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The influence of experience on teacher topic specific PCK (TSPCK) on chemical equilibrium

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Abstract

Content knowledge (CK) and Topic Specific Pedagogical Content Knowledge (TSPCK) are key components of teacher competence in transforming the science topics. Both CK and TSPCK are mostly developed at the level of pre-service teachers in chemistry topics. However, similar teachers who their CK and TSPCK were developed were not been followed to check their progress of CK and TSPCK in the field of education. Yet, little is known about how experience influences the development of CK and TSPCK within chemistry topics. To address this concern, this study used validated CK and TSPCK instruments to assess teachers CK and TSPCK within the topic of chemical equilibrium. The study involved a group of seven qualified physical science teachers who were once involved in the intervention about TSPCK on a topic chemical equilibrium in 2011. The study intended to find the influence of experience on the quality of teachers' TSPCK. In this study, a group of seven in-service physical science teachers was followed to compare their quality of TSPCK and CK in chemical equilibrium after 8 years of completing their B.Ed. The quality of the teachers' TSPCK was compared between two points, between the time when they were still undergraduate in 2011 and after eight years of experience in the field of education. The study is based on mixed methods research. The data was collected using both CK and TSPCK instruments in chemical equilibrium, as well as interviews. The marking memo was used to score CK tool, and rubric was used as a guideline to score the teachers' responses from the TSPCK tool. The rubric consisted of four levels of competencies, level 1 (limited), level 2 (basic), level 3(developing) and level 4(exemplary). The study identified that teachers' quality of CK and topic-specific PCK was not satisfactory. The following three major reasons were identified from teachers with not well-developed topic-specific PCK, (1) teachers lack experience of teaching grade 12, (2) never taught a topic within a period of 8 years, (3) and lack of attending developmental workshops. Teachers whom their topic-specific PCK developed, taught the topic in grade 12 for the past eight years. These teachers engaged themselves in postgraduate studies and content training. The study revealed that the quality of topic-specific PCK develops with experience 1) **when teachers are teaching that topic**, 2) **when teachers are constantly developed in that topic**, and 3) **when teachers are involved in other courses in science education**. The study can assist both quantitative and qualitative researchers on methods when exploring the influence of the experience on teachers' content knowledge and on the quality of their topic specific PCK in future.