Math Perspectives
Teacher Development Center
February 2017
Vol. 2 No. 2

Assessing & Developing Math Concepts

Stay Connected!

Kathy Richardson is the author and developer of the Assessing Math Concepts (AMC) series of assessments and the Developing Number Concepts (DNC) series for Kindergarten through Second Grade Mathematics. Kathy, Program Director for Math Perspectives, is one of the most respected early childhood mathematics educators. Kathy answers questions from teachers across the country who are using AMC and DNC.

If you have questions for Kathy, please send them to Math Perspectives at info@mathperspectives.com.

COUNTING OBJECTS ASSESSMENT

Q In a recent administration of the Counting Objects (#1) assessment with Kindergartners, the following question arose:

Sometimes, students will miscount the quantity presented (ex. we present 12 counters but they count 13) but can name the miscounted quantity easily when asked "How many did you count?" (ex. they say "13"). The options for recording are "Knows, Recounts To Find Out, or Doesn't Remember". While they are able to recall the quantity they counted, they counted the pile incorrectly to begin with. How can this be accurately recorded?

We are considering using "Doesn't Remember", as we see that we are able to document the inconsistency in the following question related to Rote Counting (skips 1 number or sequence is incorrect). Is this the best way to do this?

We appreciate any thoughts you can provide regarding this.

A I understand the confusion, but let me share my thinking.

There is a stage of thinking that I refer to as Count and Land. At this stage, the child is focused on the process of touching each object, saying the sequence, and telling where they landed. The number has no meaning to them, so if you ask them, "How many did you count?', they will either shrug their shoulders or recount. The student you are describing was able to hold the number he "thinks" he counted and is able to tell you that number. The fact it is an incorrect number is a different issue. As far as the child is concerned, it is the number he counted. So the response that describes this is "Knows". The fact the child lost track will show up when you choose the indicator that describes that: Loses track.

I know it feels "wrong" to give a child credit for a wrong answer, but what we need to do is analyze what we are trying to find out and if the child is or is not able to do that.

Let me know if you have further questions about this or have any other questions. *Best, Kathy*

COUNTING OBJECTS ASSESSMENT, PART 1

Q Hello, I have a question about Part 1 of the Counting Objects assessment. There is a part of that assessment that asks students to identify one more than a number without manipulatives across decades (ex: what if we had 29 and added 1 more?). I have students that are saying, "29...30". They are saying the number I am giving them, and then the answer. Does that count as the option "says rote sequence" or do they "know without counting"? I am asking because they have to say the "29" before coming to the answer of 30 but I am not sure if that means they know it, or have to say the sequence to figure it out. Thank you!

A Hi, I think the fact that the child has to say 29 before they can say 30 is an indication that they know how the pattern works but are likely not thinking about 30 as 1 more than 29, but rather as the next number in the sequence. Personally, I think that is "good enough" for now and I wouldn't worry about it. But I would select "says rote sequence" just so you know there is a bit more understanding for them to develop over time.

Let me know if you have any other questions ~ *Kathy*

ASSESSING LOWER NUMBERS WHEN A STUDENT IS READY TO APPLY

Q If a student is at the "ready to apply" level on a given concept, is it necessary to assess the lower numbers?

A Generally, it is not necessary to assess lower numbers if you can assume the working with the higher numbers reveals what the students know about lower numbers. For example, if a child can count a pile of 32 objects, we know they can also count numbers smaller than that. If a student can change numbers to 10, we can assume they can change

numbers to 6. The assessment that is not as straightforward is the Hiding Assessment. First of all, children often learn parts of 10 before they learn parts of 8 or 9. A child might know parts of 8 and still have trouble with 7 because odd numbers are sometimes harder for children than even numbers. I think for the Hiding Assessment, I would want to check a range of 3 numbers before I felt confident that I had accurate information. If you have any specific question about a particular assessment, let me know. ~ *Thanks, Kathy*

AMC—STUDENTS WITH DYSCALCULIA

Q Hello! Thank you so much for these wonderful tools - the culminations of countless hours of research, analysis, testing and revision! It has revolutionized my understanding of math and therefore my ability to teach math. I could not be more grateful!

