Math Perspectives Teacher Development Center

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Assessing & Developing Math Concepts

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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.

ASSESSING MATH CONCEPTS: MORE/LESS TRAINS ASSESSMENT

Q What the rationale is behind why Assessment 3, More/Less Trains isn't recommended when starting out using AMC? I have several teachers asking why and I don't want to give them the wrong information? - *Round Rock, TX*

A When teachers are first learning about the assessments, we don't want them to feel overwhelmed so we generally recommend other assessments as important to start with.

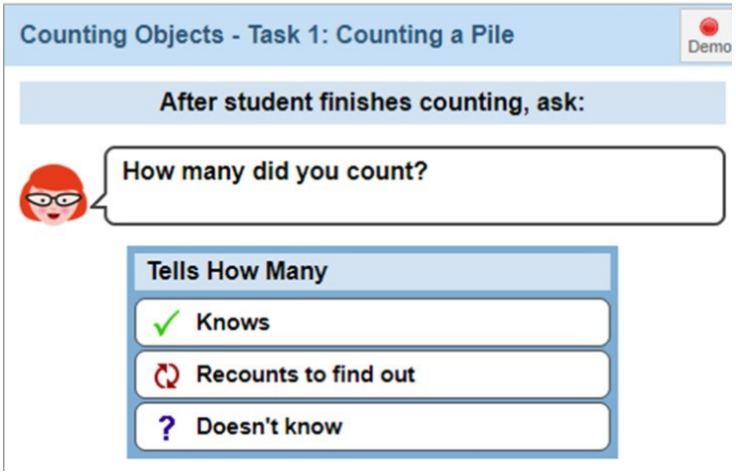
However, when teachers are familiar with the assessments and the information they can get from them and feel they have time for an additional assessment, Assessment 3: More/Less Trains can provide good information for K through 2. There are 3 levels within the assessment. Level 1 checks to see if the children can use a train they know to figure out how many in a train they don't know if the trains are lined up. This is a prerequisite for comparing. Level 2: ask "How many more in this train than the other train when the trains are lined up. This is important information for First Grade. Level 3 asks children to compare two unorganized groups. This is often good information for 2nd grade.

So, if teachers are interested, have them try the assessment and decide if it is helpful.

Thanks for the question. Let me know if you have any other questions. ~ *Kathy*

ASSESSING MATH CONCEPTS: COUNTING OBJECTS

Q When giving the Counting Objects Assessment, Task 1: Counting a Pile:



If the student counts the pile incorrectly, but is able to tell you how many they counted, do you mark "KNOWS"? We are questioning this because we know later the question asks if they were able to keep track. Is where we are marking if they could not keep track of what they counted? Thanks in advance for the clarification. - *Bedford, VA*

A Yes, you would select Knows since the child is able to tell you what they believe they counted. You are also right that the student's error in counting will show up in the Keeping Track section. Thank you for your question and let me know if you have any further questions. ~ *Kathy*

ASSESSING MATH CONCEPTS: COUNTING

Q This is our second time using the online version of Assessing Math Concepts after 7+ years of using the paper and pencil version of the assessments. As a result, we are intrigued by how these assessments have been translated by the software.

Here's one scenario and question:

A new kindergarten student is asked to count a set of 12. He lines them up first, counts to 12 accurately and knows how many he's counted. The "lines them up first" indicator moves him back to counting 7 (which he treats the same way), and then 4, which he subitizes (with no option for indicating that method). The assessment then stops without asking him to make a pile. The teacher decides to have him go on anyway and he successfully makes a pile to 5, 9, and then to 12. What is the "lines it up first" indicator supposed to tell us about this child's number sense if it yielded such an inaccurate data picture of what he can do? When is "lines it up first" the child's disposition and not an indicator of weak counting skills? We are aware of the *Methods of*

Counting explanation on page 35 (AMC Book 1) but we have seen examples of "moves" taught/used procedurally as well. Any of these counting methods procedurally taught or used will interfere with the development of number sense. Wouldn't it be more useful to find out where the skill breaks down. For example, another K student who very rotely counts beyond 32 objects (practically sending counters flying off the tray) is only able to make a pile to 5.

