NCSPM Webinar Transcript: Progress Monitoring in Mathematics

We will post that phone number in the Q and A window for your experience, doctor Stecker will have a formal question and answer time at the end of presentation, and may pause to take questions sometime in the middle of the present take, you may use the question and answer window for technical questions throughout this session, to type any questions you have with the technology, the Q and A box is is located in the bottom right-hand side of your screen, in order to type in a question, place your cursor in the send box, type your question, and click "ask". Once the question has been sent, somebody on the progress monitoring staff will respond as quickly as possible. If you prefer that your question be answered privately, please specify in the text box. We are pleased to have our event captioned in live time by a captioner who is joining us online. You might have noticed that a special box popped up on your screen when you first entered the session, that's where you'll be able to access the Real-time captions. If you were prompted to enter your name and organization for the captioner, I'm sorry, you were prompted to enter your name and organization for the captioner will have that information. We encourage you to recite the captioning window to a size that suits your needs, you may also move it to a more convenient location by clicking on the top of the box and dragging it with your mouse, if you do not prefer to view the captioning, close out of that window and it will disappear. If you have disabled the captions box and would like to restore it, click on view, and pane, and click show custom panel. Finally, a note about the audio portion of this session. We will be recording this event so it will be available online. In order to produce the best quality recording, we have muted the phone lines. We will offer you the opportunity to speak verb blip to the presenter and ask any remaining questions at the end of the presentation. At this point, we will begin recording. Good afternoon, my name is Rebecca dash and I'm pleased welcome to our third webnarspl. It is a technical information system funded by the office the special education programs, center's mission is to provide trek California assistance -- and dissemination information about progress monitoring practices proven to work in different academic areas, grades K through 5. We hope you will find this online learning opportunity to be fruitful and relevant to your work, we are fortunate to have doctor Stecker, a special education professor. Also one of our center trainers. Doctor Stecker is a spets education professor at Clemson, and earned her Ph.D. from Vanderbilt university in 1993. Where she worked understand Lyndon Fuchs in the mid 80s to early 90s, she has over 20 years of experience in research and development with curriculum based measure. and conduction training locationally and nationally on CBS matters with practicing teachers. At this point, it is my pleasure to turn things over to Dr. Stecker.

Thank you very much, Rebecca. I just wants to make sure everybody can hear me. Am I coming through?

Pam, you sound great.

Okay. Thank you.

It's a pleasure to be here today to talk with you, and it's a bit auction Ward for me because I can't see your faces. -- awkward. I hope you will bear with me as I work through this technology aspect of this presentation as well. First I'd like to get an idea of who is in the audience today. So if you would quickly answer the following yes question -- question.

Okay. It keeps changing. Looks like we have a majority of school psychologists and, I don't see the results anymore. It's hard for me to summarize them, but I'm going to go to the next question, I want to know how familiar you are with progress monitoring, particularly in mathematics. I know a lot of folks have use progress monitoring in read, you but they are not that familiar in math, I'm curious about this audience. And it looks like that might, my prediction is correct, you've heard of progress monitoring, or have used it in reading, but have not implemented it in math. I hope today's session will be helpful to you. What I plan to cover will be to describe curriculum based measurement measurements, I wants to contrast what we often do as teachers in the classroom, using a mastery measurement approach in teaching mathematics, and in assessing math, and I wants to contrast that with curriculum based measurement, and show how progress monitoring using CBM can be effective for monitoring monitoring monitoring the effectiveness of our instruction, and I will show and describe several different types of mathematics measures that are found within curriculum based measurement. I will highlight specifically one form which Lynn and Doug Fuchs developed, and Carroll Hamlet, back in the 80s, which has dinned continued to be refined, and is available through pro-Ed, but monitoring basic skills progress will be the primary measure that I'm going to show, and I will illustrate a few other measures as well. And then we'll go into specific details for how to administer these tests, how to score them, how to use that information for establishing appropriate goals for students, and then to monitor their progress towards meeting those goals, so we'll use that information for instructional decision-making purposes. So we have a lot to cover this afternoon. Okay. Progress monitoring in general is used to estimate rates of constitutes's improvement, meaning we really want to look at students' rate of change across the year. It is not enough simply to look at benchmarks or to look at actual level of performance. A student may be performing relatively poorly, have a low level of performance, but if that student is still improving in typical fashion across that year, then we're not as concerned about that student. We know that student maybe has started out ought a lower level, but is profiting from the instruction that we're providing. So it's important to look at both aspects, both level of performance, and rate of progress, and progress monitoring gives us that information. And we can use that then to try to identify students who are not demonstrating adequate progress in the program. And then we apply various interventions, and we can use the progress monitoring data to compare the effectiveness of different interventions for particular students.

