you see? What does it make you think of? What does this make you wonder?

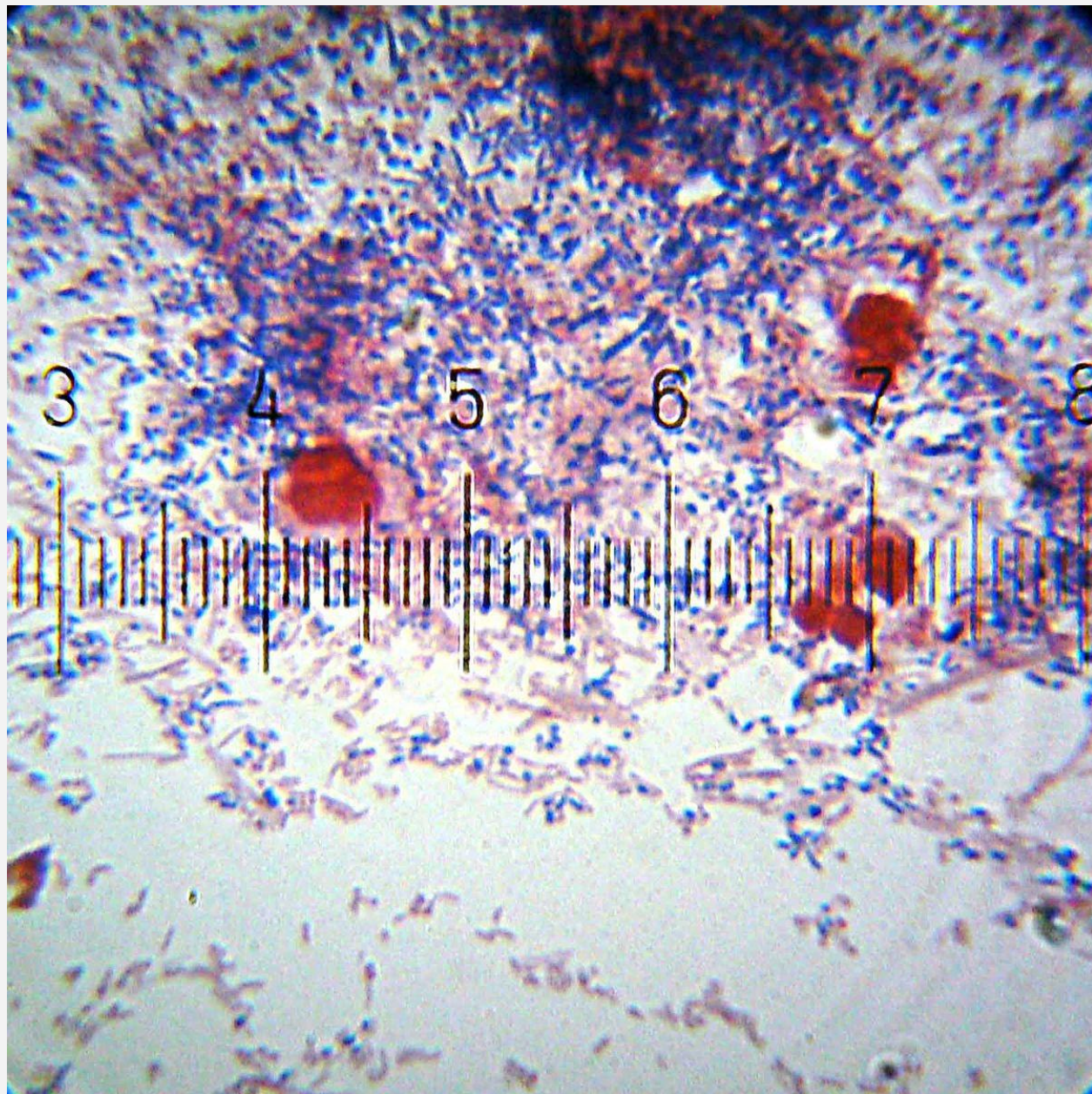
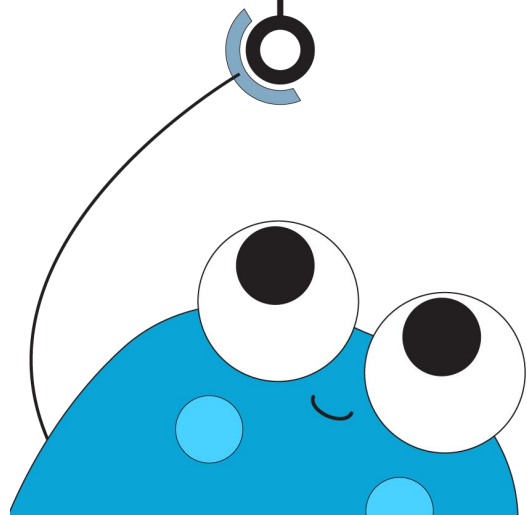


Image Credit: Wikimedia Commons / [Bob Blaylock](#)





# What Is Happening?

## Gunk on your teeth!

This is a microscopic image of *dental plaque*, or the yellow film that builds up on your teeth. It is made up of tiny bacteria that rely on you, another living thing.

