

THE GENETICS OF LEARNING AND MEMORY

Five E Instructional Model

This unit makes use of a version of the learning cycle that consists of five steps, each of which has a label starting with the letter E. Those steps are Engagement, Exploration, Explanation, Elaboration, and Evaluation. The sequence of the steps is crucial for student learning and including all five steps is necessary. A graphical summary of this approach can be found at

http://www.sandiegophysics.com/5E_Model/table.htm - listed in the Explore Gallery as **5E Model Diagram**

During the **Engagement** phase, students are introduced to the unit. In addition to awareness building, it is important at this point is to help students recognize their current understandings. The reason we emphasize the pre-assessment of student knowledge is that we cannot help them change their understandings until they first recognize what they understand.

The **Exploration** phase involves investigating a situation that is intriguing, requires use of a variety of scientific process skills, and challenges some of their initial assumptions. Students work in groups of two or three which helps them sort out their ideas, especially when what they expect to find during the investigation is in conflict with their earlier understandings.

The **Explanation** phase of the 5E model has two components. The first is where students communicate their discoveries and interpretations with the rest of the class. Translating what they think they know into words is an important part of the learning process. The second component of this phase is a more traditional approach to teaching. However, rather than simply presenting information (including scientific terminology and accepted scientific explanations) the teacher is able to base their explanations upon the experiences students had during the **Exploration** phase.

The fourth phase, **Elaboration**, involves another investigation in which students are asked to apply their knowledge to a new situation. An idea, especially a scientific explanation, is effective only inasmuch as it can be used to explain more than a single incident. Being able to generalize an explanation is an important cognitive skill, as well as one of the signatures of scientific theory. Students taking their newly formed ideas – complete with the scientific terminology – and testing their grasp of these in a new circumstance is important to help understandings solidify.

The **Evaluate** phase is the time in which the teacher can assess students' learning but it is also a time in which students can reflect upon their knowledge growth. It is important for students to recognize how their understandings have changed, in part because it parallels the development of scientific explanations. Old ideas are discarded when they prove to have less explanatory power than a competing idea. Recognizing that learning is not merely the accumulation of new ideas but instead can involve reorganizing ideas is something that many students do not recognize.

While teachers remain responsible for provide opportunities for students to learn science, the students must do more than just absorb information. Learning requires mentally taking hold of ideas and experiences and working to make them work together as a reasonable whole. The 5E instructional model uses a discrete set of steps to achieve this goal.