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# Students' understandings of nature of science and their arguments in the context of four socio-scientific issues

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**ABSTRACT**

The purpose of this study was to examine students understandings about nature of science (NOS) and their arguments in context of controversial socio-scientific issue (SSI). A total of 74 11th graders in six schools in Saudi Arabia participated in the study. The instrument used was a questionnaire consisting of four scenarios addressing SSI about global warming, genetically modified food, acid rain, and human cloning. The scenarios were followed by questions relating to argumentation and NOS. Quantitative and qualitative measures were employed to analyze the data related to participants understandings of three NOS aspects (subjective, tentative, and empirical) and their arguments components (argument, counterargument, and rebuttal). Results showed no significant correlations between argument components and the NOS aspects. On the other hand, qualitative data showed that participants who generated well-developed arguments across the four SSI also exhibited more informed understandings of the NOS aspects, especially for female participants. Further, the chi-square analyses did not show significant differences in participants arguments and NOS understandings across the four scenarios. Again, the qualitative data from questionnaires showed differences in participants responses to the different scenarios. The results were interpreted along contextual factors, emotional factors, and cultural factors. Implications for the teaching of NOS and arguments were discussed.

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Argumentation; high school; nature of science



## Introduction

With the growing challenges affecting our society, it is crucial to prepare scientifically literate students who can actively take part in addressing these challenges. All reform movements in science education advocate the preparation of scientifically literate students as a primary goal of science education (e.g. American Association for the Advancement of science [AAAS, 1989, 1993]; Council of Ministers of Education Canada [CMEC] Pan-Canadian Science Project, 1997; National Research Council [NRC, 1996]). Moreover,

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