Doctor Stecker, we have a request for you to speak a little louder, if you can.

All right. Is this any better?

I think that sound great. Thank you.

I'm using a headphone set, and there may be a problem with it. I'll try to adjust it. Okay. Curriculum based measurement is a particular type of progress monitoring, and it has over 30 years of research support. Stand dean know developed curriculum based measurement in the 70s in response to when individuals for disabilities education act was first passed in 1975, to be fully implemented in 1977, and 1978, and stap was concerned about helping special educators, monitor student progress towards year-end goals, those annual goals, and so that's the beginnings of CBM. It has been refined, changed across the years, and additional measures have been developed and a lot of research has gone into CBM to support its effectiveness and use, and we see these procedures are reliable and valid. And a number of experimental contrast studies demonstrate the effectiveness of curriculum based measurement for teachers that use that information for instructional decision making so it isn't simply gathering data on student progress and having it, although that's very important, and being able to communicate that information with other people, but teachers who actually use that information and make decisions about their instructional programs so they respond to the data by making intervention changes when the data indicates that's necessary. Teachers who do that seem to enhance students avenue achievements, they perform better than students whose teachers use more traditional ways for monitoring progress.

What do teachers typically do? If their data based r oriented collectth data and making decisions, what typical format do they use in instructing mathematics and monitoring progress? Typically, we see teachers use what we're going to call mastery measurement, as a common way for looking at students performance. I'm going to illustrate what I mean by mastery measurements, but I do want to let you know up front that this is not an example of curriculum-based measurement, I will describe that and contrast it with mastery measurement. Okay. From the standpoint of looking at a mathematics curriculum across the year, here is the hypothetical example of a fourth grade computational curriculum. What we see here are all of the critical skills that should be instructed across the year in this fourth grade math curriculum for computational skills. And what a teacher would particularly do is start with the easiest skill, logically, and move through that curriculum. If the teacher is data based, or very oriented to looking at student performance information and making decisions, the teach certificate likely to develop some forms of assessment to look at the effectiveness of his or her instructions, so the first skill in this curriculum would be addition with re grouping, so the teacher develops ten problems to illustrate addition with re grouping, and we'll give a sample form of these problems so an alternate form of these problems, a couple of times a week to students to gauge their progress F we look at the graph that appears next, we see this mastery measurement graph, student performance information, early in multidigit in instruction, and the teacher has identified a criterion for mastery as being 8 problems correct, at least 8 problems out of 10 being correct on three successive occasions. And we see after several weeks of instruction, this student has met that criterion, the student has at least 8 out of 10 problems correct on three successive assessmentth, now the teacher assumes the child has mastered this skill, and moves to the next skill in the sequence and delivers instruction then on multidigit subtraction. So we see that as the next skill in the sequence in our chart, and the teacher has to develop a new set of assessments to look at student performance on subtraction with re grouping, so here is a sample, 10-problem assessment on subtraction with re-grouping. Teacher would give this form a couple of times a week or alternate form a couple of times a week, and monitor student progress on this skill. So we see with subtraction with re grouping by looking at the next graph that the student has taken a longer period of time to master multidigit subtraction, that doesn't surprises us as teachers of students who are having difficulties in the area of mathematics, subtraction with re-grouping is particularly give, so we see the student has taken a longer periods of time to master it, but the student has gotten 8 out of 10 problems correct on three successive occasions, so the teacher says okay, this skill is mastered now, and I can move on to the next one, which is multiplication facts. That is is an appropriate way of thinking about instruction and trying to delivering instruction with regard to specific skills, but in terms of looking at students overall performance in the curriculum, mastery measurement is limited. The information that is provides is limited, and let's look at a few of the difficulties with mastery measurement. One is that curriculum that either the teacher devised or a curriculum that has been already developed, if we look at that high ark I of skills, it may be long California in nature, -- logical in nature, but not empirical, meaning we don't know from research that that's necessarily the best sequence of skills for instruction for particular students. But the curriculum is designed that way, and so the teacher is teaching in that specified fashion, and developing assessments to match those particular skills. But a problem with this assessment we be that they don't reflect maintenance or generalization of information to other skills, if we looked back, at those multidigit addition, and multidigit subtraction tests, only that particular skill is assessed at that time. So when the teacher moved on to multidigit subtraction, we don't know whether the student actually maintained his or her skills in multidigit addition, so that can be a problem, we know for many learners when they have difficulty, they need multiple opportunities to review envelopes, and may need to be -- information, to review enforcement teachers knee assessment information on that. We also see that simply marking off number of objectives that a student seems to have mastered, does not necessarily correlate well to other kinds of tests, other criterion measures such as high stakes test we give at the end of the year. And then additionally, we don't know about the reliability and validity of these particular