For these bacteria, you are a prime place to live! You provide water, food, and shelter to survive and reproduce.

However, these bacteria can damage your teeth. Brushing and flossing keeps bacteria populations low. This is why brushing your teeth and tongue twice a day helps reduce damage over your lifetime.

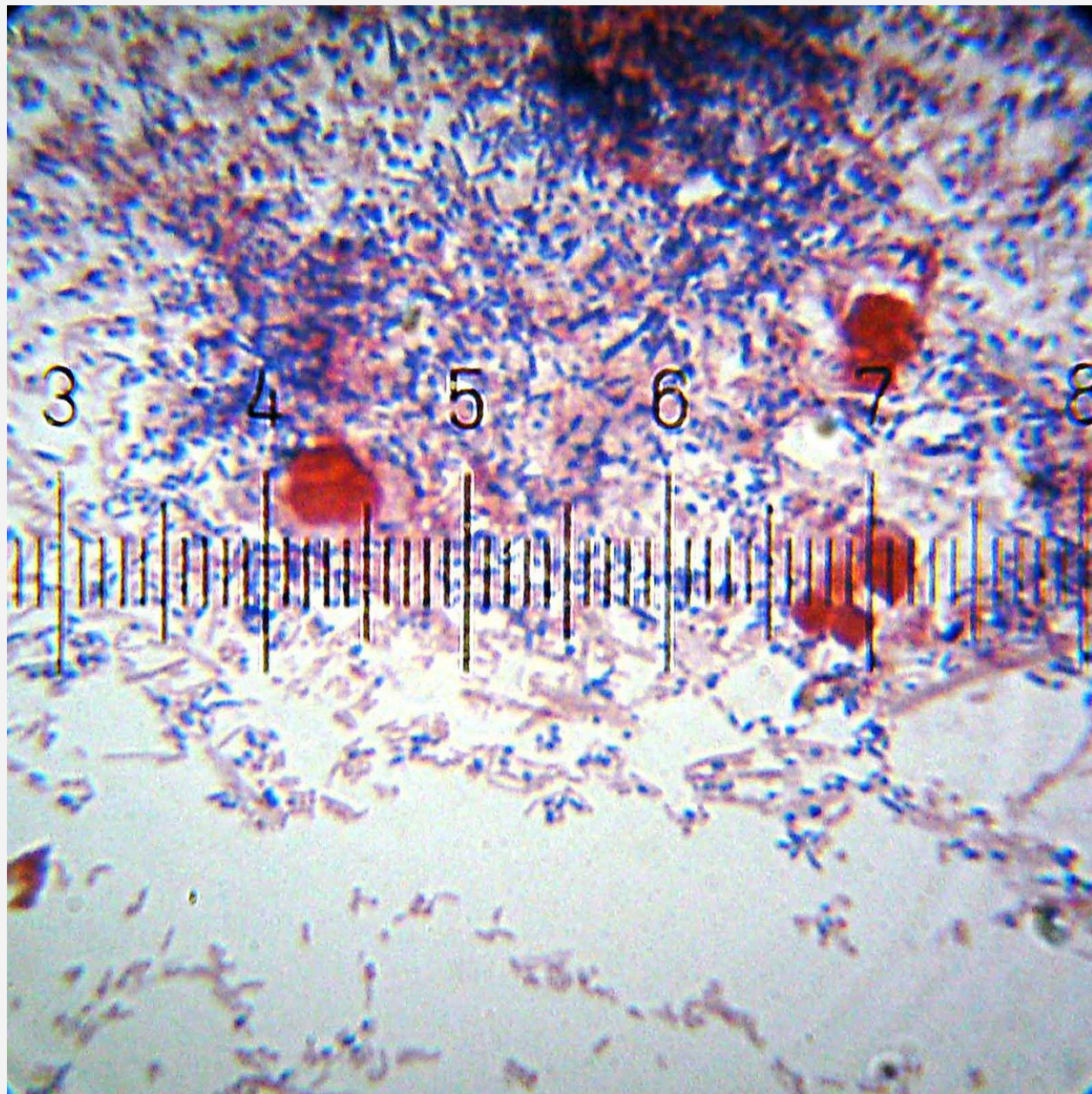
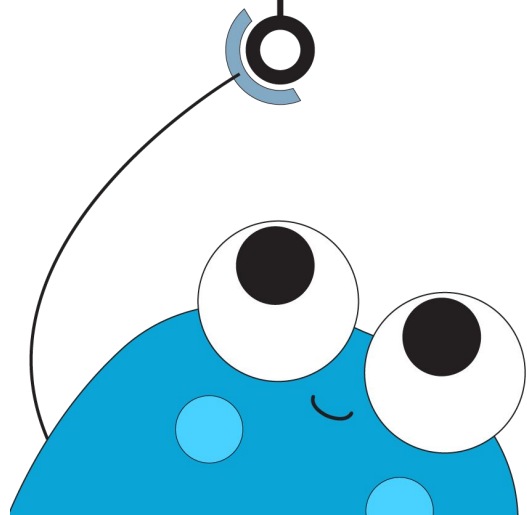
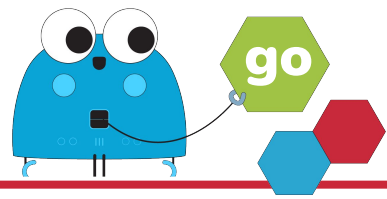


