
Accomplished science teachers have comprehensive understandings of the nature of science, inquiry, and natural phenomena.

Introduction

Accomplished science teachers realize that the goal of science education is to cultivate scientifically literate adults, and they know that productive learning is structured around knowledge of the nature of science, the process of inquiry, the context of science, and science content.

The Nature of Science

Accomplished science teachers know that scientific thought is multifaceted and that science is a way of knowing about natural phenomena. Science educators have identified a core set of concepts that express the nature of science: science is reliable and yet tentative; science is based on empirical evidence; science relies on observations and inferences; science utilizes theories and laws; scientific knowledge is generated through multiple methods; science is a creative and imaginative human endeavor; and science is a human activity that takes place within a cultural, political, and economic context.

Accomplished science teachers understand science as an expression of the deep human impulse to explore and learn ever more about natural phenomena. Teachers have a thorough grasp of science as a sense-making activity, that is, an approach to building a consistent, testable set of understandings about natural phenomena. Accomplished teachers are aware of the many complex ways in which scientific knowledge is generated, such as through experiments, correlational studies, and observations; they understand that there is no simple scientific method through which all scientific understanding is achieved. Accomplished teachers know how to apply scientific understandings to engineering practices. They also know how to help their students develop an understanding of the nature of science and to use this understanding to make informed decisions in their daily life.

Accomplished science teachers realize that in order for students to understand the nature of science, students need to engage in hands-on investigations. However, teachers also know that students do not develop an understanding of the nature of science through investigations alone; they require explicit instruction. For example, through an investigation of a pendulum, an accomplished teacher might illustrate