methods. Teachers are developing these assessments, we don't know about the right of those particular forms, and that's true with many curricular perhaps, even though they may be published programs, we don't necessarily know the mastery tests that come with the programs have documented reliability and validity. So in contrast to this mastery measurement way of looking at student performance information, we're going to look at curriculum based measurement, which will address some of those difficulties that we saw occur with mastery measurement. For example, with curriculum based measurement, the focus is on the general outcome. We're going to look across all of those critical skills in the curriculum, rather than assessing just one skill at a time, or that skill that's being taught currently. We also know that we use very specific procedures for developing the test administering them, scoring them and then uses database decision rules to evaluate student progress and evaluate the teachers instructional effectiveness. We know from years of research support that this is a reliable and valid way for looking at students' mathematics progress across the year. This next slide then shows a sample curriculum based measurement form in mathematics computation. If you wants to look back on your PDF, if you printed out the slides for this presentation, you could go back and look at those skills in the instructional high ark I for the curriculum car hierarchy, but you'll find those skills represented on this measure, so the multidigit addition with re grouping, multidigit subjects operation, the -- they are all represented on this particular measure. So we see 25 problems that represent all of the critical computational skills across the entire year. We're going to use a form like this and I'll illustrate how you would place students in the curriculum based measurement math tasks, how you figure out the level of material to use for progress monitoring across the year then I'm going to discuss how to actually give these measures and score them and I should mention again that these first samples that are, that I'm showing come from monitoring basic skills progress which were the math forms that were developed in the 80s and early 90s at Vanderbilt university, and have been used in a variety of research project, those are published now by the company pro-Ed, and in the presentation materials, you'll see the web address for pro-Ed, if you are interested in purchasing copies or masters of these forms. I will also illustrate several other types of math measures before our session is over today. -- establishing goals, end of your goal, and the goals for students, and last, we will talk about, looking at student progress to make decisions about whether the program is effective for particular students. And I always caution -- I wants to mention this is not a statement about how effective the teacher is necessarily, but how effective that program is working for particular students, that program may be working very well for many students in the class, but for two or three students, we can see from the progress monitoring information that it's not working as anticipated, for those particular individuals. And that's where the progress monitoring information is so critical. We can highlight, we can see very easily which students are having difficulty with our program and then we device interventions, we device ways of addressing our instruction for those particular students to try to bring about better performance . Okay. Our first step is how to place students in a CBM math task for progress monitoring, if you are using the basic skills progress probes, or those measures, those are available for grades 1-6, for computational skills. Concept and applications is another set of black line masters, and those are available for grades 2-6. And then there are some other forms that are actually still under going some research, but you can find information about these forms for kindergarten and first grade students, at the research institute on progress monitoring. And that web address is included in in presentation as well. But the research institute on progress monitoring is also examining other forms of CBM and looking at early numeracy measures. I will describe that is correct the number identification, quantity discrimination, and missing number. There are some similar forms of early numeracy that are also provide by aims web, and I will discuss that later, too. Okay. How should one figure out what level of material monitor progress? Generally, the answer to that question is you want to monitor progress at the grade level where the child is placed, if the child is in fourth grade, we wants to use fourth grade curricular materials, and monitor progress on fourth grade assessments, however, as a special educator, I know that not towels students are able to perform well on grade level material. So if the student is actually performing well below grade level expectation expectations. Wee may need to use a different set of procedures to try to figure out where to best place the child for progress monitoring purposes. And with that statement, I also wants to clarify, you may be monitoring progress at a level that could be different from the instructional level. Its question we need to answer first is where do we wants our student at the end of the year? Or by the ends of the i.e., what is our goal for that student? The student may be in fourth grade, and currently performing at second grade level, but if we wants that student to really do well on third grade level mathematics, then we would use third grade assessmenting to monitor progress across its entire year, even if the student sentence performing well -- isn't performing well at that level at the beginning of the year. Now, beyond those general comments, if you want to use specific numbers to help decide what appropriate level to use, this next slide describes that information, and it's really a reference slide. I'm going to go through this information rather quickly, but you'll need to refer back to this if you have a particular student who has a lot of difficulty performing on grade level, or with grade level expectations. Basically, you want the, you want to use the first bullet indicates, you wants to use the grade level where you wants that student to be competent by the year's end, and that's usually the grade where the student is placed, the grade level for that student. However, if the student is really performing rather poorly and much below grade level expectations, then you may need to