Chapter 7
Mathematics Acquisition and Immigrant Children

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ABSTRACT

Given that early mathematics education lays the foundation for later mathematics achievement, teachers of young children have the responsibility and challenge of providing effective mathematics instruction to all children, including those who are immigrants. This chapter discusses four key points relevant to mathematics acquisition and immigrant children: (a) bilingualism as an asset, (b) strengths of immigrant families, (c) teachers' mathematical knowledge, and (d) developmentally appropriate mathematics environment. It is suggested that institutions of higher education, administrators, and teachers of young children consider those four key points, and that each topic is linked to on-going professional development for the purpose of effective instruction.

INTRODUCTION

Early education lays a foundation for children's later academic success (Ludwig & Phillips, 2007) and early mathematical learning sets a trajectory for later mathematical learning. The mathematics ability of children entering kindergarten is a strong predictor of later academic success, an even better predictor than early reading ability (Duncan, Dowsett, Claessens, Magnuson, Huston, Klebanov, et al., 2007). Thus, preschool and early elementary teachers play an important role in laying a foundation for children's mathematical knowledge, skills, and interest in mathematics. In addition, providing depth and breadth of knowledge is critical, inclusive of numbers and operations; patterns, relationships and functions; geometry; measurement and data analysis (NAEYC & NCTM, 2010).

Children with families who have a low socioeconomic status (SES) show less proficiency in mathematics performance then their middle SES peers, particularly when metacognition is required (Denton & West, 2002). Also, children with low SES tend to have lower language skills which can impact mathematics acquisition (Hart

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& Risley, 1986); language is embedded within and foundational to mathematics learning. Immigrant children have been thought to be at double risk in mathematics acquisition in that they may be more likely to have a low SES background and may be learning English as a second language. It is known that children who do not acquire basic academic skills in reading and mathematics by third grade are at a disadvantage in their school career; efforts to remediate can be costly and may or may not be effective (Heckman, 2000).

BACKROUND

One of the top domestic issues in the United States is the low educational achievement of a majority of immigrant youth, typically defined as children under the age of eighteen who are foreign born or U.S.-born to immigrant parents. These children represent 25% of the nations' 75 million children (Passel, 2011); immigrant children are the fastest growing segment of the nations' population of children (Hernandez, 2004). This impacts teacher and school programs throughout the United States. For example, during the ten year period between the 1997-1998 school year and 2007-2008 school year, the following states had significant increases in students with English as a second language: South Carolina (827.8% increase), Indiana (409.8%) and Arkansas (287.1%) (Batalova & McHugh, 2010). While Spanish is the predominant language spoken by immigrant children, there are approximately 450 languages represented among students in public schools in the U.S. (Kindler, 2002).

Clearly, the demographics of the student population in America's schools is changing. Public schools are expected to be places of integration for children of immigrants. The need to serve immigrant children in rural, suburban, and urban schools will have an impact in every state and will continue to increase. Teachers are being challenged to have the knowledge and confidence to provide effective instruction for all students, including those who are immigrants. The purpose of this chapter is to discuss four key issues relevant to mathematics acquisition and immigrant children:

1. Bilingualism as an asset,
2. Strengths of immigrant families,
3. Teachers' knowledge of mathematics, and
4. Developmentally appropriate mathematical curriculum.

BILINGUALISM AS AN ASSET

When third-grade, South Korean born, Yeonjin, moved to the Midwest, her parents, both working in the field of medicine, decided to enroll her in a private school. The first day she brought home a mathematics textbook to complete a homework assignment. As her dad sat down with her, Yeonjin commented that the book looked easy. In fact, when she completed the mathematical problems she met few difficulties because she knew the universal language of mathematical symbols. However, when she got to the section of the assignment with word problems, she didn't know how to solve the problems at all. Yeonjin's dad had to help her translate the language of the word problem from English to Korean. Thinking in Korean, Yeonjin understood what mathematical processes were needed to solve the word-problem and then she was able to proceed.

There is little recognition among teachers and parents that a student's native language can be an asset in mathematical skill acquisition. Instead, there is too often a deficit view with a focus on a child's proficiency in English, or lack thereof, rather than on skills based in mathematics (Civil, 2008). Furthermore, there is some evidence to suggest that teachers have different perceptions of students based on country of origin and the socioeconomic status of the families; working class parental contributions are seen in a less