

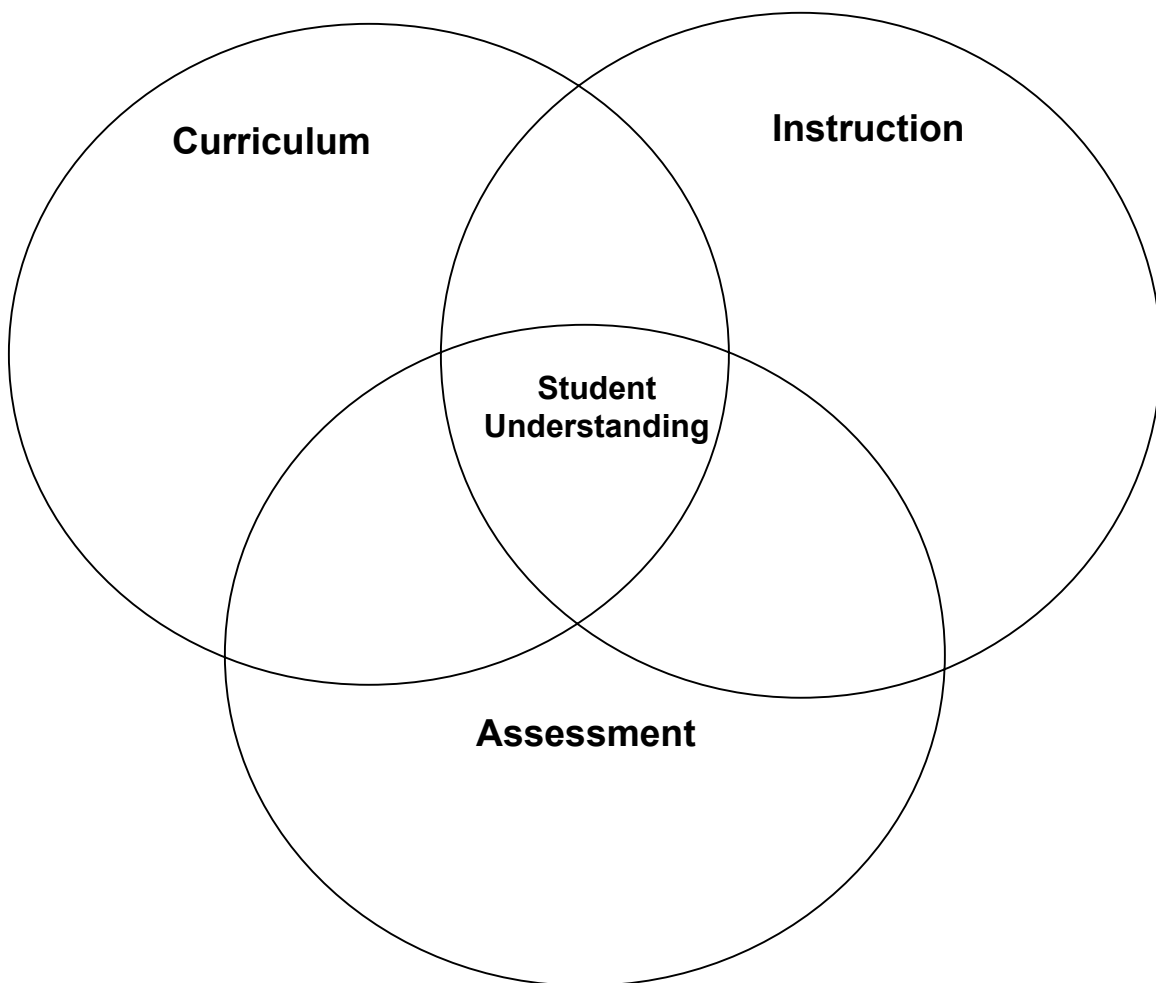
The 5 E's Instructional Model

Phase of the Instructional Model	Teacher Does	Student Does
<p>ENGAGE Initiates the learning task. The activity should make connections between past and present learning experience, and anticipate activities and organize students' thinking toward the learning outcomes and current activities.</p>	<ul style="list-style-type: none"> • creates interest • generates curiosity • raises questions and problems • elicits responses that uncover students' current knowledge about the concept/topic 	<ul style="list-style-type: none"> • asks questions such as, Why did this happen? What do I already know about this? What can I find out about this? How can this problem be solved? • shows interest in the topic.
<p>EXPLORE Provide students with a common base of experiences within which current concepts, processes, and skills are identified and developed.</p>	<ul style="list-style-type: none"> • encourages students to work together without direct instruction from the teacher. • observes and listens to students as they interact. • asks probing questions to redirect students' investigations when necessary. • provides time for students to puzzle through problems. • act as a consultant for students 	<ul style="list-style-type: none"> • thinks creatively within the limits of the activity • tests predictions and hypotheses • forms new predictions and hypotheses • tries alternatives to solve a problem and discusses them with others • records observations and ideas • suspends judgment • tests ideas
<p>EXPLAIN Focus student's attention on a particular aspect of their engagement and exploration experiences, and provide opportunities to demonstrate their conceptual understanding, process skills, or behaviors. This phase also provides opportunities for teachers to introduce a concept, process, or skill.</p>	<ul style="list-style-type: none"> ◆ encourages students to explain concepts and definitions in their own words. • asks for justification (evidence) and clarification from students • formally provides definitions, explanations, and new vocabulary • uses students' previous experiences as the basis for explaining concepts 	<ul style="list-style-type: none"> • explains possible solutions or answers to other students • listens critically to other students' explanations • questions other students' explanations • listens to and tries to comprehend explanations offered by the teacher • refers to previous activities

Phase of the Instructional Model	Teacher Does	Student Does
<p>ELABORATE</p> <p>Challenge and extend students' conceptual understanding and skills. Through new experiences, the students develop deeper and broader understanding, more information, and adequate skills.</p>	<ul style="list-style-type: none"> • expects students to use vocabulary, definitions, and explanations provided previously in new context • encourage students to apply the concepts and skills in new situations • remind students of alternative explanations • refers students to alternative explanations 	<ul style="list-style-type: none"> • applies new labels, definitions, explanations, and skills in new, but similar, situations • uses previous information to ask questions, propose solutions, make decisions, design experiments • draws reasonable conclusions from evidence • records observations and explanations
