

Sig's: SIG 11 - Teaching and Teacher Education

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To participate in the knowledge society, 21st century skills are needed. Science is seen as a promising context because it is not only a body of accepted knowledge, but also involves processes that lead to these skills (Hilton, 2010) Exploring the Intersection of Science Education and 21st Century Skills: A Workshop Summary 2010 National Academies Press 0309150647 (Hilton, 2010), such as the agreement between deep thinking and problem solving and typical scientific inquiry activities like engagement, exploration, explanation, elaboration, and evaluation. Scientific inquiry teaching strategies promise to foster students' interest in science and teachers' attitudes and knowledge are crucial for the implementation of these practices. Transforming teacher practice across the EU will require significant and sustained investment in continuous professional development based on sound research studies (Osborne & Dillon, 2008. Science education in Europe: Critical reflections 132008 London: The Nuffield Foundation (Osborne & Dillon, 2008). We will present research on both pre- and in-service teacher-training projects to improve the practice of scientific inquiry teaching and the teachers' attitudes and/or knowledge. A third presentation reports on a teacher-training project designed to develop teachers' diagnostic and teaching skills with regard to the students' competence to use scientific modelling. And finally, a fourth teacher-training project documents the impact of scientific inquiry teaching on students' motivation and their self-regulation competencies.

Primary teachers conducting inquiry projects: The effect on attitude towards science and inquiry

Quantitative methods, Pre-service teacher education, Attitudes and beliefs, Science education, Primary education, Inquiry learning

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This paper presents the results of a theoretically informed professionalisation project that was set up to improve primary teachers' attitudes towards science and attitude towards inquiry. A positive attitude towards science is of fundamental importance for teachers when stimulating interest in science among primary school students. However, most professional development projects for primary teachers focus mainly on classroom didactics and traditional science lessons. It is questionable whether this approach results in improving teachers' attitudes. One approach to change teachers' attitudes towards science and inquiry is by having them experience a genuine inquiry process themselves. This paper presents a study on the effects of a year-long teacher inquiry project, on teachers' attitudes towards science and towards inquiry. The effects were investigated using a pre-test-post-test experimental control group design (N = 62). After

participating in the inquiry project, primary teachers showed significantly improved attitudes towards teaching science on two out of six attitude components and significantly improved their attitudes towards inquiry on two out of five attitude components compared to the control group. The results of this professionalization project will be linked to a previously developed theoretical framework of teachers' attitude towards science and will be discussed in light of the results of another professionalization course that was more explicitly focused on teachers' attitudes, rather than their inquiry skills. We will contrast these two approaches to expose key elements in primary teacher professional development for successful attitude improvement regarding science education.

Attitudes and knowledge of pre-service biology teachers planning science inquiry lessons

Quantitative methods, Pre-service teacher education, Biology, Science education, Secondary education, Inquiry learning

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Learning to create an inquiry-based lesson is a critical element of teacher education (Windschitl, 2003). Not every teacher who possesses high content knowledge (CK; Shulman, 1986) is confident in teaching science (Harlen, 1997). However, both are necessary to foster students' learning in scientific inquiry (Kanter & Konstantopoulos, 2010). Van Driel, Beijaard, & Verloop (2001) recommend the use of peer coaching to help develop science teachers' pedagogical content knowledge (PCK) towards a reform-oriented curriculum, with inquiry as a central element. However, little remains to be known about the interplay between attitudes, CK, and PCK when teachers are planning science lessons. As part of our research we try to uncover the role of attitudes and knowledge in relation to the quality of planned inquiry lessons. Our intervention study, KUBeX, focuses on the impact of collaborative lesson planning in pre-service teachers. As part of the research we investigated the effects of pre-service teachers' knowledge and beliefs about teaching scientific inquiry on the quality of the collaborations and the lesson plans. KUBeX is a binational project involving three Swiss universities and one German university. Participants were pre-service teachers pursuing qualifications as lower secondary biology teachers (N=112). In this contribution we will present initial findings about the interplay of student beliefs, CK and PCK in relation to scientific inquiry. These results will allow us to look in a later step at the impact of attitude and knowledge on the quality of scientific inquiry lesson planning.

How to foster pre-service biology teachers/diagnostic and teaching skills regarding model competence

Content analysis, Quantitative methods, Pre-service teacher education, Science education, Primary education, Inquiry learning

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