

The 5E learning cycle

The basic purpose of a 5E lesson is to raise and answer questions about a scientific phenomenon.

Engage

Here, the teacher helps the students become curious and interested about a particular scientific phenomenon, thereby provoking a willingness in the students to become involved in investigations and discussions. This might be done by showing a motivational demonstration, discussing the students' real-life experiences, and so forth.

If the scientific question (the focus of the 5E) is provided by the teacher, it will generally be introduced here; if the scientific question comes from the students, it may arise naturally in "Engage", although it could also arise naturally from students' unstructured explorations in "Explore" (below).

Explore

Exploration has two aspects: exploring the ways that students think about the phenomena, and exploring the phenomena that the question is about. This step typically involves elicitation of students' ideas and confusions, brainstorming about possible ways to answer the question, and exploring a real-world phenomenon in a "hands-on" way.

An important point is that the hands-on exploring/experimenting has two distinct stages: unstructured experimenting, and structured experimenting. In the unstructured experimenting, students explore the phenomenon in a relatively open-ended way. In the structured experimenting, the class builds on the unstructured observations by generating an experimental structure that would answer the scientific question in a structured way. The class then carries out the agreed-upon experimental procedure.

Explain

At this point, the students answer the scientific question under investigation.

Here:

- The hard work of answering the question must be the students', through their own reasoning, through discussion with others, and guided by modeling and coaching from the teacher.
- The class entertains a debate about the appropriateness and justification of students' answers to the main question, including the reasoning and evidence behind their answers.
- After the student discussions and explanations, the teacher introduces appropriate scientific concepts and terminology.

Note: The explaining is primarily done by the students -- not the teacher! This is not a lecture phase! Teacher "lecture" is done only after the students have already done the explaining themselves.

Extend

Here, students solidify and extend their understanding by looking at the problem/question in different contexts and generating new questions that lead to new explorations.

Students will:

- Apply the solution or explanation in new real-world contexts
- Look for unresolved questions or problems, and pose them as a way of starting the cycle all over again

Evaluate

The evaluation might take the form of verbal assessment, written assessment, or the carrying out of another extension activity.