monitor progress at a lower grade level, and the bullets at the bottom of the slide indicate how to do that. First, you would give a couple of alternate forms of the computational measures, or of concept and applications measures, and you would score the student performance and average the scores. If the student's score, average score falls between 10 and 15 digits, or 10 and 15 blanks, which I'll explain a little bit later, then you could go ahead and stay at that level, where you have just given those baseline tests, so if the student is in fourth grade, and you went down to third grade, because the student is performing very poorly, and you are trying out third grade probes, if the student scores between 10 and 15 digits correct in the answers, then you may want to stay at that third grade level test form of across the year to look at student progress. What we are doing with CBM is to monitor progress across the year it doesn't always match the exact grade level where we're instructioning, but we wants to be able to capture student growth across the year. If the student performs very poorly, for example, in this, on this third grade level test, and scores less than 10 digits correct in the answers, then we may need to move down to second grade level material, and try a couple of baseline probes there, and average the student's score. If, however, the student scores 15 dings or greater, -- digits or greater on that original third grade test, you may want to reconsider what is grade appropriate for that student, so you may want to go back to the fourth grade level material and see even though it's kind of hard at the beginning of the year, I'm going to go ahead and use fourth grade material to monitor student progress. Again, this is a reference slide, and you may need this for particular students, but in general, you wants to monitor progress at the grade level where the student is placed, or by answering the question, what level, where I do wants my student? What level do I wants my student to be on by the end of the year? In terms of administering and scoring curriculum based measurement probes, we give students a certain amount of time which is the same amount of time each time we give the probe, the math probe to the student, and we ask the student to answer the problems as well as he or she can in that periods of time. The teacher scores the mathematics probe, and what we are looking at typically would be the number of digits correct in the answers. Or the number of problems the student got correct, or the number of blanks the student filled incorrectly, any one of those scores then could be plotted on the student's graph, and used for instructional decision-making purposes. In computation, we generally look at the number of digits correct in the answers. In looking at computational forms, with monitoring basic skills progress, these are provided for grades 1-6. Twenty-five compute taste Al problems are included in each probe, and those computational problems represent the mathematics curriculum across the year. The student works for a specified period of time, which is indicated by grade level, that may vary by grade level, but it remains standard across the year for that particular student. And then the teacher scores the test once the student has finished or when time is called. Here we see again another example of a computational measure and here you see the website for pro-Ed, it's www.proedinc.com. If you are interested in obtaining black line masters, for grades 1-6 on basic computational skills. Looking at the form again, we see that there are 25 problems that are presented randomly on the page, they are not in order of presentation in the curriculum. They are mixed up, in random order on this page. Each alternate form will have the problem listed but they will be in a different order on every probe. Here is a chart for how much time we would allot the student in taking that test, and you can see if we looked at a fourth grade test, we're only going to allow three minutes for the student to work, so the student is told up front how long they will have, and they need to work quickly through the test, and they do as many problems as they can, and we inform the students that some of the problems will be very easy for them, and others will be very difficult, in fact, they may not know how to do some of the problems on the page. We tell the students to stop and work on the problems that they can work, those problems that are easy for them, and to skip the problems that are hard and they can come back to those later if they have time that's left. We also tell the students to work through the problems even if they think they can't get the entire problem correct, because they can get partial credit for their answers, and what happens there, we are going to look at every digit or every numeral in the student's answer, and we will give a point or give credit for every digit that is correct. We tend to use number of digits correct in answers in looking at computational problems, because the research has indicated that it is a more as soon as tiff index of student change across the year -- sensitive, we can see students growth more quickly, by looking at individual digits in the answers, and scoring their accuracy, rather than waiting for the entire problem to be correct. So the way that we would do this in scoring digits in the answers is that we look at the individual numerals, and compare them to the numerals in the correct answer, and count how many digits our student got correct, and you can see in this example, the answer is 2361. So a student could earn up to 4 points if they got this answer completely correct. In the second item, we see that the student answered the problem as 2461. So the student would only get three digits correct. For this answer, so get 3 points. Towards the CBM score. And the third student answered 2441, and so the 2 and 1 are the only digits that are correct, so the student would get two points for this answer. Now, what needs to be considered as we are trying to give students partial credit or we're giving them a point for each correct digit is that we need to consider how a student would work the problem, so we have to look at our answers and decide where to start, do we start on the left side or right-hand side in scoring digit by digit in the answers. And the answer with our operations is that for addition, subtraction, and multiplication, we are going to start scoring from the right-hand side, so we will look at the one column first and the 1000s and so forth in comparing the student's