

The relationships between high school students' scientific epistemological beliefs and their informal reasoning on a socio-scientific issue

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Abstract

Socio-scientific issues are social dilemmas with conceptual or technological associations with science. Recently, how learners reason on socio-scientific issues has been highlighted by science educators. To get deeper insights into this important issue, this study was conducted to explore the relationships between 68 high school students' scientific epistemological beliefs (SEBs) and their informal reasoning on nuclear power usage. In this study, a quantitative instrument, including four scales: source, certainty, development, and justification, was utilized to evaluate the participants' SEBs, while an open-ended questionnaire was used to assess their informal reasoning on nuclear power usage. Through a series of content analyses, several quantitative measures were obtained to represent students' informal reasoning on nuclear power usage, including their decision-making modes, reasoning modes and reasoning quality. The results showed that the students' rebuttal construction, which is crucial to high reasoning quality, was significantly correlated with the two aspects of SEBs: development and the justification. It was also found that the participants' beliefs on the justification of science knowledge could significantly predict their informal reasoning quality. It seems that students' SEBs can be regarded as one of the important indicators for predicting their reasoning quality on a socio-scientific issue. It is suggested that, to improve learners' informal reasoning quality, instructors should try to promote the development of learners' epistemological beliefs towards science. Thus, their informal reasoning quality may be also improved.

Keywords: scientific epistemological beliefs, informal reasoning, socio-scientific issues, nuclear power usage