TEACHERS' UNDERSTANDING OF THE NATURE OF SCIENCE

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Abstract

There have been four systematic reviews of research on the nature of science over the past fifteen years, viz. by Abd-El-Khalick and Lederman; Lederman; Meichtry; and Abell and Lederman. This particular review follows the path of historical understandings of the nature of science, tenets of the nature of science and the stature of theories in the context of education, the role of science teachers, curricula and materials, what research has been done, how it has been done and what it tells us, and future directions for science education research. As research indicates that science teachers play a key role in forming the image of science that is held by the general public, their knowledge about the nature of science is very important. In fact it is argued that while a skilled scientist does not require an understanding of arguments in the philosophy of science, it is essential for science teachers. It is however noted that although many educational bodies advocate that students develop an understanding of the nature of science, studies report that activities which sustain the teaching of scientific enquiry are largely absent in most schools, and that the goals relating to scientific literacy for societal decision making are largely ignored. This apparent abrogation of responsibilities suggests that science educators are either unaware of the rise of science in the last hundred years, the conduct of science, its influence on values and priorities and its relation to social responsibility, or do not consider these aspects worthy of teaching in their classes. Lederman and Giddings feel that there are basic tenets of the nature of science which are implicitly and explicitly stated in the science education literature of recent decades, and about which there is some degree of consensus within the profession. These tenets, which have implications for the teaching of science and scientific literacy in schools, are the tentative and temporary status of scientific knowledge; that new knowledge in science is produced by creative acts of the imagination; that there is no one scientific method; that the methods of science are characterised by the nature of values rather than techniques; that science is a social activity, both influencing and responding to social needs; and that consensus among experts is the basis of scientific knowledge. Unfortunately, however, many curriculum reforms in science education have failed to effectively incorporate the nature of science as central to an explanation of how scientific knowledge is developed. Finally, the fact that Lederman believes that the arguments for promoting greater understanding of the nature of science in schoolchildren are primarily intuitive with little empirical support and that we have no way of knowing whether achievement of the a better understanding of NOS by our students will make them better decision-makers, or will improve their science achievement is noted, as are the concomitant implications that the jury is still out on this matter, important questions are

still left to be answered, and that there are most assuredly many questions that have yet to arise.