

https://dspace.org/

Exploring the link through which PGCE student teachers' topic specific PCK is transferred in planning, into enactment and into influencing learner outcomes

Makhechane, Mamohato Violet

2021
https://hdl.handle.net/10539/31843

Downloaded from a DSpace repository. https://dspace.org/

ABSTRACT

In response to the high demand for teachers in Africa and internationally, non-graduate teaching bachelor's degree holders are recruited into the teaching profession. While they are considered to have high content knowledge (CK) from their previously acquired bachelor's degrees, their lack of pedagogy leaves them with little or no understanding of pedagogical transformation of that CK. Therefore, an investigation of the development of their knowledge for teaching this CK was important. In science education, the construct of Pedagogical Content Knowledge (PCK) has been agreed upon as a construct that blends both the CK and Pedagogical Knowledge (PK), enabling the pedagogical transformation of content knowledge into forms that the learners can comprehend, thus improving classroom instruction. This study investigated the influence of an intervention on the development of physical sciences Postgraduate Certificate in Education (PGCE) pre-service teachers 'Topic Specific PCK (TSPCK) in the topic of Chemical Equilibrium. It focused on tracking the development of their TSPCK from the context of planning to teach, its enactment in the actual classroom teaching and how this enactment influenced learner outcomes in the same topic. The study employed a mixed method (MM) research design of a cohort of 8 PGCE pre-service teachers (PPSTs) registered for a physical science (chemistry) methodology course that aimed at developing their knowledge for teaching, using a TSPCK construct. Applying a case study as a research strategy, the whole class of 8 PPSTs formed a case that enabled the study to describe the quality of planned TSPCK. The cohort was exposed to an explicit TSPCK intervention that ran over 6 weeks. The intervention focused on developing the PPSTs' TSPCK using five content-specific knowledge components for the pedagogical transformation of content knowledge on the topic of Chemical Equilibrium. For this entire group, data were collected through the pre- and post-TSPCK tests and content representations (CoRes)before and immediately after the intervention. Then, a subset of 3PPSTs from the whole class was followed into the classroom where each of them taught two lessons each on Chemical Equilibrium. A subset of 3 PPSTs formed 3-mini cases with 3 classes of learners from 3 different high schools. Data collected at this stage were: the video-recorded lessons of the PPSTs; lesson interviews and stimulated recall interviews conducted with each of the PPSTs after the lessons; and finally, the pre-and post-learner achievement tests and learners' views about the lessons. Data from the 3 mini cases enabled the study to describe the quality of enacted TSPCK and the resultant learner outcomes. The analysis happened in four different stages. Firstly, the PPSTs' TSPCK tools and CoRes were analyzed for planned TSPCK. Secondly, the observed lessons, corroborated with interviews were analyzed for enacted TSPCK. An in-depth qualitative analysis was followed to analyze for the moments of interactive use of TSPCK components in TSPCK tools, CoRes, and lesson observations. Thirdly, the learner- achievement tests were marked with a memorandum of correct answers and analyzed for significant difference through the Rasch Analysis Model and Wilcoxon signed-rank test. Fourth, the relationship between PPSTs' enacted TSPCK and learner achievement were estimated by calculating the Pearson correlation coefficient. The analysis of TSPCK tests and Cores revealed

a significant improvement in the quality of the PPSTs' planned TSPCK following the intervention. Secondly, the PPSTs' lessons demonstrated a high quality of TSPCK enacted in their teaching, with TSPCK episodes categorized mainly at proficient and sophisticated levels. Finally, the analysis revealed a significant positive correlation between the PPSTs' enacted TSPCK and learner performance following the PPSTs' teachings. The correlation increased in positive strength with sophisticated TSPCK episodes emerging from the PPSTs' teachings. The findings suggest that an explicit use of the TSPCK construct can be used to train pre-service teachers (specifically PGCEs) whose teaching can efficiently stimulate the learning process and positively impact on learner performances. The study acknowledges the limitation brought about by the small sample size. Therefore, the findings cannot be generalized. However, the findings of this study suggest that the intervention has a potential to bridge the gap that exists between expert and novice teachers' ability to teach for understanding, and thus produce high quality teachers needed in developing countries including South Africa.