It's a Pattern! Best Practices for Promoting Young Children's Patterning Knowledge

Bethany Rittle-Johnson & Erica Zippert
Vanderbilt University

Introduction

Patterning is a topic of major importance for early math learning and instruction

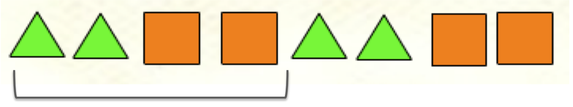
- Patterning is included as a central early algebraic topic in consensus documents in mathematics education (NCTM, 2000; NAEYC, 2014).
- Young children spontaneously engage in patterning activities (Ginsburg, Inoue, & Seo, 1999; Ginsburg, Lin, Ness, & Seo, 2003).

Patterning Definitions

Pattern: A predictable sequence that follows a rule.

Repeating Patterns: A sequence, often of objects or sounds, that follows the rule that one part (the core unit) repeats over and over.

*Core Unit: P*art in a repeating pattern that repeats



Finding the pattern allows us to know what comes next (and next after that…)

Evidence for Importance

1. Early patterning skill predicts middle-grades math achievement, including state test scores (Fyfe, Rittle-Johnson & Farran, 2018; Rittle-Johnson, Fyfe, Hofer & Farran, 2016).
2. Early patterning skill predicts end of pre-K numeracy knowledge (Rittle-Johnson, Zippert & Boice, 2018).
3. Improving children's patterning skills can improve their math knowledge (Papic et al., 2011; Kidd et al., 2013; Kidd et al., 2014).

Patterning Tips

1. Increase complexity of core unit

i. *Easiest:* AB - "This is an AB pattern because it has only 2 different parts that repeat over and over again."

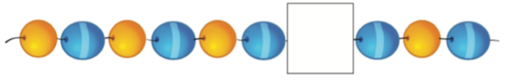
ii. *Intermediate:* AAB, ABB, AABB

iii. *Harder:* ABC (and beyond)

2. Increase demands of patterning task

i. *Easy Task:*

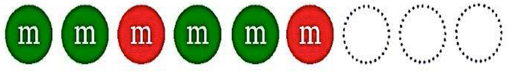
- *Missing items* - "Find the missing bead"



- *Copy pattern* - "Make the same pattern"

ii. *Intermediate Task:*

- *Extend pattern*: "What comes next?" or "Keep the pattern going"



iii. *Advanced Task:*

- *Identify the rule* – "What part repeats over and over?"
- *Abstract pattern* - "Please make the same kind of pattern down here using these shapes."

3. Use language to deepen understanding

i. *Use abstract labels*

- *With letters:* "The pattern goes A-B-B-A-B-B. It's an ABB pattern."
- *With numbers:* "This is a 1-2 pattern because it has 1 orange and 2 green, then it repeats."

ii. *Ask children to label the pattern:*

- "What kind of pattern is it?"

iii. *Prompt children to explain:*

- "Can you describe the pattern?", "How are these two patterns alike?"
- ★ Explaining to an adult improves learning (Rittle-Johnson, Taylor, & Swygert, 2008)

iv. *Distinguish patterns from non-patterns:*

- "Is this a pattern? Does it follow a rule?"

4. Find patterns in numbers too

Numbers follow rules just like patterns follow rules. When we find a pattern, we know what comes next.

i. *Growing Patterns:* Items increase or decrease and follow a rule, such as +1 or +2

2, 3, 4, 5, ? 2, 4, 6, 8, ?

- count sequence is same as adding one
- skip counting by twos is same as adding 2

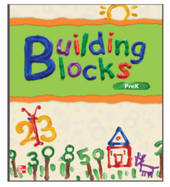
ii. *Repeating Patterns in Number System*

- One's digits repeat in the 1's and 10's place on number charts

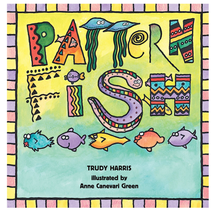
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

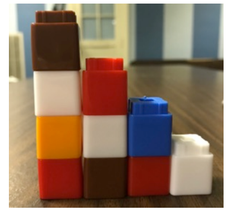
Material Ideas

- Lacing beads
- Books
- Pattern worksheets
- Pattern strips with blocks, tangrams, or objects
- Pattern trains with linking cubes (e.g. Unifix)
- Walk & dance patterns (e.g. clip-clop, clip-clop like a horse)
- Building Blocks Pre-K Math Curriculum (from McGraw Hill)
  *Source for several of these examples.



- Banana, Banana, Meatball song by GoNoodle
- Pattern Fish (Math is Fun!) book by Trudy Harris





Contact

For more information, please contact:
bethany.rittlejohnson@vanderbilt.edu
For more resources, please visit:
childrenslearninglabresources.wordpress.com

Children's Learning Lab
Vanderbilt University