

Innovations Conference

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Scott Methe's Friday A.M. Session - Key Talking Points

I have learned about CBE as a systematic way of inquiring into what a student knows. More specifically, CBE allows a practitioner to examine a student's prior knowledge in terms of what that student is able to do in response to instructional stimuli. Personally, I think that we need to see through and around the details that may be confusing for us and focus on some simple ideas.

For example, if we ask fourth grade Tommy to show how he was able to plan a simple budget for a vacation in three categories, ensuring that he did not go over \$100, we would hope that Tommy tells us how he allowed for entertainment expenses, food, and incidentals, adding the cost of the things he typically buys together, and subtracting the total from \$100 to see if he was over or under his budget. If Tommy said, "I'm sorry Mr. School Psychologist, I really can't tell you and I don't think I really know how," then we should be concerned and we should have a way of helping Tommy. As such, we'd have to make some guesses about what we think the problem is after we gather some information.

Today, I want to talk about how to identify skill breakdowns as we encounter students with increasingly intense skill deficits. We will all encounter students who appear to be "lagging" and those that are numerous grade levels behind other students.

I also want to share with you methods and results from an intervention study that demonstrated promise for students at tiers II and III.

The first thing I will need to do is to map today's talk onto the CBE process. Step 2 of the CBE process wants practitioners to make decisions about what to teach. In previous steps, we learned about finding facts. Now, we need to decide what to teach. We'll use the FACT-R strategy that begins with an observed student concern, the generation of assumed causes, and a confirmation of the fact and assumed cause. What is most important at this step is to validate a cause of a breakdown.

2. Because we can't map the brain (and even if we could we wouldn't be able to find out everything a student knows), we need to make assessments in a way that makes knowledge public, or observable. This is important because "knowledge" is a conceptual and unobservable phenomenon (just ask, do you know the same things you do when you are resting that you know when you are talking or writing about them?).

3. What, then, is prior knowledge in mathematics? Prior knowledge in mathematics ranges from basic ideas and concepts about number sense to the ability to comprehend, use, and apply mathematics to function well within a society. What are the domains and tasks that become

critically important to success in school mathematics (this assumes that the discipline of mathematics is a much more robust field of study requiring, at the very least, success in school mathematics)? Significant professional consensus traces the chain of prior knowledge upward, beginning with what is known as number sense. Numerous researchers have made such a construct definable by creating tasks that assess number sense. Number sense is one of the most fundamental and important curricular strands, and because failure in mathematics often follows from a faulty number sense, we're going to give this area most of the time in discussion.

4. What is the best way to assess prior knowledge? Direct assessment is usually the best way because it allows a practitioner to confirm the extent of student knowledge. In schools, the children that require an assessment of prior knowledge are those who struggle. This can be defined by screening results at Tier I of the RtI model. Based on screening results, it will become clear that there are two groups of students who are in need of instructional support. These groups can be best understood in terms of a simple analogy based upon percentile ranks. Because local norms are usually the best way to begin, let us agree that students below the 30th percentile are typically in need of some instructional support. Let us also agree that students below the 15th percentile are typically in greater need of support. Changing these percentiles becomes an important local issue that is based on degrees of support available to the students in a district. This should never be an arbitrary decision, but in the area of math, there is a significant lack of research predicting how certain benchmarks predict performance on state tests. High levels of support and robust use of research-based strategies, personnel, and time will allow a district to let more children in, thus setting the numbers a bit higher (35th percentile and 20th percentile).

Now, for the analogy: the color of a traffic light typically predicts what we'll see out of the cars that are approaching the light. Red and green lights result in high levels of predictability because all of the cars will likely stop at a red light and progress at a green light. We can think of students above the 30th percentile as green light students, in that most will be progressing through the curriculum. We can think of students below the 15th percentile as red light students, because the significantly low performance compared to others is a factor that stops the student from progressing, dooming the student to being stuck at a critical point that general education teachers typically cannot address.

Many of you are here to learn about what to do when students are stuck. Let's illustrate with a set of examples that help us decide what to teach. First, summative decision making requires examining the extent of a performance deficit. I usually advise the practitioner to establish the "big three" principles of instructional planning. CBE is all about this because CBE does not necessarily prescribe instructional materials; instead, it points the practitioner to key content. The big three are (a) knowing what the student is doing that is problematic, (b) knowing what the student should be doing instead (CAP), and (c) having a system to know when they are getting there. CBE does attempt to prescribe content, that is the purpose of diagnosing breakdowns in prior knowledge. However, due to the complexity of the curriculum and the "cognitive map," we cannot make everything observable. We need to generate some useful assumed causes based on a

good assessment of the student. These causes can range from broad to specific. For example, when we see a student who is having trouble with basic fact fluency, we would look closer at the performance and we'd wonder about the accuracy of the student's skills. If the student is making many errors, we would assume that the cause is that the student has not been taught or shown strategies for using the base-10 system to facilitate decomposing smaller numbers to get to 10 or "recombination."

We may also find that the student uses inefficient strategies to solve the problem if they are mentally counting up from the smaller addend ($5+7$). CBE often talks about discriminating strategy use from knowledge of the content. In this example, we would ask a student about "number partners" (Clements, 2004) in numbers like 5, 6, and 7 after modeling a practice item. We'd say, "five has three number partners, it has 3 and 2, 4 and 1, and 5 and 0." This student would probably say that I missed some, that I forgot about 2 and 3 and 1 and 4 (this shows basic problems not only with number partners, but with commutativity). Then, we would ask the student to name number partners in 7, 8, and 9. We would hope for accuracy and fluency. If the student is having problems with this, we would assume that our cause has been located and we would teach by using the expression $OTR + ICF$ to guide us. This is especially true because we think the student lacks accuracy, not fluency. Once the student is accurate with this skill, we would provide many more opportunities to practice, assuming that fluency predicts maintenance, which in turn predicts generalization.

Basic facts are an interesting takeoff point for talking more about extending the content of the CBE process downward to focus more specifically on the content of the number sense strand. Once we do this, I will give a few examples of how we've tailored content to assessment results in early numeracy and not only talk about tier III instructional planning and diagnosis, but show you an intervention program and its results.

The rest of the relevant information should be included in the slides you have in your binder or on the NC Innovations tab.