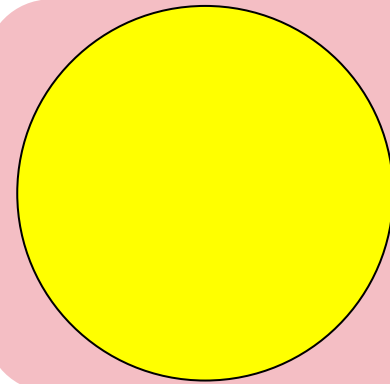
Image Credit: Wikimedia Commons / [Bob Blaylock](#)



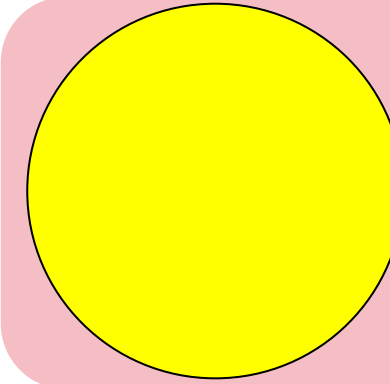
# Vocabulary Check



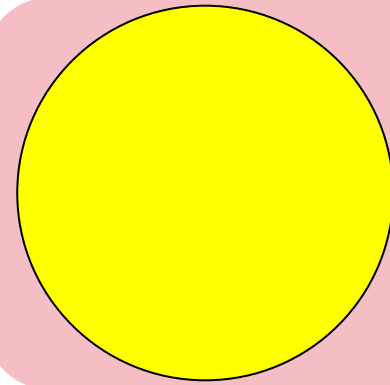
**Instructions:** Move each **BASIC NEED COMPONENT** circle to where it matches its definition.



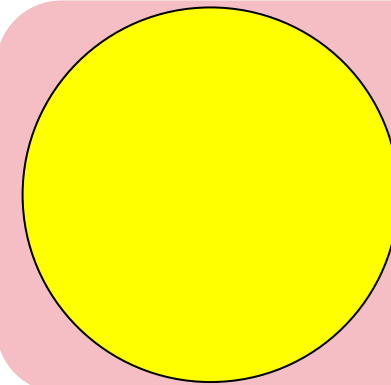
1. The material that people and animals eat that give them energy to grow, repair, and do things.



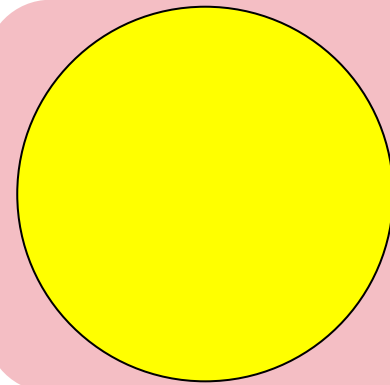
4. Something that covers or protects.



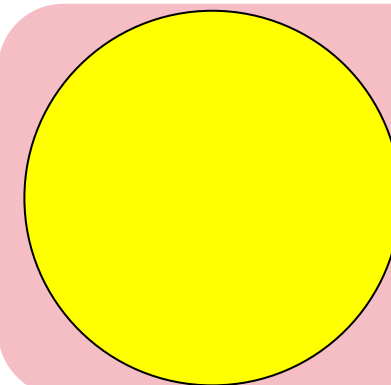
2. The light of the sun; sunshine.



5. A mixture of natural materials that covers much of Earth's surface. Materials include dead plants, dead animals, bacteria, rocks, sand, etc.