digits to the correct answer, reason we do that is because that's where students would typically start working the problem. So if they didn't finish the problem, we are going to, we are going to begin scoring where they started the problem. And they may get some digits correct, even if they didn't finish the answer. It's different though for division, because in division, we work from left to right in working out the problem, so that's the side that we will start scoring when we look at the students' answer, we will score division problems left to right. We also need to address remainders in a division problem. With these forms, we typically tell students to use a "R" when there is a remainder, when that is appropriate, and our scoring rule changes slightly then, even though we are scoring from left to right in the quotient, for the remainder portion of the quotient, we will score from right to left, because the student needed to sub packet in order to calculate that remainder, so in subtraction, we would be scoring from right to left. So, in looking at the next slide. We see the correct answer in the first problem is 403, with the remainder of 52. So we'll score from left to right and we are comparing the first digit in the student's answer with the first digit of the correct Ann, and the student got it right, even though the student wrote 43, and left out the zero in the ten's place, we are still giving credit to the 4 because that's the first digit in the student's answer in scoring from left to ride. How much, when we move to the remainder component, we see the correct answer is 52, and the student wrote 5. We need to score from right to left so we're comparing this student's answer of 5 against the correct answer of 2, and so the student did not get that digit correct. If we look at the second problem, we see that the correct answer is 23, remainder 15, the student wrote 43, remainder 5. We are going to score from left to right in the whole number part of the problem, so we compare the student's 4 against the correct answer of 2, and the student did not get it right, and then we compare the second digit in the student's answer 3 against the second digit in the correct answer of 3, the student got that one right, so you see a check mark under the 3, and then looking at the remainder component, we are scoring from right to left is he we compare the student's 5 with the 5 in the correct answer, unfortunately, the student does not have the 1 to indicate 110, but the student is still going to get credit forgiving the 5 so the student earns two points on this problem. I also need to tell you about how to score decimals and fractions. In decimals, the rule is you start at the decimal point and move out in both directions. So you need to see what the correct answer is, and then compare the student's answer against that. Find where the decimal point is in the student's answer, and line that up with the decimal point in the correct answer, and move out in both directions from that decimal in scoring each digit. For fractions, we're going to score from right to left, for each component of that fractional answer, so right to left in the whole number part, from right to left in the numerator, and from right to left in the denominator, and then we just add up how many digits the student got correct for that problem. So the next slide just shows some examples for how to score decimals, moving out from both directions from the decimal point. So in the first problem, the student gets two correct digits, but only one correct digit in the second answer. On the next slide, we see the fractions and we're scoring always from right to left for each part of the answer, so right to left comparing 6 to 6 in the whole number part so the student gets it correct, comparing the student's answer of 8 against the correct answer of 7, the student doesn't get it right, then comparing first the student's 1 on the right-hand side against the correct answer of 2, the student doesn't get it right, thin looking at the student's second digit from the right, which is also a 1, and comparing it to the correct answer of 1 in the Dee nominate nor and student does gent that digit correct, so the student gets a total of two correct digits in this answer. In the interest of time, I'm going to move on, you can refer back to these slides for specifics about scoring these different operations. Let's look at computational measure then that has been answered by this student Samantha. If we look at this measure, we see she actually attempted to answer 15 problems, she skipped two of the problems, and two problems were incorrect. She actually got 13 problems correct, but when we look at all of the digits in her answers, we see that she actually got 49 digits correct, and 49 is what we're going graph. Her score fare this measure will be 49 digits correct. I want to show you some examples of what probes would look like in mathematics for concepts and applications. For monitoring basic skills progress, these alternate forms, 30 alternate forms are provided at each grade level, 2-6, and the student is actually given three pages because it takes up more room on a page to write out word problems, or to have graphics, and so the student is presented with a 3-page probe that runs from 18 to 25 problems that represent the year-long curriculum, regarding concepts and applications. And again, a time limit is provided for work on each probe, and then the teacher scores the answers. Here is one page of a sample probe for concepts and applications and I mentioned earlier we might be scoring blanks correct. In concept and applications, this is the measure that we're using in looking at student performance, we are going to look at each answer or each blank that is answered correctly. It's going to be very difficult to try to apply digits correct in concepts and applications, because we would have to go back and think through, did we use addition to solve this problem or subtraction, or did I have to use multiple steps? Multiple operations in solving this problem? So it gets very complex trying to figure out the exact rules for looking at digits correct in the answers. So in this case, we are going to just score whether the answer is correct for each blank, so in the first item, it says write the number in each blank, this was an applications probe for grade level 2, and we see that there are three responses that we are expecting from the student for problem number 1. And we would score each of those three blanks as being a point, either correct or incorrect. Again, we would use a