# Building Spatial Thinking Skills

In Preschoolers and Early Elementary Students

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### Agenda

> Parent case study

- > What is spatial thinking
- > Why is it important to math literacy
- > Missing piece puzzle & Abstract Spatial puzzles
  - 3 prompts for parent engagement



# Parent Case Study



# What is spatial thinking?



# Why is it important?



### Building Spatial Thinking Dr. Susan C. Levine - University of Chicago

## Spatial-Vocabulary

Ability to use spatial words for shapes and sizes, form a mental picture of shapes and transform or rotate them mentally.



### **Building Spatial Thinking Skills**

Parent Prompt #1 Start Talking Spatial



# Missing Puzzle Piece



What spatial terms do you use?

left, right , top, bottom,over, under, among, thicker, vertical, straight, around, long, turn, upside down, edge, flip, corner etc...





















### Spatial Thinking and Math Research Preschool - ages 2-4

Children who played with puzzles during 6 observational home visits performed better on a measure of mental rotation at 41/2 years old than children who had not played with puzzles during home visits. (Levine et al., 2011)

Quality block play at age 4 years old was a predictor of high school math achievement. (Wolfgang et al, 2001)



#### **Spatial Thinking and Math Research**

Elementary Mathematics - ages 6-8

One study showed that 6 -to 8-year-old children improved their accuracy on calculation problems such as  $3 + \_\_ = 10$ after having practiced mental rotation for 45 minutes. In contrast, children who practiced crossword puzzles saw no such improvement. (Cheng and Mix, 2014)

Another study found a relationship between construction skills (jigsaw puzzles and blocks) and strong number sense and success in solving math word problems (Nath and Szucs, 2014)



### **Building Spatial Thinking Skills**

# Parent Prompt #2 Promote Structured Play



## **Abstract Spatial Puzzle**



#### Abstract Spatial Puzzle - ages 4 and up



Spatialthinkingskills.com



### **Abstract Puzzle Play**





### **Building Spatial Thinking Skills**

# Parent Prompt #3 Ask Questions



What question prompts might you use with your students?

What patterns or shapes are you looking for? What kind of piece might connect? What shapes or colors will match up? What other colors (lines, shapes) do you need? What shapes, colors, lines patterns are the same?



Although spatial skills are often assumed to be innate, evidence from research suggests that they can be taught and improved. (Uttal et al., 2013) Spatial thinking is malleable -It can be improved! 45 min - 1 hour over 12 weeks



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