Using the 5E Instructional Model

KnowAtom curriculum uses the 5E instructional cycle to connect the three dimensions of the Next Generation Science Standards. We do this by engaging students' curiosity with phenomena that they unpack through Socratic dialogue, investigations, scientific experiments and engineering challenges.

As students work individually or in cooperative groups to solve real-world problems and answer questions as scientists and engineers, teachers support students as a facilitator and coach. In this role, teachers move away from an "I do," "we do," then "you do" approach to a student-centered approach of "you do" and "we are thought partners."

As articulated by the CA Science Framework (June 2016 draft version), each segment of the 5E instructional cycle supports the other phases in an iterative spiral more than a direct linear sequence. Because the 5E instructional strategy is most effective when it isn't a linear structural format, you will not see it used as such in our curriculum. The following table and lesson flow chart show how KnowAtom incorporates each segment of the 5E instructional cycle throughout a unit's lessons. Each KnowAtom instructional unit is made up of multiple scaffolding lessons.

5E Segments	5E Model with KnowAtom
ENGAGE	
▪ engage in new concepts ▪ access prior knowledge ▪ make connections between past and present learning experiences ▪ frame the learning experience	✓ Nonfiction student reading engages students with complex real-world phenomena. ✓ Socratic dialogue engages students in higher order thinking and reflective group dialogue. ✓ Experiment and engineering labs presents students with investigative phenomena to engage them in the hands-on activity they will carry out.
EXPLORE	
▪ participate in activities ▪ use prior knowledge to generate new ideas ▪ design and carry out investigation	✓ Students explore an investigative phenomenon hands-on. ✓ Students work independently or in teams to plan and carry out their experiment or an engineering challenge. ✓ Hands-on activities require students to apply scientific knowledge to make sense of their explorations.
EXPLAIN	
▪ demonstrate conceptual understanding, process skills, and behaviors ▪ make deeper connections with ideas being explored ▪ communicate new understandings	✓ Socratic dialogue provides the teacher with opportunity to pinpoint misconceptions and coach students toward deeper understandings. ✓ In Socratic dialogue, students communicate their ideas about how elements of the phenomena being explored may be explained scientifically. ✓ Students use their data and observations to form a conclusion (both in writing and verbally), based on a claim that is supported with evidence gathered during their investigation.
ELABORATE	
▪ extend understanding with new experiences ▪ apply knowledge to new situations and contexts	✓ In Socratic dialogue, teachers coach students to elaborate on their ideas and make additional connections.
EVALUATE	
▪ assess understanding and abilities (self, peer, and teacher evaluations) ▪ demonstrate understanding in assessments	Formative and summative assessments are included throughout each unit. For example: ✓ The Socratic dialogue allows the teacher to evaluate student ideas with factual evidence as they move toward deeper understanding in the dialogue. Students engage in peer and self-evaluations during this process. ✓ Teachers use lesson debrief/wrap-ups to evaluate student understanding, assessing for misconceptions before moving onto the next lesson. ✓ In grades 4-8, the lab notebook entry serves as an assessment for experiments and engineering labs. ✓ Formal vocabulary and concept assessments are provided for students to apply their learning to a different situation and context.

KnowAtom™
Focus on what matters.

KnowAtom Lesson Flowchart with the 5E Model

1. Nonfiction Reading

- Students **ENGAGE** with complex real-world anchor phenomena.
- Students **EXPLAIN** different connections within the phenomena to demonstrate their conceptual understanding.

2. Socratic dialogue

- Students **ENGAGE** in critical and reflective group dialogue by making concept-concept, concept-self, concept-world connections.
- Students **EXPLAIN** how elements of anchor phenomena may be explored and perhaps explained scientifically.
- Teachers coach students to **ELABORATE** on their ideas to make additional connections.
- Students **EVALUATE** their ideas and the ideas of others with factual evidence as they move toward deeper understanding in the dialogue.
- Students prepare to **EXPLORE** ideas that they identify as weak or lacking evidence.

3. Planning and Carrying Out Investigations

- Students **ENGAGE** with investigative phenomena that provide real-world contexts for what they will investigate, presenting a question to answer or problem to solve.
- Students **EXPLORE** the investigative phenomena, working independently or in teams.
- Students **EXPLAIN** how they will investigate the phenomena and the kinds of data they will collect.

4. Sharing Conclusion

- Students use the results from their investigation, experiment, or engineering lab to **EXPLAIN** the investigate phenomena scientifically by forming a conclusion, complete with a claim reasoned with evidence gathered during their investigation (both in writing and verbally).

5. Debriefing and Transition

- Students **ELABORATE** on their conclusion, making connections back to the anchor phenomena and the big-picture questions the investigation addressed.
- Teachers **EVALUATE** student understanding, assessing for misconceptions before moving onto the next lesson.

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