specified period of time at that second grade level probe, we would provide 8 minutes for the student to work through those three pages. Some people ask me why it's so important to stick to a particular period of time. Well, we're not able to compare student performance performance on a graph if we start changing the measures, start changing the amount of time we are giving students, we wants to see that in the same period of time, the student is able to answer more and more problems correctly, and get more and more digits correct or more and more blanks correct across the year as the student learns more and more math skills. So we need to keep the time constant. We've do not allow enough time for most students to finish the probe and there's a reason for that, too. We don't want the students to top out at the top of the graph when we are monitoring their progress, we wants that graph to capture progress so ever time, even for students who do well. So we make it challenging for students to finish, we don't expect them to finish every problem on the page, or on the pages in the amount of time that we're allotting in scoring the concept and applications, the students will receive one point for each blank they answer correctly, and we score the, or we plot of number of blanks correct on the student's graph. Here is an example probe net for Quinton's test. This is one page of a 3-page test and the next slide shows the last two pages for this test. And what we look at are the number of blanks that the student filled incorrectly, so as you see on this slide, the top problem on this second page, problem number 11, has three blanks, and the student got all three of those blanks correct so the student would get 3 points there. Or if you look at the page on the right-hand side, you'll see problem number 19 where it says write the fraction when, and it gives directions, and you see a box for each one of those numerals, and we are scoring each one of those boxes as a blank, or as a separate answer. So the student got those items correct so the student would have gotten four points correct on that item number 19 for some sample early numeracy measures, you can get decision at information about these particular measures from website www.progressmonitorring.org, but I will explain thousand to look at number identification, for students in kindergarten and first grade, I would use that's for kindergarten students, and the more complex measure in first grade of sampling all of the critical skills in the curriculum for first grade, like what we would see with monitoring basic skills progress, but for very low performing students, the teacher may decide to use number identification quantity discrimination and missing number even for first grade students. Number identification provides 84 items and the student is ask to respond orally to identify the within number that is present armed, and the student only gets one minute to work on this measure, so this slides shows a sample page. He's the, the probe is actually 3 pages long, but this is the first page of a probe that would be given to a student for number identification. So the student reads from left to right, and names those numbers, just identifies the numbers, and the teacher has a score sheet that looks like this so the teacher writes down what the student says the answer is, and the correction answers are provided at the ends of the blanks, so the teacher can score easily as correct or incorrect. If the student does not know an item, or doesn't respond within three seconds, the teacher will just move the student on to the next item, can point to the next item and say try this one. So the teacher doesn't correct any errors the student makes and do the not provide of correct response

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But just moves the student on, we don't want students to spend a long toward of time on any one item they don't know, because this measure is only for one minute, we don't want a lot of time wasted on those particular items the student doesn't know, so we move them on after three seconds, move them on to the next item. So this slide shows a sample score sheet that has been completed, where the teacher has filled in what the student says for number identification, and we see that in Jamal's case, the score that will be plotted on the graph is 54, the correct, the score on the student's graph would be 54. Another way to look at students' early math skills is quantity discrimination, in this probe, the student is presented with 63 items and the student is asked to tell which of the two numbers is larger, and the student works for one minute, and teacher writes down what the student says, so this slide shows an example of one page of quantity discrimination, student sees those numbers together, the 3 and 7, and the student needs to say that the 7 is the larger number, so the student says 7, and moves to the next item to compare the # and 5. This slide shows teacher's score sheet, and again, the same directions are used if the student hats difficulty with a particular item, and spends three seconds trying to figure it out, the teacher moves the second on to the next item and says try this one, and points to the next item. Any items that the student skips, the teacher puts a hyphen on the score sheet, and at the end of one minute, the teacher stops the student, and count out the number of correct items, and we see Lynn's score sheet here, and Lynn attempted 38 items, go only got 33 create, we would grab 33 as the score on her graph. The last early numeracy measure is missing number

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In this probe, the student is presented with 63 items, and works for one minute, and what the student is expected to do is tell what number is missing in a sequence of four numbers, this slide illustrates one page of a 3-page probe that a student would look at with missing numbers, so you can see in the first item, 3, 4, blank, 6. We want the student to say 5, so the student is to provide the number that is, that belongs in the blank, the number that is missing in that sequence. The teacher writes down on the score sheet what the student says, and again, we will move the student on after three seconds if the student has not provided an answer to that item. The student, teacher stops the student at the end of one minute, and marks how many items the student got correct. On this example, Thomas got a score of 18 correct, and that's what the teacher would grasp. I want to show just a few more measures, sample measures of what can be