

# Epistemologische Einstellungen von angehenden Chemie- und Physiklehrenden

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## Abstract

One of the currently discussed topics of research in science education is “nature of science” and its implementation in science curricula. In German secondary schools science is taught in separate subjects: physics, chemistry, and biology.

In the course of the adoption of philosophy of science topics basic research concerning the differences between epistemic stances of science teachers has not been conducted yet. The German “Bildungsstandards” do not explicitly mention aspects of nature of science. Additionally the epistemological aspects of the standards in physics and chemistry education are quite similar.

Theoretical works of different authors lead to the assumption that the subject of study influences the epistemological stances of students. Ludwik Fleck’s approach of domain-specific styles of reasoning (“Denkstile”) is one of the central aspects of the works of Thomas S. Kuhn and Ian Hacking.

This study contributes to (1) the understanding of epistemic stances of pre-service physics and chemistry teachers in Germany and (2) the relation of teachers’ epistemic stances and their views about models and modelling in science education.

Regarding pre-service teachers, views on aspects of nature of science can differ between biology, physics, and chemistry teachers. The first research question aims at these differences. Due to missing quantitative instruments examining epistemological stances in respect of the degree of scientific realism, a questionnaire is developed and carried out with additional questionnaires and tests to measure variables like knowledge and interest in philosophy of science.

The second research question is concerned with the relations of teachers’ epistemological stances and their representation and activities with models and modelling in classroom

contexts. Different questionnaires are applied to examine the extent of the correlations.

The results show the sample of pre-service chemistry teachers to be more attracted to a realistic epistemology than the physics teachers. The variable knowledge of philosophy of science is found to be influencing the degree of scientific realism. Within the group of physics teachers the degree of scientific realism also turns out to be dependent on the interest in philosophy of science.

Teachers' attitudes towards models and modelling in science education seem to be related to their epistemic stances. The strongest correlation is found between the degree of scientific realism and the teacher's representation of models in science education contexts. Pre-service teachers with realistic stances tend to represent models as direct copies, while less realist persons describe models as tools or instruments. Furthermore, teachers with low-realistic stances discuss the meaning and nature of models more often. The relation of the degree of scientific realism and the way of introducing models in school education by pre-service science teachers is not significant.

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