Now, I am challenged with two students whom my math coach and I suspect have dyscalculia, particularly in being able to hold quantity in their minds in order to manipulate it. The hours of working with them on quantities (decomposing and recomposing) to 10 and 20 seem to have no effect on their understanding of how to apply that to larger numbers.

I have read and applied your suggestions in all 9 volumes of the AMC and all 3 volumes of the DNC as well as your book How Children Learn Number Concepts (which I refer to as "my Bible" with my colleagues). With all of my students, it has been hugely successful except for these current students.

Are there further resources you recommend for this 3-5% of the population (according to B. Butterworth, neuroscientist in UK) with this condition?

A Hi, I am so glad you are finding my work with children of help to you. About the students you mentioned... Of course, I would need a lot more information about the students to be specific but I do have some thoughts that might help you.

First of all, I think we need to assume the students don't have dyscalculia for the moment, anyway. There are lots of reasons children don't seem to apply what they are learning. The main reason is they don't totally understand what they have learned "to do." When I work with children, I can usually find that place where the numbers just stop having meaning. So a kindergarten might know 1 more as long as the models are present and not have a clue when I start asking, "What if we had 4 and added 1." Or children may be able to count out 9 counters but find that 18 is just too big to think about.

Sometimes children have not learned to attend to patterns. Learning to look for patterns takes practice.

Another reason children may not be able to do what they are expected to do is their own fear that they don't or can't understand -which makes it really hard to think. Another is they may have missed some very basic idea that they just have not figured out yet but everyone assumes they must know.

The first thing I would do, is try to find the level of mathematics you cannot talk them out of believing. You may need to go back much farther than you expect. For example, I am thinking of a 7 year old who I assessed informally using bits and pieces of the assessments as I tried to figure out why he lacked confidence and seemed more willing to guess than to engage in the tasks I was presenting him. He used a very soft voice to answer me and seemed to be guessing. So I put 3 counters until a bowl and asked him how many there were under the bowl. He was able to tell me 3. I then put one under the bowl or told him the wrong answer. "I think there are 7 under there now." He knew there had to be 4, so all of a sudden he had a real voice and confidence and told me "No. There are 4." Now he was sure no matter what I said when I added or took away some examples. I moved on from that to some other questions including some he had just guessed on a few minutes before. He now was able to answer. It was like he decided he could play the game after all. If he had not been able to defend the right answer, I would have gone down to 1 if necessary. In my experience there is always a place they will argue with you when they absolutely know they are right. (This is a different kind of arguing than some kids do when they try to defend some nonsense they thought their teacher had taught them. Defending nonsense is different than knowing you know).

I am also thinking of a couple of other children I worked with who didn't seem to be having the typical problems. One 4th grade boy seemed to understand what we were doing and then it would seem to disappear from his mind. I gave him scratch paper and had him write any intermediate steps or any numbers he figured out but forgot once he went on. It seemed to not be a math problem, but some kind of memory problem.

It seems to me that not being able to apply what they know about smaller numbers to larger numbers may be a sign that the students memorized what they were supposed to know

instead of seeing all the parts as related. Some children learn parts faster because they recognize the relationships but some do not. They may know 10 + 6 is 16, but not the 6 + 10 is 16. They may be able to use what they know about 4 and 4 to figure out 5 and 3 because they can imagine moving 1 to change it to 5 and 3.

As I write this and try to share some things that make seeing relationships hard, I realize it would be better if I knew more specifically what the 2 students know but can't apply to larger numbers. If you could describe more about what is leading you to think they may not be able to think with numbers, I may be better able to help.

Thank you for your dedication to your students. I would love to help if I can.~ *Kathy*

If you're using Assessing Math Concepts and have a question regarding any of the nine assessments, we'd love to hear from you. Please email us your question to info@mathperspectives.com.

If you are using the paper Student Interview forms and would like to receive information on the Web-based version or professional development, please contact us at info@mathperspectives.com.