



Reasoning about Scientific Controversies: What Constitutes a Sophisticated Personal Epistemology?

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Abstract

Personal epistemology refers to people's knowledge and beliefs about the certainty, sources, and justification of knowledge[1]. With regards to science education, the development of a mature or sophisticated personal epistemology about scientific knowledge is seen as a key learning goal[2]. A sophisticated personal epistemology is needed to make sense of scientific controversies such as climate change. As teachers play a key role in shaping young people's views of science, it is important to assess the sophistication of teachers' personal epistemology related to scientific controversies.

This study investigates the epistemic beliefs that preservice teachers evoke when reasoning about climate change. Data for this study was collected using written questionnaires and in-depth interviews with 20 preservice teachers in Australia. The interviews were anchored four scenarios related to climate change (two were related to controversies about data or measurement, and two about causal claims). Content analysis was performed on the interview data; the reliability of the coding was established through an inter-rater agreement process.

The findings show that the preservice teachers were able to draw upon a variety of epistemic ideas reflecting both empiricist as well as constructivist epistemologies. Although they lacked deep understanding about the relevant scientific concepts, the preservice teachers could were aware that knowledge about data/measurement are more certain than knowledge about causal mechanisms. They were also aware that while scientific knowledge is built upon some empirical basis, it is also the product of a reasoning process that could be influenced by scientists training and personal beliefs.

These findings contradict the assumption (held by most theories of personal epistemology) that people hold unitary and coherent beliefs about an area of knowledge[3, 4]. The findings are more in line with the alternative view that personal epistemology is composed of fine-grained, context-sensitive ideas or elements that individuals draw upon quite flexibly when reasoning about knowledge[5]. In this view, being epistemologically sophisticated about science is not about having a constructivist epistemic belief that is consistently applied across contexts. It is more about being able to draw upon the appropriate ideas to reason about a complex issue. The methodological and practical implications of these findings will be discussed in the paper.

References

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