

GISMO and the Science Curriculum

In Project 2061, the American Association for the Advancement of Science has undertaken to define goals for science education. From the preface of their report:

“Science for All Americans' is the result of a three-year collaboration involving several hundred scientists, mathematicians, engineers, physicians, philosophers, historians, and educators. It is, we believe, as close as it is possible to come to a valid expression of the view of the science community on what constitutes literacy in science, mathematics, and technology.” *Science for All Americans, Preface p. x*

Under the topic “Teaching Science, Mathematics, and Technology”, the report states,

“Teachers should do the following:

- Start with questions about nature
- Engage students actively
- Concentrate on collection and use of evidence
- Provide historical perspectives
- Insist on clear expression
- Use a team approach
- Do not separate knowing from finding out
- Deemphasize the memorization of technical vocabulary”

Science for All Americans, p. 200

It is surprising how natural and easy it is to do all of these things within the museum exhibit framework. Working on GISMO, students are asked to find a topic of interest to them, research it, and document their findings for other students, working in teams. GISMO gives the feel of really doing science, in a way that is within reach of elementary and middle school students.

Integration of subject matters is a goal across the school curriculum. Again, GISMO makes it natural and easy to accomplish the goal. Building an exhibit, students not only learn scientific principles, they also write reports, construct models and exhibits, and create art work for displays.

A particular problem for schools is integrating traditional shop/career programs into a curriculum that is increasingly directed at meeting the needs of college-bound individuals. While college preparation is a laudable ideal, many students who are gifted in other areas are not recognized, lose interest, and miss the opportunity to fully develop their skills. The museum context involves a wide spectrum of technical, career, and construction-oriented dimensions. Thus, the museum methodology specifically addresses the needs of vocational-track students while validating and integrating this critical component of the scientific enterprise. Technology and science have a synergistic relationship. Again, referring to the AAAS report:

“It is the union of science, mathematics, and technology that forms the scientific endeavor and that makes it so successful. Although each of these human enterprises has a character and history of its own, each is dependent on and reinforces the others.”

Science for All Americans, p. 1

The GISMO concept strongly also addresses the needs of groups that are traditionally underrepresented in the

sciences. It has been unusually successful in incorporating, engaging, and providing very positive outcomes for members of ethnically and racially distinct populations and females.

National science education standards envision change throughout the system. The teaching standards propose the changes shown in the following table. GISMO facilitates all of them.

Less Emphasis On:

More Emphasis On:

Treating all students alike and responding to the group as a whole

Understanding and responding to individual student's interests, strengths, experiences, and needs

Rigidly following curriculum

Selecting and adapting curriculum

Focusing on student acquisition of information

Focusing on student understanding and use of scientific knowledge, ideas, and inquiry processes.

Presenting scientific knowledge through lecture, text, and demonstration

Guiding students to active and extended scientific inquiry

Asking for recitation of acquired knowledge

Providing opportunities for scientific discussion and debate among students

Testing students for factual information at the end of the unit or chapter

Continuously assessing student understanding

Maintaining responsibility and authority

Sharing responsibility for learning with students

Supporting competition

Supporting a classroom community, with cooperation, shared responsibility and respect

Working alone

Working with others