Chapter 4
A Comprehensive Framework for Teacher Knowledge (CFTK):
Complexity of Individual Aspects and Their Interactions

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ABSTRACT

In this study, we examine the validity of the Comprehensive Framework for Teacher Knowledge (CFTK) through a systematic review and meta-analysis. This model, developed through a series of exploratory studies, transforms current understanding of teacher knowledge from a linear structure to a three dimensional model by pairing 6 inter-related aspects into three orthogonal axes: 1) Field comprised of subject matter and pedagogy; 2) Mode comprised of orientation and discernment; and 3) Context comprised of individual and environment. The current study analyzes the way interactions of these aspects appear in literature across a wide domain of subject matters. These interactions have direct implications for future research on teacher knowledge as well as policies for guiding professional development and pre-service teacher training.

INTRODUCTION

Teacher knowledge forms the foundation for all the pedagogical decisions that occur in the classroom, drawing upon teachers' personal experiences, education, and other teacher preparation (Borko & Putnam, 1995). Several teacher knowledge frameworks have been put forward to explain components of teacher knowledge (e.g., Cochran & Conklin, 2007; Even, 1990; Jacobson, 1997; Salhi, 2006; Sankar, 2010), and some frameworks have gone so far as to hypothesize interactions among these components, most noticeably, Pedagogical Content Knowledge, or PCK (Shulman, 1986). Yet no single framework exists to encapsulate the complexity of teacher knowledge. A new framework clarifying the nature of teacher knowledge could provide a structure for more precise research on the nature of teacher knowledge and its impact on student learning and achievement (Ball, Thames, & Phelps, 2008; National Council of Teachers of Mathematics (NCTM), 2000). Similarly, Wilkinson (2005) described the need for formal understanding of teacher knowledge to avoid the erosion of teacher autonomy and the professionalization of teaching. Korthagen and Lagerwerf (2001) considered a broader, all-encompassing teacher knowledge framework to be a necessary component for diagnosing and correcting gaps between theory and practice.

The Comprehensive Framework for Teacher Knowledge (CFTK; Ronau et al., 2010; Ronau, Rakes, Wagner, & Dougherty, 2009; Ronau, Wagener, & Rakes, 2009) was developed to address this need by integrating six aspects of teacher knowledge into a single, three-dimensional structure. The present study develops the validity of CFTK through a systematic review of literature by addressing the following questions:

1. Does CFTK address all aspects of teacher knowledge found in existing research?
2. Which CFTK aspects have been seen to interact in existing research?

BACKGROUND

Several knowledge frameworks have been posited and accepted related to student thinking and learning such as Bloom's hierarchical taxonomy (Bloom, Englehart, Furst, Hill, & Krathwohl, 1956), Hiebert and Carpenter's (1992) procedural and conceptual knowledge, Skemp's instrumental and relational types of knowledge (1976/2006), Webb's Depth of Knowledge (Webb, 2002, Webb & Kane, 2004), and Porter's (2002) Cognitive Demand. These frameworks began the work of exploring knowledge and learning generally from the standpoint of what teachers need to know about student learning.

Another wave of studies developed Shulman's PCK further by examining the application of PCK to specific contexts such as Mathematics Knowledge for Teachers (MKT; Hill, Schilling, & Ball, 2004), and Technology Pedagogical Content Knowledge (TPACK; Mishra & Koehler, 2006; Niess, 2005). These and other frameworks significantly contribute to understanding the inner workings of some aspects of teacher knowledge including some aspect interactions, but none of these frameworks accounts for all of the components of teacher knowledge found in literature, and no framework has attempted to address all known interactions of teacher knowledge aspects. Such an absence in the literature may result in a lack of focus about fundamental problems in education such as which aspects are important for short term and long term student growth and learning, whether different aspects and interactions are more important across different subject matters and grade levels, and which aspects and interactions need further study and the nature of such needs. The complexity of teacher knowledge may account for much of this deficiency.

The nature of teaching demands a high degree of organization among multiple facets of teacher knowledge (Ball et al., 2008; Camp, 2001; Mishra & Koehler, 2006; Peressini, Borko, Romagnano, Knuth, & Willis, 2004). This demand is consis-

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