## *Research Note*

# South Korean Elementary Teachers' Pedagogical Content Knowledge in Mathematics Introduction and Background

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**Abstract:** *The purpose of this research is to develop an understanding of South Korean elementary teachers' pedagogical content knowledge in mathematics. In accordance with this purpose, this research seeks to identify the mathematics knowledge for teaching at the elementary level by analyzing South Korean elementary teachers' pedagogical content knowledge in mathematics.*

## Introduction

The *Common Core State Standards for Mathematics Initiative* (CCSS) proposes that the teaching of mathematical content needs to underscore both procedural skills and conceptual understanding "to make sure students are learning and absorbing the critical information they need to succeed at higher levels" (CCSS, 2010). Teachers need to develop not just a deeper knowledge of subject matter (algebra, geometry) but an understanding of the mathematical process of inquiry and problem solving to enrich their teaching practices and to encourage critical thinking skill development in their students. Teachers' perceptions of what constitutes good mathematics instruction pose great influence on the type of mathematics pedagogy they will deliver in their own classrooms (Hill, 2004). Most important, policymakers and national organizations begin to focus on how teachers might promote students' high academic performance (U.S. Department of Education, Office of Postsecondary Education & Office of Policy Planning and Innovation, 2002). In addition, wide-ranging research over the past decades has shown that the diversity in teacher quality might have a huge difference on student performance (Rice, 2003). In particular, recent research has revealed that student performance in mathematics is most affected by mathematics teacher quality (River & Sanders, 2002). How then might we define mathematics teacher quality?

There are studies that attempt to find the answer to this question concerning elementary teachers' pedagogical content knowledge in mathematics. For example, Hill, Rowan, and Ball (2005) propose that the quality of mathematics teaching and student achievement is affected by elementary teachers' pedagogical content knowledge in mathematics. In this case, elementary teachers' pedagogical content knowledge in mathematics should be distinguished from secondary teachers' pedagogical content knowledge in mathematics, because there are certain differences between them (Dee & Jacob, 2011). Thus, because it is viewed that elementary teachers' pedagogical content knowledge in mathematics influences student performance in mathematics, it is important to study the nature of this impact on student performance.

In order to understand elementary teachers' pedagogical content knowledge in mathematics, this study will focus on elementary teachers of South Korea. Cross-national research might provide chances to understand diverse issues about teaching and learning (Cai, 2001).

## Study Objectives

The purpose of this research is to understand South Korean elementary teachers' pedagogical content knowledge in mathematics. In accordance with this purpose, this research seeks to identify the mathematics knowledge for teaching at the elementary level by interviewing at least eight South Korean elementary teachers on their pedagogical content

knowledge in mathematics and observing their teaching. In addition, this research will survey at least 300 South Korean elementary teachers in order to complement and to broaden the findings generated from the interviews and observations of the eight elementary teachers. In an attempt to understand South Korean elementary teachers' pedagogical content knowledge in mathematics, the guiding question for this study is what pedagogical content knowledge in mathematics do South Korean elementary teachers use in their classroom?

This study is also informed by the following sub-questions:

1. How do South Korean elementary teachers make meaning of their pedagogical content knowledge in mathematics?
2. How does their understanding of pedagogical content knowledge in mathematics influence their classroom practices?
3. In what mathematics activities do those teachers engage their students that relate to pedagogical content knowledge?

## Material, Methods, and Analysis

South Korean elementary teachers' pedagogical content knowledge in mathematics might be part of their instructional practices. Therefore, there is a need to conduct extensive interviews with South Korean teachers and observations of their teaching. Also, conducting a survey will help to develop a broader perspective about elementary teachers' pedagogical content knowledge. For that reason, this study will use mixed-methods, which merges the strengths of quantitative and qualitative paradigms. The National Research Council (2002) suggests that investigations may be bolstered considerably by using several approaches that incorporate "quantitative estimates of population characteristics and qualitative studies of localized context" (p. 108).

## Interviews

The data sources will include three audio-recorded interviews with the South Korean elementary teachers and observations of their teaching. The first interview will create space for understanding the participants' pedagogical content knowledge in general. The second interview will involve an investigation of the participants' pedagogical content knowledge with students' works. A questionnaire developed in a previous study (Ball, 1998) will be adapted for use in the second interview. The third interview will contain questions about the observations of their teaching for understanding the participants' perspectives and clarifying their intention within the context of their teaching.

## Observation

A second data source will consist of a 40-minute classroom observation of each of the eight South Korean elementary teachers. The collected data from filed notes may enrich and complicate our understanding of the interview data because, as Rossman and Rails (2003) observe, the participants' actions can be "purposeful and expressive of [their] deeper values and beliefs" (p.195).

## Analysis of lesson plans

It may not always be feasible to observe and video record teachers' teaching (Cai, 2005). Instead, analyses of lesson plans can provide insights into how teachers conceive of and plan their lessons (Stigler, Fernandez & Yoshida, 1996). Therefore, this study will include the analysis of 16 lesson plans of eight South Korean elementary teachers that I will observe based on the theoretical orientation and the conceptual framework.

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