Science Teachers' Association of Ontario
Association des Professeurs des Sciences de l'Ontario
STAO/APSO

Science Co-ordinators' & Consultants' Association of Ontario
SCCAO

Position Paper: The Nature of Science

Introduction

A primary goal of Ontario's grades 1-8 Science and Technology and grades 9-12 science curricula is to develop scientifically and technologically literate individuals who possess the knowledge, skills, and habits of mind required to participate in a science– and technology–based world. The Science Teachers' Association of Ontario/Association des Professeurs de Sciences de l'Ontario (STAO/APSO) and the Science Coordinators' and Consultants' Association of Ontario (SCCAO) support and promote this goal.

A scientifically and technologically literate person is one who can read and understand common media reports about science and technology, critically evaluate the information presented, and confidently engage in discussions and decision-making activities regarding issues that involve science and technology. Furthermore, an important component of scientific literacy is an understanding of the Nature of Science (NOS)—what science is; what scientists, engineers and technologists do as individuals and as a community; how scientific knowledge is generated and validated; and how science interacts with technology, society, and environment.

Nature of Science

The primary goal of science is to understand the natural and human-designed worlds. Science refers to certain processes used by humans for obtaining knowledge about nature, and to an organized body of knowledge about nature obtained by these processes. Science is a dynamic and creative activity with a long and interesting history. Many societies have contributed to the development of scientific knowledge and understanding.

Scientists develop the best possible theories and laws about nature. Scientific theories are explanations of natural phenomena, and scientific laws are generalizations or universal relationships describing natural phenomena. Scientific laws and theories must be logical, testable, and consistent with empirical evidence about the natural world, and they must make accurate predictions about natural phenomena. In general, theories do not become laws; rather, they explain laws.

Scientists continuously assess and judge the soundness of scientific knowledge claims by testing laws and theories, and modifying them in light of compelling new evidence or a re-conceptualization of existing evidence. While some scientific developments occur relatively quickly, and are considered revolutionary, most developments in science result from a steady advancement of scientific knowledge. In general, scientists and technologists operate on the principle that scientific laws and theories are robust and durable.

Science, Technology, Society and the Environment

Science and technology exist in social and environmental contexts. They are affected by the values and choices of individuals and governments, and in turn have a significant impact on society.

Technology involves the development and use of materials, tools, and processes for solving human problems and helping to satisfy human needs and desires. Many of the products of technology help humans accomplish tasks that would otherwise be very difficult or impossible to carry out. Although technology provides many benefits, it also produces associated costs and risks. Science often uses and requires tools and processes developed by technology, and conversely, technology often employs principles, laws, theories, and processes developed by science.

Society influences science and technology in a variety of ways. For example, funding priorities are often given to products and processes deemed most "useful" or "productive." In addition, scientists' and technologists' decision-making processes may be influenced by their own interests and experiences.

Science and technology have significantly shaped society's basic views of the environment. One example is the current interest regarding the impact of burning fossil fuels on global warming, and the resulting political/scientific debate concerning international controls on fossil fuel consumption and associated emissions.

Recommendations

Students in science courses should be given ample opportunities to develop a sound understanding of science, the Nature of Science, and the interrelationships among science, technology, society and the environment.

Practicing science teachers are encouraged to engage in authentic science experiences (e.g., collaborative community partnerships) and professional learning experiences (e.g., conferences), in order to develop a deeper understanding of how science is done, and to increase and/or update their understanding of the Nature of Science.

Preservice science teacher candidates should be given opportunities to learn about the Nature of Science along with science curriculum, assessment, and pedagogy.

References

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