



Tips for Read-Alouds in Math





Adapted from Building Blocks

Pause & Ponder:

- o *How do your students currently interact with texts, the teacher, and other children during classroom read-alouds? How might those ways of interacting affect children's construction of mathematical ideas?*

Children construct ideas about mathematics through participating in everyday routines and through interactions with caring adults. Shared book reading is an activity that helps children relate how mathematics can fit into their own lives. However, reading books to children out loud is *not* sufficient for accelerating mathematics vocabulary development and comprehension – the *way* we share books with children matters. Children must be actively involved in asking and answering questions as well as making predictions or inferences if we want to strengthen children's capacities for mathematical thinking and reasoning.

The recommendations you find here are based on a systematic review of studies conducted by researchers and the wisdom of practitioners.

Recommendation 1: BOOK SELECTION

Pause & Ponder: Take a look at the books available in your classroom and school library.

- o *Are there any books in your classroom or library where a mathematical topic or idea is part or central to the plot of the narrative?*
- o *Are there any biographies of scientists or mathematicians?*
- o *Are there any informational/expository books or manuals?*
- o *Are there any books that you and the children are fond of that you could mathematize and revisit?*

Reading aloud can introduce children to books and types of literature – poetry, short stories, biographies – that children and families might not discover on their own. Be intentional about the book you select to share, as the type of text and genre of book you select influences the responses and reactions of your children (Price, van Kleeck, & Huberty, 2009).

The plot of books will not always contain explicit mathematical content. In such instances, you can *mathematize* parts of the story. Mathematizing, simply stated, is to treat a subject or problem in mathematical terms. In other words, it is the process of viewing and expressing an event, problem, or relationship through a mathematical lens.



Books (and book reading) can be mathematized in three ways. In *text-dependent books*, the story plot or ideas cannot advance without an understanding of the mathematics. Mathematics may not be a central aspect of the plot in *idea-enhancing books*, but they do offer opportunities for children to deepen their understanding of a particular mathematical idea or concept. Finally, *illustration-exploring books* contain pictures that lend themselves to the exploration of mathematical concepts (whether the text highlights or mentions them).

Also consider using non-fiction, or expository books. Such books contain text structure, visual design features, linguistic features, abstract concepts, and vocabulary that differentiates them from storybooks (Price, van Kleeck, & Huberty, 2009).

Resources

Hitz, A., & Smith, A. (2013). Mathematizing read-alouds in three easy steps. *The Reading Teacher*, 67(2), pp. 103-108.

- The authors describe their process for how teachers can mathematize book reading through three steps. They also offer an example using an instance of reading aloud *The Hungry Caterpillar*.

Recommendation 2: QUALITY OF INTERACTIONS

Pause & Ponder:

- o *What is typically the focus of discussion during read-alouds in your classroom? To what degree do you focus on asking analytic questions?*
- o *What mathematics do I need to know (and perhaps revisit) to support and scaffold children's learning?*

High quality shared book reading experiences is characterized by the back-and-forth rhythm of how adult and child fit into the others actions and needs. We recommend that adults focus their attention on the *emotional* quality of shared book reading. Warm, affectionate interactions with adults in the context of shared book reading can be associated with love of books and motivation to read, as well as early language and literacy outcomes (e.g., Bingham, 2007; Cline & Edwards, 2012; Sonnenschein & Munsterman, 2002). Emotionally responsive adult behaviors include:

- (a) warmth and sensitivity to the child's cues and interests (e.g., joint attention on where the child is pointing);
- (b) adult use of strategies to increase child enjoyment (e.g., such as reading with expression); and
- (c) adult involvement and enjoyment, evidenced by smiling, laughter, and book-related talk.

Instructional behaviors include pointing to pictures, labeling, asking questions, and offering additional information (see Fletcher & Reese, 2005 for a review). Extra-textual talk (conversation that goes beyond



reading the text to engage the child) benefits children’s learning, especially if that talk moves beyond simply labeling pictures and elicits children to make predictions about story plot and character motivation, and other conversations that inspire higher-order thinking and reasoning (e.g., “What would you do if you were in that situation?”).