3. The mixture of gases you can't see or smell that surrounds Earth.



6. A liquid that comes from the clouds as rain and forms streams, lakes, etc.

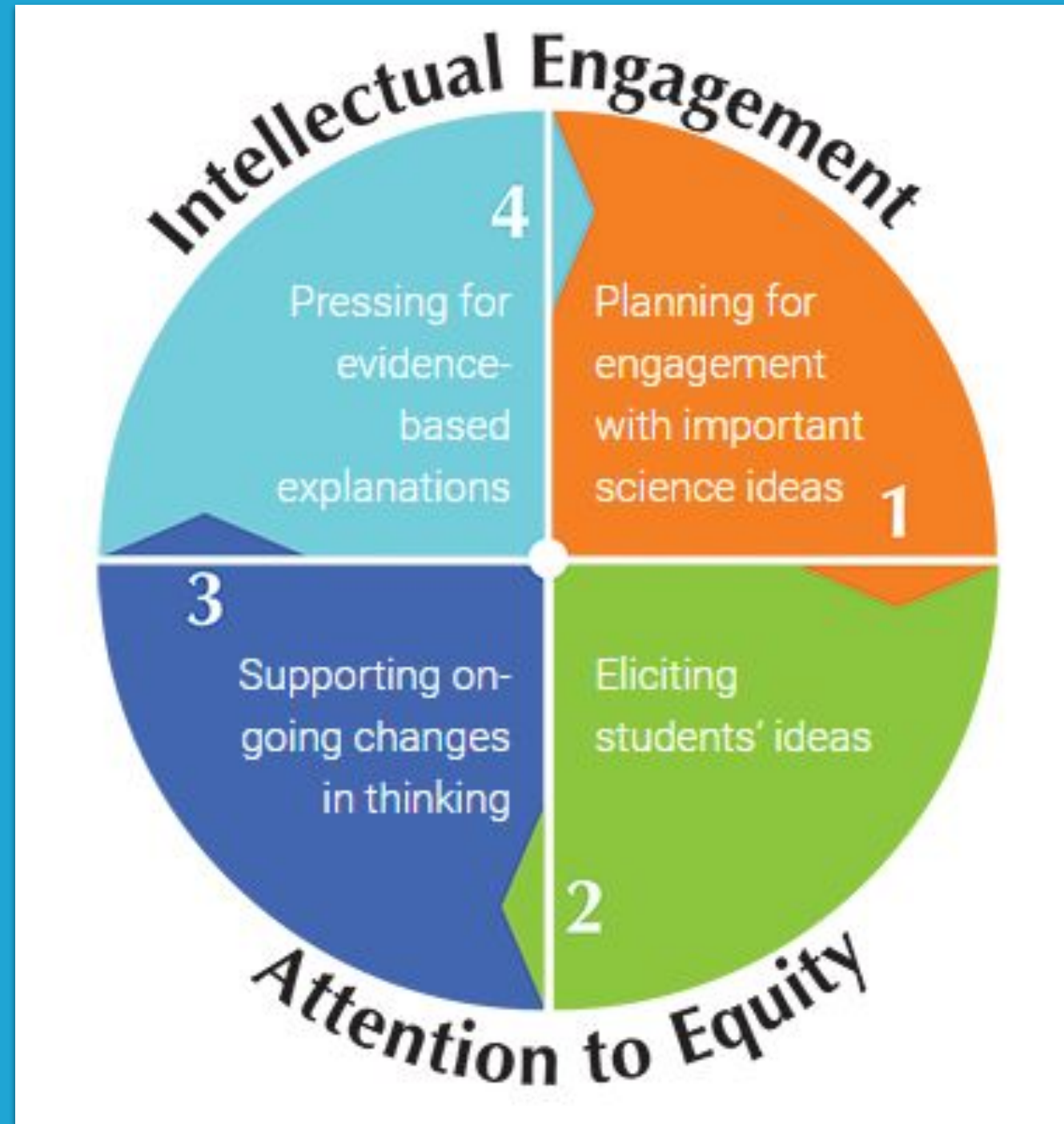
# Reasoning, Sharing Experiences & Using Language ALOUD

Productive Discourse (TALK) is Important

- Talk is a form of thinking
  - Requires formulation/construction of relevant ideas
  - Making thinking public
- Shared ideas are a resource for others
  - Hear how another person thinks
  - Civil disagreement, challenge our thinking



# Ambitious Science Teaching



# Science Talk

- “Specialized Language”
  - Build identity as “knowers of the natural world”
  - Make work meaningful
  - How science is done and communicated
- Talk Moves:
  - Probing
  - Pressing
  - Re-voicing
  - Prompting student discourse
  - Putting ideas “on hold”



**Questions can be used to  
“shape the nature and flow  
of classroom discussions and  
the cognitive opportunities  
offered to students.”**

- Boaler, J., Brodie, K. (2004) *The importance, nature, and impact of teacher questions.*

