

Savittree Rochanasmita Arnold 2008: The Development of a Course to Enhance Pre-service Science Teachers' Professional Knowledge. Doctor of Philosophy (Science Education), Major Field: Science Education, Department of Education. Thesis Advisor: Associate Professor Bupphachart Tunhikorn, Ph.D. 349 pages.

Professional knowledge has been explained as the knowledge that is held in active relation with practice, and also is used to shape professional practice or action. The purpose of this study was to design, implement, and determine the effectiveness of a course to enhance pre-service science teachers' professional knowledge during the course and student teaching. The course was designed with guiding principles, current situation of professional experience training, previous methods courses, and expected levels of professional knowledge derived from analysis of documents and needs of participants. The results from the Designing Phase revealed the course characteristics which included: providing opportunities for pre-service science teachers to see examples of how to teach; enhancing scientific, technological, and research on best practice knowledge; enhancing inquiry, planning, and teaching skills, and reflective thinking; encouraging the happiness, attitude toward the teaching profession; enhancing knowledge of topic-specific instructional strategies, subject matter knowledge, lesson plans, science process skills, classroom management, producing instructional media, utilizing technology, assessment and teaching based-on the student centered approach; providing opportunities for pre-service science teachers to revise and implement domains of professional knowledge into planning and teaching practice through the process of seminar discussion; integrating reflection and role models were used as activities in the course. The course aimed to enhance pre-service science teachers' professional knowledge in lesson planning and transforming science content into effective teaching with respect to the National Education Acts 1999.

The findings from the implementation of a course through fifteen weeks of activities indicated that the course influenced pre-service science teachers' underlying professional knowledge by enhancing them to be more consistent in constructivist-based views of teaching and learning science. Moreover, the course also affected the ability to implement professional knowledge during the school based portion of a companion course by having some influencing factors emerge from the study. In the follow up phase, the course continued to enhance pre-service science teachers' underlying professional knowledge and their abilities to implement professional knowledge during their student teaching. There were factors that affected the development of the professional knowledge that emerged during the study. The key factors included the cooperating teachers, practicum school context, the university advisor, and the course. The main influence pre-service science teachers received from the course was on lesson plan writing. The characteristics of pre-service science teachers' students tended to be enhanced in a positive manner which included knowledge, process, and attitude toward science.

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