

Kindergarten Numeracy Development: Explaining Thinking, Using Metacognition, and Making Connections

Developmental aspects	Emerging With direct support...	Developing With guided support...	Applying With minimal support...	Extending
The Child	With direct support, and teacher modeling, may participate and may attempt to make sense of mathematical experiences.	With guided support, demonstrates a willingness to explore mathematical ideas while participating in problem solving experiences. Is beginning to show an awareness of numbers, space and time used in everyday life.	With minimal support, demonstrates interest in and a willingness to explore mathematical ideas while purposefully participating in problem solving experiences. Communicates an awareness of how numbers, space, and time are used in everyday life.	Shows interest and curiosity while purposefully exploring mathematical problem solving experiences. Perseveres. Makes and explains connections to numbers, space and time as used in everyday life.
Processes				
Explaining thinking, using metacognition, and making connections	With direct support, may describe thinking, which may or may not be related to the task at hand.	With guided support, is beginning to explain thinking. May need prompts.	With minimal support, makes connections and explains some aspects of thinking.	Explains thinking independently and in detail; makes personal connections.
The Support/Scaffolding*	The Model: showing, instructing, explaining, directing, making explicit, demonstrating, giving examples	The Coach: structuring, sequencing, focusing, cueing, guiding, organizing, supporting	The Advisor: suggesting, reminding, prompting, monitoring, asking for elaboration	The Mentor: extending, stretching, wondering aloud, exploring, "what if-ing"
*a variety of supports (teachers, peers, environmental, etc.) can be provided at any stage of development				

Scenario: In a small group, the teacher has modeled how to play the following game. "I put 5 counters on my mat. Now I am going to close my eyes and you can change it to a new number. Then I will try to figure out what you did." One of the children takes away 2 counters. The teacher says, "Oh, now there are only 3. Something has been taken away, because 3 is fewer than 5. Did you take away one?" The child giggles and shakes her head. "Did you take away two?" "Yes!" says the child. The teacher invites one of the other children to put five counters on the mat and close his eyes. The teacher adds 3 counters, making 8 on the mat. When the child opens his eyes, the teacher asks, "What do you think I did?" The child says, "I think you put more." The teacher asks him, "What makes you think there are more now?" The child says, "I can see more counters than before. There was only 5. Now there is...mmm...a bigger pile."



Direct Support

After observing this introduction, Matt is next to take his turn. He puts 5 blocks onto his mat and closes his eyes. The teacher takes 1 block away. Matt opens his eyes and counts the remaining four. Then he starts to squirm. Seeing that he is uncomfortable and needs direct support to complete his turn, the teacher *directs* Matt to look into her hand, where she is holding the block she has taken away. She *shows* him that when she puts it back on the mat, there are 5 blocks again. She *demonstrates* thinking aloud by saying, "When you opened your eyes you saw 4. There was 1 missing. I took it away and hid it in my hand." Then she counts out 5 new blocks and directs Matt to take some away. He shrugs and loses interest. The teacher realizes he will need further support to develop the concept of changing group size and explaining his thinking about it.



Guided Support

The teacher shows the group how to use their fingers to show changes in group size. Most can see and say that you have to put 1 finger down when 1 is taken away. To reinforce their understanding of putting down a finger each time one is taken away, the teacher provides guided support. She *structures* several examples, inviting the children to show with their fingers and to explain in words what happens as she illustrates with blocks, taking away 1, 2, 3, and 4 from 5. Then she invites them to show with their fingers what happens when she adds more blocks, making 6, 7, and 8.



Minimal Support

Once the children in the group seem confident in using the blocks and their fingers to show taking some away and adding more, the teacher helps them form partners to begin playing the game. In pairs, they take turns taking away or adding blocks, and saying what they think their partners did. With minimal support, most children can say whether the change involves more or less blocks, but only a few can figure out how many were added or taken away. The teacher *prompts* them to help one another by counting aloud or using fingers as they move the blocks in and out of their groups.



Without Support

Two pairs of children get the idea and take great delight in figuring out what their partners did. Without support, they are able to explain their thinking to one another. "You took away 2, I can tell, because if you put the 2 back, there will be 5 again. Am I right? Show me what you did!" The teacher *extends on* their explanations by encouraging them to show one another what has happened with both the blocks and their fingers.

