

A Society for College Science Teachers Position Statement

on

Introductory College-Level Science Courses

INTRODUCTORY COLLEGE LEVEL SCIENCE COURSES

The Society for College Science Teachers takes the position that the major goals of introductory college science courses are to contribute to the scientific literacy and critical thinking capability of all college students and to provide a conceptual base for subsequent courses taken in the disciplines. The Society defines science literacy as the knowledge and understanding of a) the nature and role of scientific knowledge and process, b) the major principles and concepts that transcend the various sciences, c) the relationship of science to technology, and d) the applications of science to the individual and society.

CHARACTERISTICS OF AN EXEMPLARY COURSE

Content and Processes

An exemplary introductory science course should primarily serve the above goals. It should feature a carefully articulated sequence of topics that overtly illustrates, in a context of scientific inquiry, connections between concepts and principles germane to a course of study. The content and processes should not be all inclusive, rather they should represent the essential scientific information and skills of which students should become aware to function as scientifically literate and critically thinking adults. Accordingly, courses should emphasize the methodologies and logic used by scientifically literate people to investigate the world. Interdisciplinary connections between issues and principles of science, technology and society should be made where appropriate. The Society supports interdisciplinary courses as a means to achieve these goals.

Laboratory Experiences

Laboratory experiences should be related to and integrated with the conceptual flow of every science course. Laboratory activities should feature experimental procedures that require students to think about, select, generate, test, and evaluate the effectiveness of hypotheses and the scope of their results. The laboratory should be considered an opportunity either for discovery or for students to extend and refine their existing conceptual framework. Field experiences should be included where appropriate.

Format

Introductory course content should be presented in a format that promotes critical thinking, higher order cognitive skills, and a capacity for problem solving and decision making. Students should be given opportunities to work collaboratively on meaningful tasks, the completion of which requires intellectual rigor based on in-depth understanding of essential content and its relevant contextual framework.

Teaching Strategies

Teaching strategies should reflect established best practices as articulated in the research literature, particularly those of the cognitive sciences. Accordingly, instructional practice should diagnose and attend to student's learning styles as well as prior knowledge and alternative conceptions. Instruction should foster the nature of the thinking required to acquire and integrate both procedural and declarative knowledge. Additionally, opportunities should be made available for students, in both individual and collaborative settings, to extend and refine their knowledge and evaluative thinking capacity.

Assessment

Assessment of student performance should be matched with predetermined goals in terms of anticipated student outcomes. Both cognitive and process gains, particularly those associated with higher order cognitive skills should be appropriately appraised. Alternative means of assessment should be developed and used for those outcomes that cannot be evaluated by traditional means.

STUDENT OUTCOMES

Upon completion of any introductory science course, at a minimum, every student should know and be able to do the following:

- Use the language and concepts of science appropriately, and effectively in written and oral communication.
- Use the methodologies and models of science to select, define, solve and evaluate problems independently and collaboratively.
- Adequately design, conduct, communicate, and evaluate relatively basic but meaningful experiments.
- Make scientifically based decisions and solve problems drawing on concepts and experiences from relevant areas.
- Evaluate critically; evidence, interpretations, results and solutions related to the course content within a real life context.
- Explain scientifically related knowledge claims as products of a scientific inquiry process that, while diverse in scope, conforms to the principles of logical reasoning.
- Demonstrate research skills necessary to access needed data to support scientific inquiry.
- Ask meaningful questions about real world scientific issues and conundrums.