# Teacher Actions

Questioning Research

## Question Design

- Goals
- Open v. Closed & IRE
- Varied *Depth*

## Implementation

- Ownership
- Wait Time
- Encouragement
- Feedback

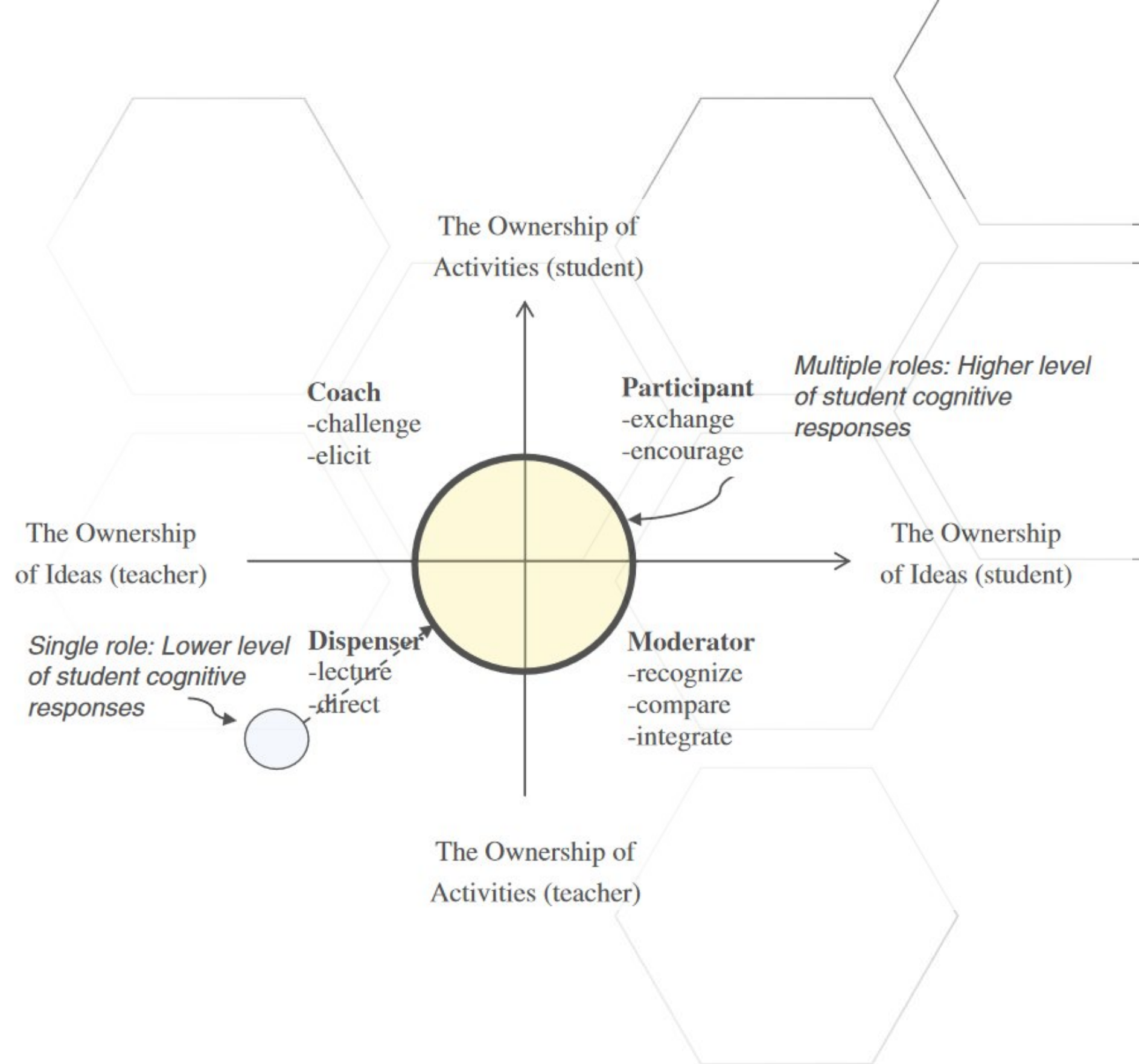


Figure From: Chen, Y.-C., Hand, B., & Norton-Meier, L. (2017). Teacher Roles of Questioning in Early Elementary Science Classrooms: A Framework Promoting Student Cognitive Complexities in Argumentation. *Research in Science Education*, 47(2), 373–405. <https://doi.org/10.1007/s11165-015-9506-6>

# Texas ELPS

Learning, Listening, Speaking, Reading, Writing - in English

ELPS Speaking TEKS	Discussion STEMS	Strategies
<p>Student is expected to...</p> <p>3E: Share information in cooperative learning interactions.</p>	<ul style="list-style-type: none"> <li>• <i>I feel/think/believe...</i></li> <li>• <i>In my opinion...</i></li> <li>• <i>I agree/disagree that... because...</i></li> <li>• <i>The way I would...</i></li> <li>• <i>After considering _____ I think...</i></li> </ul>	<ul style="list-style-type: none"> <li>• Instructional Conversation</li> <li>• Literature Circles</li> <li>• Peer Editing</li> <li>• Interview Grids</li> <li>• Pairs View</li> </ul>
<p>Student is expected to...</p> <p>3G: Express opinions, ideas, and feelings ranging from communicating single words and short phrases to participating in extended discussions on a variety of social and grade-appropriate academic topics</p>	<ul style="list-style-type: none"> <li>• <i>How do you feel when/about...?</i></li> <li>• <i>What is your opinion about...?</i></li> <li>• <i>Another ___ might be ____ since ...</i></li> </ul>	<ul style="list-style-type: none"> <li>• Anticipation Chat</li> <li>• Instructional Conversation</li> <li>• Literature Circles</li> <li>• Question, Signal, Stem, Share, Assess</li> <li>• Reciprocal Teaching</li> <li>• W.I.T. Questioning</li> </ul>



# RPA ELPS Spotlight

## Strategies, Sentence Frames & Probing Questions for Emergent Bilingual Learners

### English Language Proficiency Standards (ELPS)

Emergent bilingual students may come from diverse linguistic and cultural backgrounds, and may have varying levels of proficiency in English. The English Language Proficiency Standards (ELPS) provide a framework that is designed to support emergent bilingual students in developing their English language skills while learning academic content across four domains of language development: listening, speaking, reading, and writing. Helpful literacy tasks to support all levels of language acquisition proficiency are included in each segment of this TREK.