<p>EVALUATE</p> <p>Encourage students to assess their understanding and abilities and provide opportunities for teachers to evaluate student progress.</p>	<ul style="list-style-type: none"> • refers students to existing data and evidence and asks, "What do you already know?" Why do you think ...? • observes students as they apply new concepts and skills • assesses students' knowledge and/or skills • looks for evidence that students have changed their thinking • allows students to assess their learning and group process skills • asks open-ended questions such as, Why do you think...? What evidence do you have? What do you know about the problem? How would you answer the question? 	<ul style="list-style-type: none"> • checks for understanding among peers • answers open-ended questions by using observations, evidence, and previously accepted explanations • demonstrates an understanding or knowledge of the concept or skill • evaluates his or her own progress and knowledge • asks related questions that would encourage future investigations

Science Education in California

What resources are used/available in each of these areas?



Additional Concept Statements from the Science Standards

- Electric and magnetic phenomena are related and have many practical applications.(Physics #5)
- The conservation of atoms in chemical reactions leads to the principle of conservation of matter and the ability to calculate the mass of products and reactants.(Chemistry #3)
- Energy is exchanged or transformed in all chemical reactions and physical changes of matter. (Chemistry #7)
- The bonding characteristics of carbon allow the formation of many different organic molecules of varied sizes, shapes, and chemical properties and provide the biochemical basis of life. (Chemistry #10)
- Astronomy and planetary exploration reveal the solar system's structure, scale, and change over time. (Earth #1)
- Life has changed Earth's atmosphere, and changes in the atmosphere affect conditions for life. (Earth #8)
- As a result of the coordinated structures and functions of organ systems, the internal environment of the human body remains relatively stable (homeostatic) despite changes in the outside environment. (Biol/Life #9)
- A multicellular organism develops from a single zygote, and its phenotype depends on its genotype, which is established at fertilization. (Biol/Life #3)

Reflection Questions

How will this session's information and issues that arose assist you in your work as a Key Leader and as an advocate for science?

What issues around the CA Science Standards come to mind? What could you do - at your school, district, county, or state level - to advocate for:

- More science education in all CA schools.
- Better science education in all CA schools.
- Supportive state policies for science education.
- Local support for science education.