

Textbook Analysis: Patterning Content Coverage in Kindergarten

Jennifer Tang, Ashli-Ann Douglas, Bethany Rittle-Johnson

Background

The Common Core State Standards (2010) for Kindergarten did not include patterning as a content standard (found [here](#)), unlike past state and national standards. We examined content coverage in popular math textbooks to get a sense of the impact that implementation of the Common Core may have had on the inclusion of patterning. Specifically, we examined several textbooks for instruction and activities on repeating patterns (i.e., sequences that follow a rule where one part of the sequence repeats over and over (e.g. ABABAB) and growing patterns (i.e., sequences that follow a numeric rule that increases or decreases by a set amount (e.g., 2, 4, 6, 8).

Textbooks Reviewed


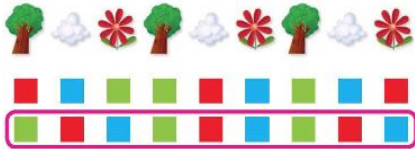


We reviewed the kindergarten edition of math textbooks from several major publishers from different years. The textbooks published after 2011 did not contain any patterning instruction. This included Envision CommonCore curriculum editions from 2012, 2013-2014, 2015 and 2020, and GOMath! Curriculum editions for 2012, 2015, and 2016. However, the 2011 edition of Envision Kindergarten Math curriculum and the Houghton Mifflin Math Kindergarten curriculum from 2005 included patterning instruction and activities.

Analysis

We identified repeating and growing patterns presented in these two textbooks. For each pattern, we identified the pattern unit. In repeating patterns, this is the smallest part of the pattern that repeats over and over (e.g. AB in the ABABAB pattern) while in growing patterns,

this is the direction and unit of change (+ 1 in the pattern 3, 4, 5, 6). We also used the categories defined and illustrated in Table 1 to classify what the task of each patterning item was.

Table 1: Definitions and Examples of Repeating and Growing Pattern Tasks

Definitions			
Term	Description	Example	Textbook & Instructions
Extend	Continuing a pattern by following the current rule to add on part or full pattern unit (including What comes next? items)		Envision Kindergarten 2011 (Teacher Edition) "Have children draw the shapes that continues the pattern"
Abstract	Creating the same pattern with the correct pattern unit using different materials or objects		Envision Kindergarten 2011 (Teacher Edition) "I made a pattern with these pictures (point to top row). Which of these patterns has the same rule as mine"
Create	child comes up with their own pattern unit, creating any pattern they want as long as it is a sequence that follows a rule		Found in all textbooks "Choose 3 colors to make a pattern. Describe your pattern out loud"
Identify	Identifying the pattern unit or pattern sequence (noting that AB is the part that repeats in ABABAB pattern)		Envision Kindergarten 2011 (Teacher Edition) "have children circle where the pattern repeats in each exercise"
Missing	Identifying the missing object(s) that are missing in a current incomplete pattern		Envision Kindergarten 2011 (Teacher Edition) "Circle the missing shape."

Type of pattern and pattern unit. As shown in Table 2, repeating patterning items were common in these two Kindergarten textbooks while growing patterning items were rare (i.e., .94 and .84 of patterning items were repeating patterning items). A variety of pattern units were used for repeating patterns, with AB, ABB, ABC and AAB pattern units being the most common. Of the small number of growing patterns, a large majority followed a plus 1 pattern unit.

Pattern task. The most common task was to extend the pattern (e.g., what comes next?), and this was true for repeating and growing patterns. Abstracting a pattern by creating the same type of pattern with new materials was the second most common task for repeating pattern items. Creating a new pattern and identifying the pattern unit also occurred occasionally for repeating patterns. The least common task for repeating pattern items was to find the missing object(s) within a pattern.

Table 2: Patterning Instruction in Each Textbook*Number of items in textbook (Proportion of all repeating or of all growing in parentheses)*

Type of Item	Envision Kindergarten 2011 (Teacher Edition)	Houghton Mifflin 2005 Kindergarten (Teacher Edition)
Repeating Pattern Items	155	61
AB Pattern Unit	44 (.28)	21 (.34)
ABB Pattern Unit	29 (.19)	11 (.18)
ABC Pattern Unit	22 (.14)	12 (.20)
AAB Pattern Unit	23 (.15)	14 (.23)
AABB Pattern Unit	6 (.04)	0
Any (child chooses)	31 (.20)	3 (.05)
Repeating Items by Task	155	61
Extend Items	56 (.36)	23 (.38)
Abstract Items	25 (.16)	13 (.22)
Create Items	17 (.11)	8 (.13)
Identify Items	50 (.32)	9 (.15)
Missing Items	7 (.05)	7 (.12)
Growing Pattern Items	7	9
+1 Pattern Unit	6 (.86)	7 (.78)
+2 Pattern Unit	0	1 (.11)
+3 Pattern Unit	0	1 (.11)
-1 Pattern Unit	1 (.14)	0
Growing Items by Task	7	9
Extend Items	6 (.86)	8 (.89)
Identify Items	1 (.14)	1 (.11)

Links to Curricula

Curriculum	Year	Website	Pattern Section?
Envision	2011	Link Here	Yes
Envision CommonCore	2012	Link Here	No
Envision Common Core	2013-20 14	Link Here	No
Envision CommonCore	2015	Link Here	No
GOMath!	2012	Link Here	No
Go Math!	2015	Link Here	No
Go Math!	2016	Link Here Link Here	No
<p><i>Note.</i> We used a hard copy of the Houghton Mifflin Math Kindergarten 2005 curriculum (teacher's edition volume 1).</p>			