

GSA Meeting, November 2002, Denver

GSA Session: "Geoscience Research Partnerships as a Strategy for Engaging K-16 Students and Teachers in Inquiry-Based Learning."

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***Inquiry in the National Science Education Standards: From structured exercises to guided learning experiences to open ended research***

The National Science Education Standards emphasizes the use of inquiry in the teaching of science. The Earth and space sciences section of the NSES stresses the importance of students developing the skills to think critically about Planet Earth and the global systems that have operated over long time to produce the world we see today. In preparing the national standards, the writers attempted to follow the cliché that “less is more” in terms of formally teaching students only the fundamentals and allowing the real science education come through experiment and investigation. Through careful analysis of observations and data collected in experiments, young people can learn essential scientific content and come to view the world from a scientific perspective. Central to such a perspective is “reasoning from the data”.

One of the challenges faced by primary and secondary teachers and by those in the research community interested in supporting good K-12 instruction is designing a sequence of experiments, exercises, and fieldwork that are interesting, demanding, and instructive. For very young students, well-structured activities are necessary to teach basic concepts. For older students, more open ended, but still guided, explorations are needed to encourage “what if” questioning and subsequent experimentation to find out. For students in their last two years or so of secondary school, true research experiences are essential.

As experienced researchers know only too well, good research takes time. Unfortunately, K-12 education has become highly structured, with a strong focus of preparing students to succeed on mandated standardized tests. Devising guided explorations and developing meaningful research projects that in the available time communicate the essential content (to meet the demands of standardized testing) while providing valid research experience is the challenge.

This presentation will review the NSES from the perspective of their support for inquiry-based learning. Examples will be given of structured exercises for young students, guided learning experiences for middle school students, to open ended research projects suitable for high school students.