Research suggests three kinds of extra-textual talk is used with young children: (1) Print-related comments and questions, (2) Content-based comments and questions, and (3) Praise and feedback. Print- and content-related extra-textual talk has varying levels of cognitive demand. Table 1 contains the type of comments and questions that can be used in the context of shared book reading along with an example. The comments or questions at the top of the table and increases in cognitive demand.

Table 1
Examples of Extra-Textual Talk of Varying Levels of Cognitive Demand

Questions and Comments about Print and Reading Conventions	
Print Conventions	<i>“Do you see the numbers?”</i>
Reading Conventions	<i>“As we read from left to right, the numbers get larger.”</i>
Questions and Comments about Mathematics Content	
Summarizing	
Explanation	
Hypotheses	
Making Inferences and Predictions	
Praise and Feedback	

Recommendation 3: FOCUS IN ON VOCABULARY

Pause & Ponder:

- o *How do you introduce and talk about new words in stories?*
- o *When do you introduce and talk about new words? Prior to the story? The middle? The end?*
- o *What are some of the mathematical ideas or language you hear in class every day? In what way can this language be connected to formal mathematical concepts you are reading about?*

Reading aloud introduces the language of books, which differs from language that children hear in everyday conversation and dialogue in television, video games, and movies. The language found in books is more descriptive and will typically contain more formal grammatical structures. Two read-aloud practices that support vocabulary development is to (1) define new words while reading, as well as (2) encourage children to use these words and phrases when answering questions or while discussing characters or events in the story. Thus, interactive read alouds offer opportunities to enhance the *breadth* (volume of known words) and *depth* (how well words are known) of functional vocabulary (Lennox, 2013). To “know” what a word means is also to have a keen sense of how that word is situated



within a broader network of concepts as well as how a word's meaning can vary (Neuman & Dwyer, 2009).

A good starting point is to identify the words children will need to make meaning of to make sense of the story. Once you have identified these words, be sure to define and talk about the target word in multiple ways. Consider providing repeated exposure to those words, and engage children in back-and-forth conversations that can help to consolidate their understanding of the target word(s).

Commenting on the meaning of words or asking children what he/she thinks the word means are both beneficial (Blewitt & Langan, 2016). Defining the words before, during, or after reading the story is also beneficial (Jimenez & Saylor, 2017). What matters for vocabulary development during one-on-one interactive book reading sessions is adult verbal responsiveness: verbal replies to children's actions or speech that are *prompt* (immediate), *contingent* (connected to the behavior or actions of the child), and *appropriate* (positively connected to the child's actions or behavior) (Tamis-LeMonda, Cristofaro, Rodriguez, & Bornstein, 2006).

Recommendation 4: EXTENDING THE MATHEMATICAL CONVERSATION BEYOND SHARED READING EXPERIENCES

Pause & Ponder:

- o *What are some of the ways that I can make children's thinking about the mathematics in the story visible?*
- o *What are some of the activities I can do so that children have opportunities to practice using the mathematics vocabulary from the story?*

Giving children time and space to process the content of the story, develop tools to understand the content on their own terms, or experience it in a new way can consolidate understanding or yield new insight. Here are some ideas on how to extend mathematical experiences beyond shared reading time.

- Retell or dramatize the story with props or manipulatives.
 - Acting out the story with friends and props/manipulatives serves to make abstract ideas and relationships concrete.
 - Larson & Rumsey (2017) provides an example of how manipulatives can be meaningfully integrated into book reading.
- Read several books on the topic (and make them available in the classroom library).
- Make thematic objects available for free play/exploration.
 - Provides an opportunity for children to act on what they know or understand, and perhaps elaborate upon that understanding.
- Have children write their own story.
 - Writing as well as drawing – letters, numerals, and shapes – are an object of knowledge (before it conveys knowledge). To understand this “object,” children must deconstruct and reconstruct the rules of the system.