General tips for working with emergent bilingual students are provided below.

#### Listening

- **Provide real-life examples:** Use examples from the students' own experiences to help them connect the content.
- **Ask clarifying questions:** Encourage students to seek clarification from their peers or teacher on confusing content.
- **Assess Listening Comprehension:** Provide multiple modes of opportunity for students to demonstrate listening skills, such as asking questions, collaborating with peers, and taking notes.

#### Speaking

- **Use routine language:** Repeat key vocabulary and phrases multiple times throughout the lesson to reinforce learning.
- **Allow for group work:** Encourage students to work in small groups to reinforce the concepts and vocabulary.
- **Assess speaking:** Monitor students as they demonstrate their speaking skills through retelling, giving information, and participating in discussions.

#### Reading

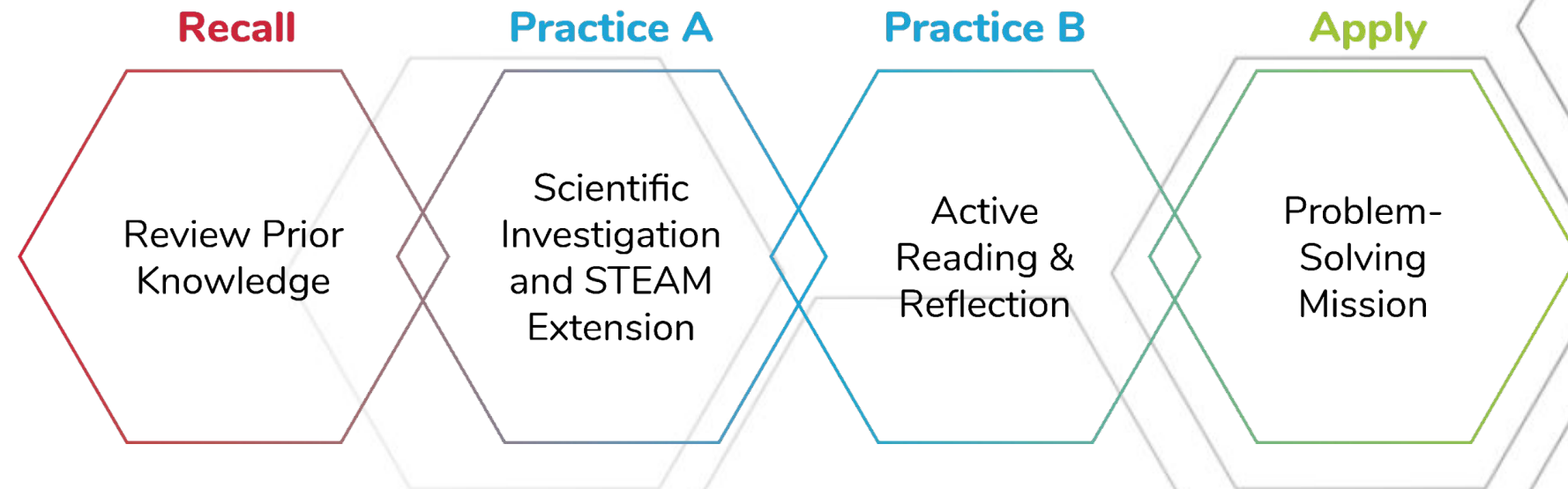
- **Use visual aids:** Use images, diagrams, and videos to help students better understand the concepts being taught.
- **Use graphic organizers:** Use graphic organizers, such as Venn diagrams or concept maps, to help students organize information.

### STRATEGY: Visual Scaffolding

**Body Talk:** Students will use visual images to identify and describe the basic needs of living things and use gestures that demonstrate how plants fulfill their basic needs.

#### Instructions:

1. Show the students the five index cards with images related to each basic need (e.g. a tree for "air," a flower for "sunlight," etc.) and ask them to suggest what each image represents in terms of the basic needs of living things. Write their responses on the board. **(Reading)**
2. Hold up each card and ask the students to create a gesture that represents the basic need on the card. For example, they could pretend to take a deep breath for "air" or make a drinking motion for "water." **(Listening and Speaking)**
3. Ask the students to repeat the gesture and say the word associated with the basic need. Repeat this for each of the five cards.
4. Next, ask the students to act out a scenario where a plant is fulfilling its basic needs (e.g. reaching for the sun for "sunlight," soaking up water through its roots for "water," etc.).
5. Have each group present their scenario to the class, using the gestures and words they learned to explain the plant's needs.
6. Have the students work in small groups to create their own sentences that show a plant fulfilling its basic needs. **(Writing)**



