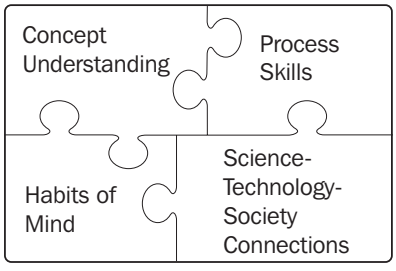
Contents

What is

The discipline of science is often thought of as a body of knowledge dealing with various aspects of the physical and biological world. Science is commonly referred to as biology, physics, earth science, and chemistry. Each of these subjects comprises a massive amount of information. The perception of science and, thus, science education as primarily concept understanding implies that the result of learning science is the acquisition of a knowledge base of facts.

More contemporary definitions of science and science education view concept acquisition as but one piece of a broader, richer picture. Science education can be defined as education in natural and social sciences, mathematics, and technology. This larger vision of science focuses on inquiry about the physical world in the context of society. This vision can be thought of as a puzzle that comprises an intricate interplay of several pieces: concept understanding, process skills, habits of mind, and science-technology-society connections. The pieces of science, just as the pieces in a puzzle, are not meaningful in and of themselves. Rather, each piece must be studied within the framework of the other pieces.



Science Literacy Puzzle

Science Literacy

It is not enough for education to be self-fulfilling; science education needs to prepare citizens to deal with global, national, and local problems, such as population growth, loss of resources, and the

Science?

effects of pollution, disease, and social strife. The definition of the scientifically literate citizen includes the following characteristics (AAAS 1989):

- familiarisation with the natural world
- awareness of how mathematics, science, and technology are related to one another
- understanding of key concepts and principles of science
- ability to think scientifically
- knowledge that science, mathematics, and technology are human enterprises and what that implies about their strengths and limitations
- ability to use scientific knowledge and ways of thinking for personal and social purposes

If acquiring these characteristics is deemed a worthy educational goal, then the key components of science literacy should be carefully and creatively integrated into the school curriculum. Such curriculum components derived from the list of characteristics above might include the following:

- a knowledge base emphasising basic concepts and principles as well as more abstract concepts such as unity and diversity
- an understanding of the interrelatedness of science, technology, and society (S-T-S connections)
- strengths and limitations of science as a human enterprise
- ability to think and trust the thinking process and to develop problem-solving skills and processes

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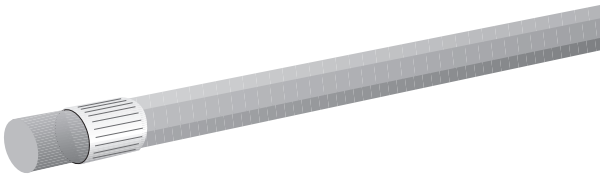
developing scoring rubrics for



As has been shown in the previous chapters, the boundaries that have traditionally separated the disciplines of science, mathematics, and English are being challenged. Science now focuses on a set of big ideas, as does mathematics. The ideas look different in the contexts of the different disciplines, but they are essentially the same: symmetry, balance, equilibrium, cycles, and so on. The new visions require teachers to reconsider the concepts they currently teach and strive to teach concepts, or big ideas, that transfer across disciplines.

The same is true for process-skill instruction. It is now apparent that the thinking skills required in science are similar to those used in mathematics. Classification in mathematics is similar to classification in science. Completing an analysis in mathematics is like completing an analysis in science. This is also true for the scientific habits of mind. In mathematics these habits of mind are called mathematical dispositions. No matter what the term, these habits of mind tend to be similar throughout the disciplines. For example, the ability to ask clear questions is essential in mathematics, science, and English. Noting the similarities among the concepts, skills, and habits of mind of the different disciplines is very helpful when developing scoring rubrics, as it will assist in identifying the important features of an interdisciplinary task.

Rubrics

One of the greatest challenges in developing performance assessments is the ability to identify the critical features of a task. This can be likened to taking an x-ray. An x-ray enables a physician to "see" the underlying bones and muscles that support the human body. In a sense, this is the view a teacher needs when determining how to score or assess a performance. Every performance contains important