

PCK and beliefs about teaching and learning electricity in lower secondary: A comparison between teacher students and first year-teachers

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The relationship between teachers' beliefs, PCK and their teaching practice has driven research in the field of teachers' professional knowledge for the last decades. In order to investigate whether and to what extent PCK varies between teacher students and fully educated teachers, this study focuses on the comparison of PCK test results of pre-service teachers and first year-teachers in Austria. First findings show, that there is hardly any difference between pre-service teachers' and first year-teachers' PCK. Nevertheless some difference was detected concerning beliefs as well as the self-efficacy.

1 Theoretical Background-

This project is located in the research field of teachers' professional knowledge, which has established itself as a fixed component of educational research. There is consensus that teachers' professional knowledge can be divided into three parts: content knowledge (CK), pedagogical knowledge (PK) and pedagogical content knowledge (PCK), which was first declared by Shulman [8]. Since the introduction of PCK, numerous interpretations and views of how this profession-specific knowledge can be defined and articulated have been made. However, a few "big ideas" which characterize PCK have emerged [2] [6]:

- PCK is a teacher-specific knowledge base
- PCK is topic-specific
- Beliefs about learning and teaching are distinct from PCK, but act as amplifiers and filters for teaching physics
- PCK is related to content knowledge as well as pedagogical knowledge
- The integration and reflection-in-action of PCK plays a crucial role while teaching

A model of teachers' professional knowledge and skills that includes teachers' beliefs in addition to PCK and covers all those big ideas is the "consensus model of PCK" [2], formulated after the first PCK-Summit held in 2013.

The relationship between teachers' beliefs and PCK has driven research in this field in the last years, but there is still uncertainty to which extent PCK as well as beliefs can be developed and enhanced [3][4].

2 Focus of the study – Research questions - Methods

In order to investigate whether and to what extent PCK varies between teacher students and fully educated teachers, this study focuses on the comparison of pre-service teachers at the end of their studies and first-year teachers in Austria.

Hence, approximately 120 students and beginning teachers filled in a three-part questionnaire. The first part measuring PCK focused on the topic of electricity. The PCK-test consists partly of items of already existing test instruments [1] as well as of some newly generated items. The

second part of the questionnaire contains scales measuring beliefs about teaching and learning physics [7] and the third covers the measurement of self-efficacy teaching of physics[5].

Research questions guiding the analysis of the collected data are as follows:

- Is the developed questionnaire an adequate instrument to measure PCK and beliefs of our sample?
- How well-developed is pre-service and beginning teachers' PCK in the field of electricity? What differences can be detected between the two groups?
- What differences concerning beliefs can be discovered between pre-service teachers and beginning teachers?

3 Results and Conclusions

Preliminary findings show that the used questionnaire is sufficient to measure PCK in the field of electricity. Furthermore, the used scales measuring beliefs and self-efficacy concerning teaching of physics are reliable. A first analysis of the PCK-scores indicates little to no difference between teacher students and first-year teachers. However, differences in the belief system as well as self-efficacy can be found. This leads to the assumption that the first year of teaching changes affective personality traits whereas a knowledge gain in PCK cannot be detected.

A deeper insight into the results of the PCK-test, beliefs and self-efficacy will be presented at the conference.

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