

The PhD Science TEKS Edition Approach to the Learning Cycle

Throughout each module, students engage in the learning cycle to make sense of and explain authentic phenomena.

They begin each module by generating questions and developing an initial explanation of the anchor phenomenon. Then students investigate various supporting phenomena to better understand the anchor phenomenon. Students periodically return to the anchor phenomenon to revise their explanation by applying evidence gathered through their investigations and data analysis.

At the end of the module, students participate in a Socratic Seminar to reflect on the conceptual understanding they have developed and used to explain multiple phenomena. Students transfer that knowledge to explain a new phenomenon in the End-of-Module Assessment.

The table on the right shows how particular student actions and the 7E phases relate to each stage of the *PhD Science TEKS Edition* learning cycle.

CONTENT STAGES	STUDENT ACTIONS THAT SUPPORT TEKS SCIENTIFIC INVESTIGATION AND REASONING	Strongly Related 7E Phases*
WONDER	<ul style="list-style-type: none">Observe a rich phenomenon and generate questions.Connect prior understanding to the phenomenon.	Elicit Engage
ORGANIZE	<ul style="list-style-type: none">Develop an initial explanation of the phenomenon.Focus on a question to investigate.	Explore
REVEAL	<ul style="list-style-type: none">Explore the question through investigation.Analyze data to gather evidence relevant to the question.	Explore
DISTILL	<ul style="list-style-type: none">Apply evidence and reasoning to revise the explanation of the phenomenon.Communicate new knowledge. Compare and synthesize with prior understanding and other information.	Explain
KNOW	<ul style="list-style-type: none">Generate new questions.Apply knowledge to a different phenomena in a new context.Connect knowledge across contexts to develop fundamental science conceptual understanding.	Elaborate Extend
ALL		Evaluate

*Although the Elicit and Engage phases both relate to the Wonder stage and the Elaborate and Extend phases both relate to the Know stage, each 7E phase includes unique elements that should not be conflated in instruction.



Scientific Investigation and Reasoning

With *PhD Science TEKS Edition*, students build their understanding of science concepts by engaging in the TEKS Scientific Investigation and Reasoning standards as they explore authentic phenomena. Students move from just reading about science to *doing* science.

For example, in Level 1 Module 2, students learn about light by studying wayang shadow puppetry and answering the Essential Question: How do puppeteers use light to tell stories during wayang shows?

When students participate in a hands-on investigation comparing different shadows with an object, surface, and light source, they determine that shadows form when objects block light from reaching surfaces. Their exploration of authentic, phenomena helps them build an enduring understanding of science concepts.

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Helping students develop an enduring understanding of science concepts

Great Minds® was founded on the belief that *every* child is capable of greatness.

To help them achieve it, children need access to high-quality, knowledge-building curricula. They need an approach to learning that takes them beyond the rote memorization that educational publishers have relied on for years.

Answering the call for a new science curriculum to support the needed pedagogical changes, our teacher-writers and experts created *PhD Science® TEKS Edition*, a phenomenon-based program in which teachers facilitate the learning, but students own it. With *PhD Science TEKS Edition*, students rigorously engage in learning that coherently builds their understanding of science.

- Knowledge Building:** Through hands-on investigations and evidence-based learning, students develop a deep, lasting understanding of science concepts that they can apply far beyond the anchor phenomenon of each module.
- Coherent Storyline:** Each lesson builds on the lessons before it so students develop their understanding of science concepts in the context of the anchor phenomenon.
- Rigorous Engagement:** Students actively engage in a learning cycle of asking questions and sharing initial ideas about phenomena they study, investigating those questions, developing evidence-based explanations, and transferring their new knowledge to explain different phenomena. Supported by differentiation strategies the curriculum provides, all students engage with rigorous content through hands-on investigations, collaborative conversations, and analysis of authentic texts and media.



Activity Before Concept, Concept Before Terminology
Rather than simply memorizing definitions, *PhD Science TEKS Edition* students develop deep, lasting comprehension of scientific concepts through hands-on investigations and evidence-based learning about the phenomena they are exploring *before* they learn related terminology.