## Practice A

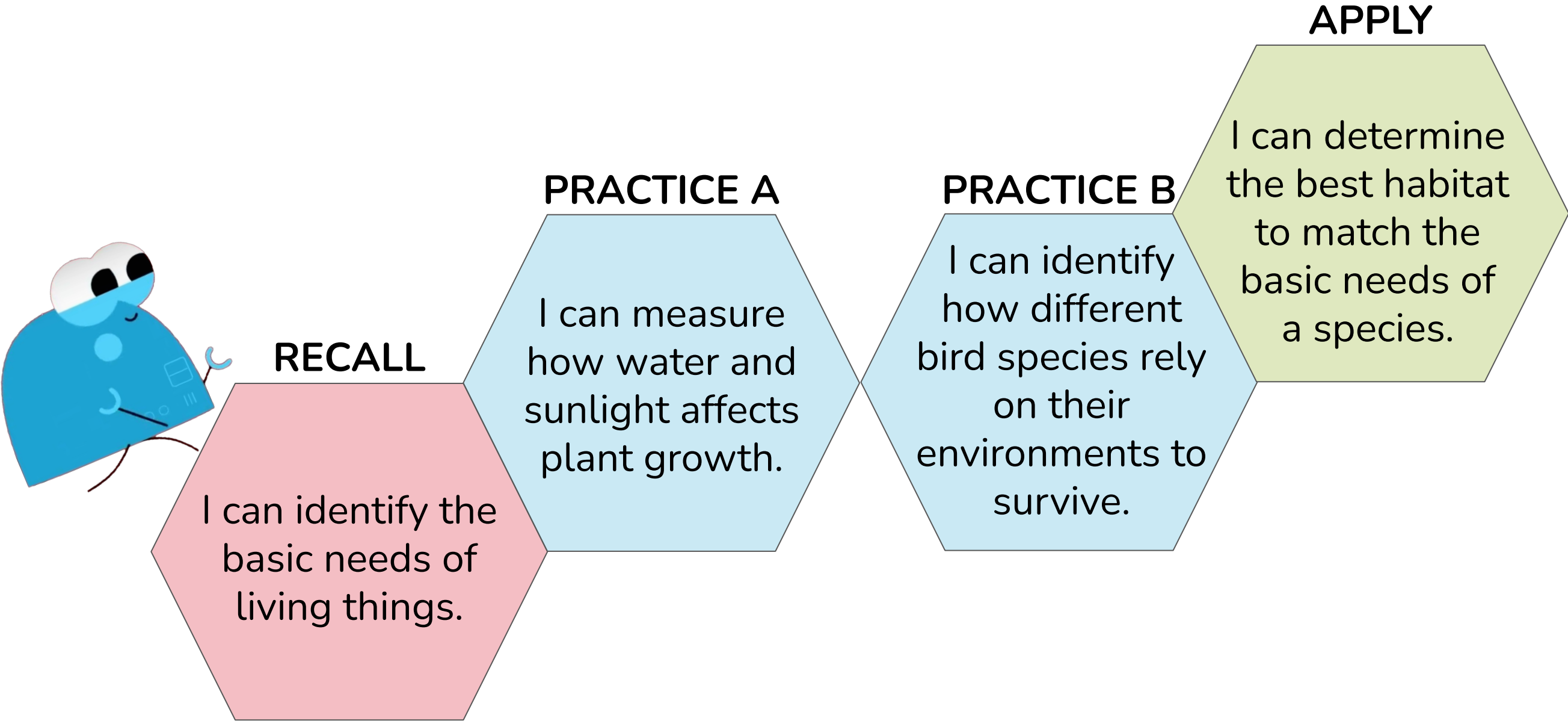
Scientific Investigations and STEAM Extension

- ✓ Provides varied investigation types
- ✓ Scaffolds data interpretation and other process skills
- ✓ Integrates math skills

# TREK Goals

## 5.12A Interdependence

Observe and describe how a variety of organisms survive by interacting with biotic and abiotic factors in a healthy ecosystem.



# TREK Goals

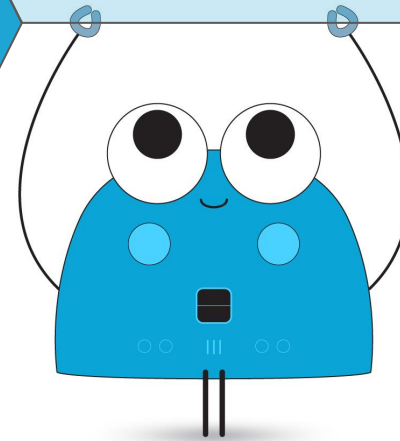
## 5.12A Interdependence

Observe and describe how a variety of organisms survive by interacting with biotic and abiotic factors in a healthy ecosystem.

Practice A

Investigation:  
Plant Growth

I can measure  
how water affects  
plant growth.



