Pedagogical Content Knowledge Development of Preservice Secondary Mathematics Teachers

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Research Apprenticeship Report Abstract

This study of five preservice secondary mathematics teachers was conducted during the participants’ concurrent enrollment in a mathematics methods course and a mid-semester student teaching experience. The study investigated the development of pedagogical content knowledge—the ways of representing and formulating the subject that make it comprehensible to others (Shulman, 1986). By utilizing participants’ constructed concept maps and related interviews, this study attempted to define ways that pedagogy informs content and ways content informs pedagogy in order to answer the question of how pedagogical content knowledge develops.

Three phases of map construction were analyzed—preactive, interactive, and postactive (Artzt, 1999; Jackson, 1968)—which took place before, during and after the preservice teachers’ first teaching experience in the classroom. The themes of (a) planning, (b) reflection, (c) adjusting, and (d) knowing students, emerged from the pedagogical map data as commonly important concepts for the preservice teachers. For preservice teachers added these concepts of importance as hierarchical knowledge during the interactive phase while one showed predominant growth through reflecting on her actions in the postactive phase.

Pedagogical content knowledge developed within their cognitive framework of reflection in and on their interactions with students’ learning processes and ongoing, informal assessment. Instances of considerable awareness on the part of the preservice teachers often occurred when skills gaps, timing, and motivation were issues of relevance in their classroom experiences. Analysis of the concept map data indicated the preservice teachers constructed a deeper schema of pedagogical cognition during the interactive phase and a deeper level of reflective thinking during the postactive phase. Implications for mathematics teacher education include the metacognitive benefits of focused reflection on pedagogical content knowledge during preservice education.