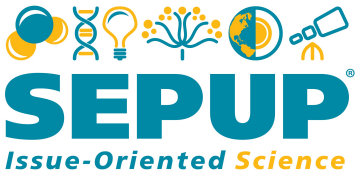
The following pages are select samples from

Issues and Science, Third Edition, Designed for the NGSS

This is a small excerpt from the *Teacher Resources* to be used for evaluation purposes. We encourage the use of all available sample materials in or out of a classroom to properly understand the seamless integration between equipment, student materials, and teacher resources. *Issues and Science* is not a traditional textbook and should not be evaluated as one.



THE LAWRENCE HALL OF SCIENCE
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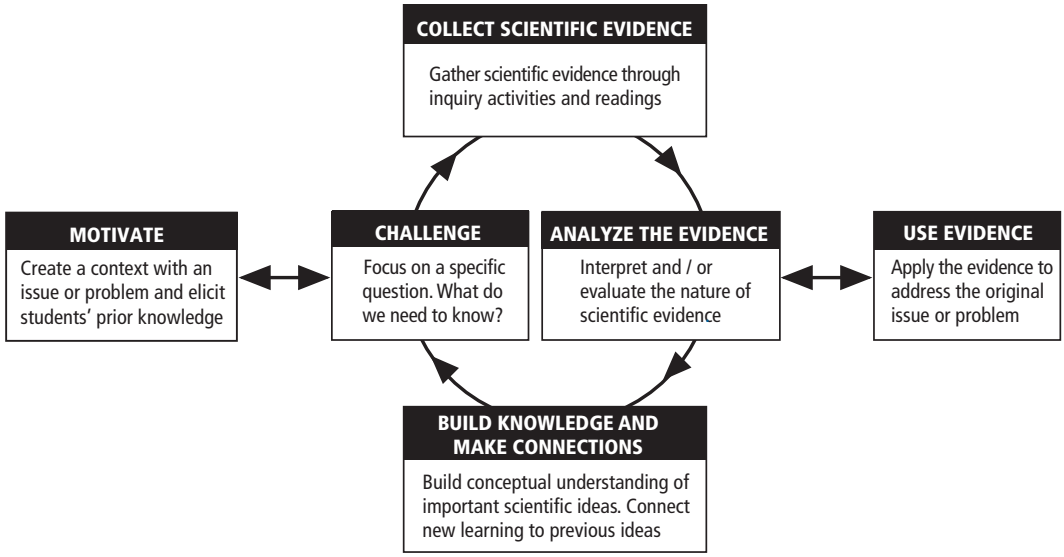
INTRODUCTION TO *ISSUES AND SCIENCE*

SEPUP'S APPROACH TO TEACHING AND LEARNING

SEPUP (Science Education for Public Understanding Program) is a science education project developed primarily by former and current classroom science teachers. A program of the Lawrence Hall of Science at the University of California at Berkeley, SEPUP develops instructional materials and approaches to support classroom science education. SEPUP's approach to science education includes the following key features:

An instructional model that integrates scientific inquiry with a thematic approach for teaching science in the context of personal and societal issues. The phases of the model are illustrated in the diagram below.



Issue-oriented science helps students see that science is connected to their lives and communities in many ways. Students investigate such questions as: Why should a person take a full course of antibiotics? How can a family reduce energy costs? What are the trade-offs involved in deciding if a space mission should have a human crew? In Issues and Science, these kinds of issues furnish a focus for students' work and reflection. The activities and investigations also require students to apply scientific evidence to and analyze the trade-offs involved in personal and societal decisions. SEPUP is not an advocate of specific positions, and the units do not promote teachers' or students' acceptance of any position. Instead, it provides students with knowledge, skills, and understanding that will help them make their own informed decisions. SEPUP selects issues that

- require an application of evidence.
- require an understanding of important scientific concepts and processes.
- engage diverse groups of students.
- are complex enough to foster discussion and debate.

Inquiry-based instructional strategies that give students experience with scientific processes and natural phenomena. SEPUP's instructional activities follow an inquiry continuum, from guided to open-ended. Guided inquiry introduces students to important ideas and gives them a model for scientific approaches. More open-ended-inquiry experiences encourage students to develop their abilities to ask and investigate questions, to understand how to apply scientific principles to new problems, and to think critically about scientific evidence. Inquiry in SEPUP courses takes many forms, including hands-on investigations, analysis of data from other sources, use of physical and computer models, discussion of information and evidence gathered from readings, and role plays and presentations.

Strategies that are geared to middle school students' learning styles. These include a combination of individual work, cooperative group work, and a wide variety of classroom activities. SEPUP has tested Issues and Science units extensively with students in classrooms across the United States to ensure that the material is challenging but appropriate for middle school students. The variety of activities accommodates students who have different learning styles and stimulates all students to improve their laboratory, research, reading, writing, and presentation skills.

A consistent approach to individual and cooperative learning. SEPUP'S 4–2–1 model ensures that individual learning is enhanced through group interaction. The 4–2–1 model refers to configurations in which students work.

4 A group of four students shares the materials and tools used in laboratories and investigations, which facilitates collaboration (and controls the cost of materials). The groups of four also work together in other kinds of activities, such as discussion of open-ended questions, research, and presentations.

2 Often a procedure or activity calls for the groups of four students to split up into pairs. Pairs usually present and discuss data and observations with the other pairs, and on occasion students continue to work in pairs when responding to specific questions.

1 Each student is expected to have a copy of the Student Book for class, and each must create an individual science notebook. In the notebooks students enter classroom work, such as data, observations, and written responses to selected questions. This ensures that each student is individually accountable for the results of each activity and for mastering the concepts discussed in class.

Important concepts and skills that spiral through each unit and the whole course. SEPUP introduces, develops, and reinforces scientific concepts in various ways. Key ideas and vocabulary introduced in one activity appear again in later activities, enhancing students' understanding and retention. Similarly students develop essential scientific skills from one activity or unit to another.

A course-development process that builds on educational research and classroom field tests of the curriculum and materials. Research provides examples of effective middle school science instruction and information about students' ideas on various science-related topics. SEPUP tests the research-based units in classroom trials to ensure that they work in a range of classrooms. SEPUP also solicits and studies feedback from teachers and students to ensure the materials contribute to the desired learning goals.

An assessment system integrated into the curriculum for both formative and summative evaluation of students' work. SEPUP's assessment system sets up ways for teachers to collect evidence on what students have learned and to help students improve their understanding, skills, and performance. It also guides teachers to work with other teachers within a school district or a school's science department to develop clear and consistent expectations for students' work. As with all other aspects of the program, the embedded assessments and item banks are based on research and classroom trials. The assessment system and item banks are discussed in depth in Teacher Resources III, "Assessment."