Chapter 19
Beyond Words and Numbers: Exploring the Interplay Between Language Challenges and Mathematical Problem-Solving Abilities

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ABSTRACT

This chapter critically analyzes the complex relationship of developmental language disorders (DLD), and the mathematical problem-solving abilities of children and adolescents. The implications of this topic for inclusive education and the academic performance of students with DLD make it of utmost importance in educational research and practice. By gaining insights into how language difficulties impact mathematical problem-solving, teachers and practitioners can develop targeted interventions and support strategies to meet the unique needs of this population. The chapter emphasizes the need for a comprehensive analysis of this relationship and identifies the existing knowledge gap. Exploring the multifaceted nature of language difficulties in mathematical contexts, the chapter examines the influence of both linguistic and non-linguistic factors on problem-solving abilities. It challenges prevailing assumptions and explores alternative theoretical frameworks to provide a more nuanced understanding of the cognitive mechanisms underlying mathematical thinking.

INTRODUCTION

In the context of educational research and practice, the relationship between developmental language disorders (DLD) and mathematical problem-solving abilities is a topic of paramount importance (Cross, Joanisse & Archibald 2019). Understanding this intricate relationship is crucial for fostering inclusive education and supporting the academic success of students with DLD. By examining how language difficulties affect mathematical problem-solving, teachers and practitioners can develop targeted interventions and support strategies tailored to the unique needs of this population. Despite the significance of this topic, there exists a notable gap in knowledge regarding the complex interplay between language

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difficulties and mathematical problem-solving abilities. While studies have explored the impact of language on various aspects of education, including literacy and communication skills (Cummins, Pellicano & Crane 2020; Vitiello & Williford 2016), the specific connection between language and mathematics has received comparatively less attention (Planas, Morgan & Schütte 2018). This knowledge gap necessitates a critical analysis to unmask the particulars of this relationship and identify effective approaches for supporting students with DLD in their mathematical learning.

The current understanding of the relationship between language difficulties and mathematical problem-solving abilities often relies on assumptions that position language as the sole mediator in mathematical thinking (Fuchs et al. 2020). However, such assumptions overlook the diverse cognitive processes involved in mathematical problem-solving and neglect the potential influence of non-linguistic factors (Crossley, Liu & McNamara 2017). To address this limitation, critical analysis is essential to challenge prevailing assumptions, explore alternative theoretical frameworks, and consider the multifaceted nature of mathematical cognition. By conducting a thorough examination of the existing literature and theoretical perspectives, this chapter aims to fill the gap in knowledge by providing a critical analysis of the relationship between language difficulties and mathematical problem-solving abilities. It seeks to shed light on the underlying cognitive mechanisms involved in mathematical thinking, considering both linguistic and non-linguistic factors (Crossley, Liu & McNamara 2017). Through this analysis, the chapter will contribute to a more comprehensive understanding of how language difficulties impact mathematical problem-solving, paving the way for evidence-based interventions and support strategies.

As we delve deeper into the complexities of the language-mathematics relationship, the chapter explores the potential impact of shared expertise, interdisciplinary collaborations, and emerging technologies in advancing our understanding and informing evidence-based practices. By encouraging professionals from diverse fields to come together, we can leverage collective knowledge to revolutionize the development of interventions and support strategies for students with DLD. Longitudinal studies and data analytics open new avenues for uncovering the developmental trajectories of mathematical problem-solving abilities and understanding the long-term effects of language difficulties. Furthermore, the exploration of inclusive instructional practices, differentiated instruction, and assistive technologies presents innovative pathways to enhance mathematical comprehension and skill development for students with diverse cognitive and linguistic profiles.

With a commitment to interdisciplinary efforts, the chapter advocates for the development of comprehensive and evidence-based approaches that embrace inclusivity and empower every individual, regardless of their language challenges, to unlock their full potential in mathematics and beyond. By continuously challenging assumptions and embracing emerging technologies, teachers, researchers, and practitioners can shape a more equitable and supportive educational landscape, paving the way for innovative and impactful practices that leave a lasting impression in the realm of mathematics education for students with DLD.

Language as a Mediator in Mathematical Problem-Solving

Language as a mediator in mathematical problem-solving has been a prevailing assumption, but it is essential to challenge this notion and explore alternative perspectives on the cognitive mechanisms involved. Theories of embodied cognition propose that mathematical thinking goes beyond linguistic representations and involves sensorimotor experiences and bodily interactions with the environment (Cuccio & Graziano 2022). This perspective suggests that mathematical understanding is shaped not only by