I hope this query is not too annoying. We are certainly invested in making sense and will continue using our best judgement to navigate these assessments for the purpose of knowing our mathematicians as well as we can. But if you have any thoughts that could help us use this assessment tool more effectively, please do not hesitate to reach out. Many thanks. - *Bronx, NY*

A Your question is not at all annoying. In fact, it is very interesting to me and raises an issue I haven't considered before. The assessment is intended to see whether the child can count an unorganized group of counters which implies they can't be "given credit" if they change the task to counting counters that are lined up. Because children are making the task "simpler" when they line them up, counting this way is not considered "Ready to Apply." However, what I never considered until you brought it up is that a child could end up going back to 4 because they consistently lined them up no matter how large the group of counters was. The simple solution to that is to interrupt the child and say, "Could you see if you can count them without lining them up first?" I suspect the student you described could do that. I know I have told teachers it is okay to interrupt the child if you feel they can count without lining them up, but I don't think I have written that suggestion anywhere. I will add that suggestion to what I am writing.

You are right about the fact that children can also be taught to move the counters too, but I don't really have a way to prevent that. I hope more information about a child who is just doing what they have been taught will show up in Making a Pile as you indicated.

I am very interested in other issues that may come up for you as you use the online assessments after years using paper and pencil. I hope you will let me know your thoughts and experiences. Thanks for your question. ~ *Kathy*

AMC Online Benchmark Report

Q My district uses the online version of Assessing Math Concepts. My question is this, what instructional level is deemed as meeting the benchmark on the Benchmark Report by School? Thank you! - *Manassas, VA*

A Thanks for your question. The way the benchmark reports are set up, you can select which part of the assessment or the range of numbers you are interested, but the benchmark itself is set at Ready to Apply for each section. Let me know if you have any further questions. ~ *Kathy*

Question via Twitter Conversation

Q Is there a good reason not to use the words "minus" or "plus" with kindergarteners? It seems if you read a subtraction problem as "take away", you are ignoring compare problems. Isn't it easier to just use the correct academic language from the beginning?

A There is a principle about developing and using formal language with children that informs all my decisions about what language to use in many different situations. The principle is that children need to make sense of a concept and describe in their own words before more formal language is introduced. It is easy to learn a new word for an idea you understand. A young child can identify a certain kind of dinosaur and easily learn to call it a Tyrannosaurus Rex. But it is much harder to learn a word for a concept you do not yet fully understand like the "distributive property". What is important is the development of the concept knowing that the words should help us describe and communicate what we know about the concept.

So, I introduce children to addition and subtraction by acting out situations which the children can describe using the language they already have. For example, I might have children act out the following story: "Three children got in line to go to the library and then two more children got in line. How many children are in line, now"? Acting it out is not going to be difficult even for kindergarten children. The new learning is how to describe what happened and how to write it down. I can record what the children say with words or with symbols. When I choose to write symbols, 3 + 2 = 5, I present them as a reminder of what we did. I could say "three children and two more children got in line so now there are five altogether." Later I could say, "3 and 2 makes 5." When the children can read equations using informal language and know what it represents, then I can tell them that mathematicians say, "3 plus 2 equals 5." From then on, I can use informal and formal language interchangeably.

I do the same thing for subtraction. The situations we would naturally act out and the language we would naturally use involve "taking away." But, what about comparative subtraction? Are we limiting the child's understanding if we only model take-away? I don't think so. The reality is that many of the concepts young children work with are not fully and completely understood. Controlling the language they

can use or requiring them to use language they don't readily understand does not help develop the understanding. If they are thinking and making sense of the mathematics they are learning all along the way, they will easily take on "another way" to think about subtraction problems or another kind of problem to solve when they are able to consider that idea.

Comparative subtraction requires children to understand what is being asked when someone says, "How buttons in this box are white? How many buttons are red? How many more white buttons are there than red buttons?" Many children will not be able to interpret the language and not arrive at the right answer. Some will be able to "do it" if the teacher shows them how to line up the buttons and then see how many buttons are "sticking out." But even if children are shown how to get an answer, they will not see how this can be related to the other "minus" problems. In order to really see why we use a minus sign for both situations, they need to see that some of the red and white buttons are the same number… if they take those away what is left is the "difference."

I find most kindergarteners not able to interpret "how many more?" Some first graders can and most second graders can. If I use the assessment, More/Less Trains, I will be able to see what level of thinking each child has reached. If I use the Teacher-directed Activities and the Stations from *Developing Number Concepts*, I can support the growth of the concept and the use of the language at the appropriate level no matter what grade level I am working with. ~ *Kathy*

Resources by Kathy Richardson:

Learning to Compare Numbers (p. 30) Critical Learning Phases and Solving Word Problems (p. 197) from How Children Learn Number Concepts.

More/Less Trains Assessment (Assessing Math Concepts)

Developing Number Concepts Book 1: Counting, Comparing and Pattern

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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.