Science Education Reform

More Emphasis . . . Less Emphasis

The Changes Recommended in the 1996 National Science Education Standards after Four Years of Debate and a Cost of Ten Million Dollars

Goals for School Science

The goals specified by the National Science Education Standards are to educate students who can:

- Experience the richness and excitement of knowing about and understanding the natural world;
- Use appropriate scientific processes and principles in making personal decisions;
- Engage intelligently in public discourse and debate about matters of scientific and technological concern; and
- Increase their economic productivity through the use of the knowledge, understandings, and skills of the scientifically literate person in their careers.

Most of the changes are needed in the way teachers teach, the way they continue to grow as teachers, and how student learning should be assessed. The major changes envisioned are offered as “less emphasis” conditions which describe what commonly occurs, while the “more emphasis” descriptions are the recommendations for gaining more success. The following page includes the nine ways for science teaching and the seven ways student learning can be assessed.

Teaching

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 in active and extended scientific inquiries
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 (and involving students in the process)
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 other teachers to enhance the science program

Assessment

Less Emphasis On	***More Emphasis On***
Assessing what is easily measured	Assessing what is most highly valued
Assessing discrete knowledge	Assessing rich, well-structured knowledge
Assessing scientific knowledge	Assessing scientific understanding and reasoning
Assessing to learn what student do not know	Assessing to learn what student do understand
Assessing only achievement	Assessing achievement and opportunities to learn
End of term assessments by teachers	Students engaged in ongoing assessments of their work and that of others
Development of external assessments by measurement experts alone	Teachers involved in the development of external assessments