found related to mathematics for progress monitoring. I want to caution you that you need to really investigate different math measures and select the measure that best suits your purposes, that hits your curriculum or your way of thinking about student progress in math. What I've I illustrated to this point primarily with the exception of the early numeracies measures is how skills based approach to looking at student progress, so we've looked at those computational skills or the concepts and application skills that are critical at each grade level for the student but there is an alternative way, and that's looking more from a more robust indicator approach so aims web provides some probes that would follow this robust indicator approach, where you might just be monitoring basic facts progress. We know that basic facts skill is very much connected to students' ability to be able to perform accurate hi and more complicated tasks, and that students become more accurate and become more proficient faster at answering basic facts items so we can actually use basic facts as a way of looking at student progress across the year. And that would be looking at it from this robust indicator approach. So aimsweb provides samples of both types where grade level skills are presented, and here we see a sample third grade probe for computational skills, so that represents critical skills in the student's curriculum, or we see sample measures that can be downloaded from the web, and these facts measures, you have a variety of choices, you can choose single operations, just look at addition facts, or multiplication facts, or get mixed operations probes. Another tool that can be used is yearly progress probe, this is a web based format. In this tool, this web based tool, the student sits at the computer and answering math questions, so they have scratch paper they can work out the items at the computer, but they enter their answers directly on the computer and it is scored immediately, and in this measure, it lasts for 15 minutes and the skills represent critical skills at that grade level in both computation and in problem solving so the next slide shows an example of a problem, word problem for student represents problem solving skill at that grade level. What do we do with the student's scores then once we have them? We want to make sure we graph them so we have this visual depiction of student progress across the year, and we're going to use that student progress information to determine whether our goals are appropriate for students, and where the students are progressing adequately. We can also compare different interventions, different mathematics programs or instructional enter Vinces to see what intervention brings the most improvement, teachers can use computer graphing programs, use a template, what we want to do is make sure that the, whatever index we are using for scoring, whether it's correct digits, or correct blanks or correct problems, that goes on the vertical axis and horizontal axis shows the number of instructional weeks, or shows a calendar, it shows time so here we see a sample progress monitoring graph, and we see that across the year, the student is gradually improving in mathematics performance, so this graph shows the number of digits correct in three minutes, so this was a fourth grade computational probe, and we see in the same 3 minutes that over time, the student was able to attempt March and more problems, and get more and more numbers right. How do we use this information to set goals for our students? There are several different methods, and I should tell you what I'm providing are just guidelines today. I'm going to give you some numbers, you'll have some numerical information to work from, but again, you are going to have to really consider professional judgement. It is not, I'm not giving you hard and fast rules. I'm giving you general guidelines to consider in setting ambitious goals for students. The three main methods that I'll discuss are the end of year benchmarking method, using national norms foreslope of improvement, and a third framework is this intra individual framework, that we don't use that often. For end of year benchmarking, for typically performing students, we can just look at research data on what has been shown as typical benchmarks for student at the end of the year, if they can reach this benchmark, they have progressed fairly well across the year, and they are likely to be successful on their end of years tests and success fell in the next year of instruction. This end of year benchmark chart has been provided for the monitoring basic skills progress for those probes in computation and concepts and applications, and what this chart shows is the maximum score so how many digits correct would be possible at different grade levels, or how many blanks would be possible on concepts and applications probes? And then what the benchmark score would be, so if a student can get at least that many digits correct, or that many blanks correct by the end of the year, then we could say the student has done well in that curriculum, so we could use the benchmark information -- for typically developing students, and how much growth they make on a weekly basis, so how many digits they grow from one week to the next, or how many blanks they grow from one week to the next across the year. And we see this represented at different grade levels. So for example, at third grade, we would expect typically performing students to improve at least a third of the digit correct or .3 digits correct each week across the year, so we could use that information to help us establish a typical rate of progress for student growth across the year at that grade level. This slide provides information for a student who started out performing at 14 digits correct at, early in the year on a fourth grade computational measure. So if we use the chart and we look at fourth grade, and look under computation, wee see that .7 digits correct would be expected as a weekly growth rate. So at this point in time, we have, this is just a hypothetical example, we have 16 more weeks left to the end of the year, so what woe we expect our student to be able to do by the end of the year if the student is currently performing at 14 digits correct? We would multiply our 16 weeks that we have left by our weekly growth rate, so 16 times .7, and that yields 11.2 digits, and we are going to add that 11.2 digits to where a student is already starting, or already performing 14 digits correct, so if we add 11.2 to 14, we get 25.2, and we would expect