Exploring how prospective biology teachers argue about controversial issues

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Mandatory vaccination, climate change, energy transition: topics at the interface between science and society are often controversial. Science teachers should teach their students to engage with such topics in a differentiated way so that they can make informed decisions and take responsibility. But how well can the future teachers do this themselves?

Dr. Nina Minkley from the Behavioral Biology and Biology Education group at Ruhr University Bochum, Germany, together with Professor Moritz Krell and Dr. Carola Garrecht from the Leibniz Institute for Science and Mathematics Education in Kiel, investigated this question with 76 prospective biology teachers. The team's conclusion: the structural complexity of their argumentation was good.

In terms of content complexity, however, they could include a broader range of content areas and perspectives in their argumentation. The researchers reported their findings in the *International Journal of Science and Mathematics Education* on March 15, 2023.

Should there be a mandatory vaccination against COVID-19?

The topic of the argumentation that the 76 participants wrote down as part of the study was a possible mandatory vaccination against COVID-19. The study took place in spring 2021, at a time when there was still a shortage of vaccine, but mandatory vaccination was already being discussed.

On the question of whether there should be a mandatory vaccination against COVID-19, the participants positioned themselves in different ways. "In terms of the structural complexity of their argumentation, they reached a relatively high level and justify their position with several arguments. Around a third even included possible counter-positions in their own argumentation," reports Nina Minkley.

Content complexity is only reflected to a limited extent

However, it was also noticeable that the participants were less confident

regarding the content complexity, that is, the consideration of different content areas such as politics, ethics, and social sciences. Here, the participants only considered two of the possible six content areas on average.

"We also found that those who supported mandatory vaccination most often referred to scientific and ethical arguments, such as protecting others. They rarely used political arguments. Those who argued against mandatory vaccination were slightly less likely to argue with scientific and ethical reasons, but referred much more to political arguments," says Nina Minkley.

The researchers recommend that the ability to argue about issues at the interface between science and society should be better embedded in the training of future teachers. "There are many perspectives on such issues, and ideally teachers should be exposed to the full breadth in order to be able to teach this skill to their students, too," the team says.

More information: Moritz Krell et al, Preservice Biology Teachers' Socioscientific Argumentation: Analyzing Structural and Content Complexity in the Context of a Mandatory COVID-19 Vaccination, *International Journal of Science and Mathematics Education* (2023). DOI: 10.1007/s10763-023-10364-z

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