# Integrating Concepts, Practices, and Themes

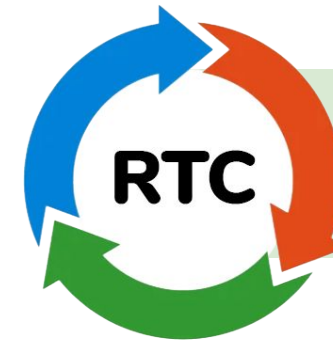
## What You Learn

All organisms interact with living and nonliving things in healthy ecosystems.



### How You Learn

- Ask Questions
- Collect Data in Data Tables
- Graph, Analyze, and Interpret Data
- Communicate Explanations



### How You Think

- Cause-and-Effect Relationships
- System Models

Practice  
A

# Description of TREK Segment

<b>What did you do?</b>	
<b>What did you learn?</b>	

# Building Expertise

AST Discourse  
Primer (p. 8-14)



A

TERC Talk Science  
Primer (p 7-11)



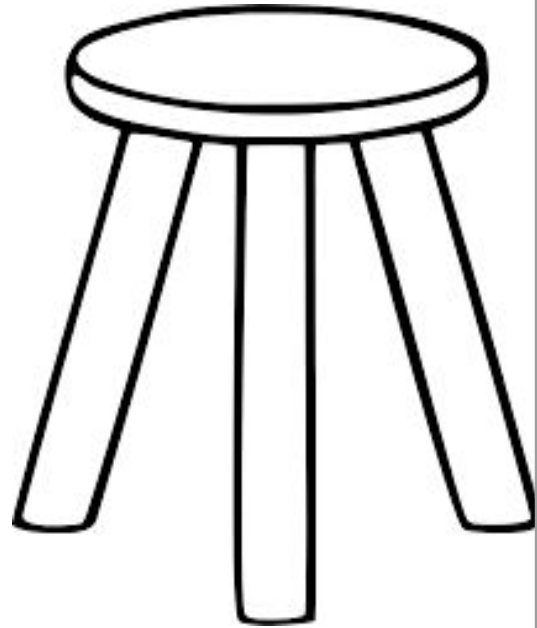
B

STEM Teaching  
Tools Brief #16



C

# Learning Objective(s)



<b>Content</b>	5.12A Observe and describe how a variety of organisms survive by interacting with <b>biotic and abiotic factors in a healthy ecosystem.</b>
<b>SEP (Skills &amp; Practices)</b>	<ul style="list-style-type: none"><li>o 5.1A <b>Ask questions and define problems</b> based on <b>observations</b> or information from text, phenomena, models, or investigations.</li><li>o 5.1G <b>Develop and use models</b> to represent phenomena, objects, and processes or design a prototype for a solution to a problem.</li><li>o 5.2E <b>Evaluate</b> experimental and engineering designs.</li><li>o 5.3A Develop <b>explanations and propose solutions</b> supported by data and models;</li><li>o 5.3B <b>Communicate explanations and solutions</b> individually and collaboratively in a variety of settings and formats.</li><li>o 5.3C Engage respectfully in <b>scientific discussion.</b></li></ul>
<b>RTC (Recurring Themes &amp; Concepts)</b>	<ul style="list-style-type: none"><li>o 5.5A Identify and use <b>patterns</b> to explain scientific phenomena or to design solutions.</li><li>o 5.5B Identify and investigate <b>cause-and-effect</b> relationships to explain scientific phenomena or analyze problems.</li><li>o 5.5D Examine and model the <b>parts of a system</b> and their interdependence in the function of the system.</li><li>o 5.5G Explain how factors or conditions impact <b>stability and change</b> in objects, organisms, and systems.</li></ul>



# Elicitation of Student Ideas

<b>Improving Learning</b>	How will discussing/talking about their ideas improve your learners' science understanding connected to the learning objectives?
<b>Goal(s)</b>	What do you want to understand about your students' thinking?
<b>Expectation(s)</b>	What do you expect to learn about your students' understanding?

# Activity for Eliciting Student Ideas

<b>Activity Description</b>	
<b>Teacher Questions</b>	6-8 strong teacher questions that direct and elicit student thinking aligned with your learning objectives
<b>Teacher Moves</b>	If the discussion stalls or veers off-topic, What questions or talk moves you will utilize to re-connect the discussion to your learning goals?
<b>3D Science</b>	How does your specifically address the three-dimensions (three learning objectives)?

# Point 4

Explanations & Findings



# Gallery Walk

POINT 4

Questions?



# Science and Engineering Practices

From Framework for K-12 Science Education

- Ask Questions.
- Develop and Use Models.
- Plan and Carry out Investigations.
- Analyze and Interpret Data.
- Use Mathematics and Computational Thinking.
- Construct Explanations.
- Engage in Argument from Evidence - including dialogue.
- Obtain, Evaluate, and Communicate Information.



# Crosscutting Concepts

From Framework for K-12 Science Education

- Patterns,
- Cause and effect,
- Scale proportion and quantity,
- Systems and system models,
- Energy and matter,
- Structure and function, and
- Stability and change