then that our student could get approximately 25 digits correct by the end of the year, which is 16 weeks down the line. We would mark on the graph what our average baseline performance is, or where a student is starting at the beginning of the year, and using the a method then for establishing an appropriate year-end goal, and put a T of X out there. if we look at this graph, this slide Dee pictures three scores that we were using at students baseline or early in the year performance. And we summarized that with a X on the vertical line that you see, so we summarize the student's median performance or middle performance of 5 digits correct. And we set 20 digits correct as our year-end goal, and we connect those two Xs, and that depict our goal line, so we see the rate of growth that the student needs to making across that period of time in order to meet the goal, who would we translate this information to E i.e. P? We would consider our median baseline performance as our current level of performance, so in the previous example, we had five digits correct as our median performance, so we would say that given 25 computational problems at a particular grade level, the student currently is writing 5 digits correct. What we want to do then is predict how well the student should do, or will do, by the end of the year, so we translate that information into a goal statement, so we write it similarly, given 25 computational problems at, and in this case, the sixth grade level, Pamela will write 75 digits correct in 6 minutes by, and you would insert the year-end date, or the date for a year from now if you are writing the i.e. P goal. The last method to consider with goal setting is intra individual framework, and in this method, the basic idea is that the student is either performing very poorly or performing very well so our typical growth rates don't apply, and if the student is performing poorly, we are not sure the student is going to meet that benchmark information, so who can you we still establish -- how can we establish an appropriate goal, or how can we still help the students to improve across the year? And the basic idea here is that we gather data on how well the student is currently progressing so we may collect 7 to '8 point -- data points, and figure a rate of progress over that period of time, and we want to improve that rate so we may multiply that student's rate of improvement or that slope that we figure will multiply it by at least 1.5. We don't want to allow the student to continue at the same rate, we want the student to continue to improve so we are just going to try to improve that slope by a little bit, and this slide illustrates an example, provides an example, illustrates how we can figure out how, by looking at the student's points what the slope is or the rate of improvement. I'm only going to go through this one example, which I know is probably not going to be enough for many of the participants today in terms of learning how to apply this accurately and easily, so what I'm going to refer you to will be the website for the knacks center on -- national website, www.studentprogress.org, and if you look at the summer institute information for 2005, or 2006 and looks at the mathematics presentations there are day long workshops and shorter once, you can look at the power point presentations, there's a manual that provides written description, and also handouts of examples so you can see additional examples and see the information illustrated in multiple ways. If you refer to those materials on the website. But very quickly, taking you through this weekly rate of improvement, you look at this graph, we are trying to determine what the rate of improvement or the slope is for this particular student, and we are going to use a very simple way of trying to figure this out, we are going to take the data points that are provided, we see 9 of them here, and we are going to by the data path into third or proximal thirds, and look at the median or middle score in the first third so at the beginning of the phase, and look at the middle score in the last third or end of the phase. And we see that the student's score, the median point in the last third of the phase in the third phase, the last third of the data path, the student's middle score is 40, student's median score in the first third or in the first phase is 20, so we are going to subtract 20 from 40, and we are going to divide it by the weeks we have here, the number of data points less 1, so the number of data points of 9, minus 1, and our answer is 2.5, so what we see is that the student has improved by a weekly rate of about 2.5 digits correct across that period of time, and if the student is currently improving, this is a student who is doing very well, we want high performing students to improve upon their rate of progress as well, so we see that the weekly growth rate is 2.5. We are still going to multiply it by 1.5, for setting our long-term goal, and 2.5 times 1.5 is 3.75, so now we are going to take 3.75 as our new rate of progress and multiply it by the number of weeks left to our goal date. Let's just say we have 20 weeks left, we'll multiply 20 times 3.75, and we will add that product to where our student is currently performing during baseline. And that's how we'll set our end of year goal. So I've given you three methods to consider in trying to set an ambitious goal for a student, looking at the national norms for weekly rate of improvement, also looking at benchmarks that indicate good performance by students or typical performance by students at the end of the year, and then also this intra individual framework that you may consider for particularly low performing or particularly high performing students. The last step that we need to consider before I'm going to open this up for some discussion and for question and answers, the last step that we are going to consider will be how to use database decision rules for addressing the instructional program. What we need to do is to collect baseline performance for students, set end of year goal, and then the teacher continues to evaluate student progress periodically. We are going to give measures to students typically once a week if the student is a student with a disability in the area of math, we may want to give measures twice a week to that student so that we are gathering additional information. But what will happen is that approximately every 7 to 8 data points, we wants the teacher to stop and look at that student's graph, and answer this question: Is my instruction helping this student? