

# Development of Pedagogical Content Knowledge for Teaching Nature of Science

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## Abstract

Developing students' Nature of Science (NOS) conceptions is recognized as a salient science curricular emphasis in the recent education reforms around the world. In Hong Kong, the pressure for preparing apt teachers capable in teaching NOS is mounting in achieving the new curriculum goals stipulated in the reform document. Studies showed that teachers require more than knowledge of NOS to teach successfully. It is suspected other knowledge bases for teaching is also important in informing teachers' pedagogical decision related to NOS instruction. Among all knowledge bases, pedagogical Content Knowledge (PCK) seems to be most germane to the teaching practice that development of PCK is a coveting goal for teacher educators. However, virtually no study focused on the development of PCK for teaching NOS (PCKnos). This study aimed to fill the research gap through studying how preservice teachers acquire PCKnos.

In this study, ten preservice teachers majoring in biology teaching in a preservice teacher preparation program in Hong Kong have participated. In the Major Methods Course of the program, preservice teachers completed three assignments that focused on infusing NOS ideas in teaching biology. All three assignments placed heavy emphasis on reflection of pedagogical experiences; two of the three assignments used video technology to support preservice teachers' development. In assignment 1, participants viewed two authentic videos demonstrated NOS instruction and selected episodes for making comments. The comments captured the knowledge of preservice teachers about teaching of NOS. The two videos were repeatedly viewed and being commented at three different occasions in the teacher preparation program (at start of the program, before main practicum, and at the end of the program) therefore assignment 1 captured portraits of teachers' understanding of NOS instruction at different developmental stages. Assignment 2 was a video supported lesson study that preservice teachers needed to video tape their peer for learning while assignment 3

was a curriculum pack design task. Assignment 2 and 3 further supplement the data provided by assignment 1 on PCKnos.

All assignments are used in analysis to infer structures and content of PCKnos. In addition, by comparing PCKnos demonstrated longitudinally at different stages in assignment 1, hypotheses about how PCKnos was developed were formed.

Hypotheses were further tested by interview data and data from all other assignments and observation. We explored the emergent themes of 1) the content and development of PCK for teaching NOS during the course of the program, and 2) the influencers of PCK development in the context of the teacher preparation program.

Result indicates that though the development of PCKnos is idiosyncratic, teachers' reflection and teaching experience seems to be essential ingredients in improving the awareness of pedagogical issues. It is also found that helping preservice teachers to develop PCKnos may require explicit attention to specific NOS items. Therefore we would like to argue teacher preparation program should address teaching of NOS explicitly so as to facilitate preservice teachers to develop a more informed PCKnos.