

Developing Mathematical Thinking: The Six Predictors in Mathematics Education

> RESEARCH OVERVIEW BY Jonathan Brendefur, PhD and Associates



# THE SIX PREDICTORS IN MATHEMATICS EDUCATION

(RESEARCH OVERVIEW)

## Introduction

In early mathemaÆcs educaÆon, the ability to translate research findings into actionable intervenÆons is paramount for fostering student success. This endeavor is central to idenÆfying key predictors that inform targeted support strategies. These six predictors shape students' mathemaÆcal proficiency over time. This research overview aims to underscore the importance of these predictors in bridging the gap between research and pracÆce, with a parÆcular focus on the pivotal roles of measurement and spaÆal reasoning as structural components.

# **The Six Predictors**

#### Number Sense and Sequencing

Number sense is central to mathemaÆcal learning, encompassing fundamental skills such as subiÆzing, counting, and comparing quanÆÆs. Research indicates that deficiencies in number sense predict later math achievement, highlighÆng its criÆcal role in early math screening and intervention strategies.

#### **Number Facts**

Mastery of basic arithmeÆ operaÆons is essenÆal for mathemaÆcal fluency and problem-solving skills. The research underscores the significance of fluency with number facts as a predictor of overall math achievement. It is an important aspect of early math and intervention planning.

## **Contextual Problems**

The ability to solve real-world mathemaÆcal problems is a key indicator of mathemaÆcal proficiency. Contextual problems, including joining, separaÆng, part-whole, and comparing problems, offer insights into students' problem-solving abilities and conceptual understanding. In early math assessments, addressing contextual problem-solving, especially in comparison and part-whole problems, can inform targeted intervenÆons to enhance overall mathemaÆcal achievement.

#### RelaÆonal Thinking

Relational thinking lays the groundwork for more advanced mathemaÆcal concepts, parÆcularly algebraic reasoning. Understanding mathemaÆcal relationships and patterns fosters deeper conceptual understanding and problemsolving abilities. IntegraÆng relational thinking into early math practices can strengthen students' mathematical reasoning skills.

#### Measurement

Measurement skills are foundaÆonal to mathemaÆcal understanding, providing students with tools to comprehend fracÆons, decimals, and geometric concepts. Proficiency in measurement is essenÆal for developing strong numeracy and data analysis skills. PrioriÆzing measurement in early math assessments and targeted activiÆes can support the culÆvation of crucial mathemaÆcal competencies from an early age.

#### SpaÆal Reasoning

SpaÆal reasoning abiliÆes are highly linked to mathemaÆcal achievement, particularly in geometry and spatial problem-solving tasks. Spatial reasoning encompasses visualizaÆon, orientation, and spaÆal relations, which are integral to understanding geometric concepts and solving spaÆal problems. Recognizing the importance of spaÆal reasoning in early math assessments can inform targeted interventions to bolster students' spaÆal reasoning skills.

#### The Six Math Predictors



## Importance of Measurement and Spatial Reasoning: Structural FoundaEons

While all six predictors play significant roles in early math education, measurement and spaÆal reasoning are structural components underpinning mathematical understanding. Measuring proficiency lays the groundwork for understanding numerical concepts and geometric relaÆonships, while spaÆal reasoning skills facilitate problem-solving abilities across various mathematical domains. Educators can prioriÆze intervenÆons that strengthen these foundaÆonal skills by highlighÆng the importance of measurement and spaÆal reasoning in early math assessments, laying a solid groundwork for students' mathemaÆcal success.

## Conclusion

In conclusion, the six predictors offer invaluable insights into students' mathemaÆcal proficiency and guide targeted intervenÆons to support their academic growth. By emphasizing the importance of measurement and spatial reasoning as structural components, educators can ensure a strong foundaÆon for students' mathemaÆcal understanding. Bridging research findings to practical applicaÆons through early math assessments enables educators to tailor intervenÆons that address specific areas of need, ultimately fostering enhanced mathemaÆcal achievement among young learners.

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