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# **Studies on Freshman Science Student Teachers' Beliefs about Science Teaching and Learning**

## **Abstract**

The present dissertation focuses as a case on freshman Science student teachers' beliefs about teaching and learning science from four German universities. The studies focus an overall consideration but also differentiations between student teachers' beliefs from secondary Chemistry, Biology and Physics teaching, as well as from Primary Science education. The work is a collection of different qualitative and quantitative studies and an approach towards their integration in a Mixed-Methods-Design.

In the qualitative part of the dissertation, freshman Science student teachers' Beliefs about Classroom Organisation, Beliefs about Teaching Objectives and Epistemological Beliefs in the Natural Sciences are evaluated. This part made use of the idea of analysing student teachers' drawings about themselves as a teacher in class. In a pilot study, an instrument and evaluation pattern was developed by Grounded Theory. This instrument was applied to a sample of 284 student teachers from the four science teaching domains. In the quantitative part, information was collected from the same sample as in the qualitative main study about student teachers' Curricular Beliefs, Beliefs about the Nature of Science and about the Nature of School Science. Here different Likert-type questionnaires were used. Finally, an integration of the data from all the four qualitative and quantitative studies is discussed in the means of a Mixed Methods approach. The integration was made on the basis of the calculation of empirical quantiles.

The studies indicate that a wide diversity of beliefs exists among the whole sample of Science student teachers and also within the different sub-groups of student teachers from the four different teaching domains (secondary Chemistry, Physics, Biology, or Primary Science). Clear overall tendencies between the sub-groups were found when recapitulating all the data from the different studies simultaneously. The results suggest that beginning Chemistry and, even more pronouncedly, Physics student teachers profess quite strongly-held, traditional beliefs about teaching and learning science. Biology and Primary Science student teachers express quite modern beliefs towards teaching and learning in their subjects. Their beliefs prove to be more in line with modern educational theory in the means of student-oriented teaching and constructivistic learning.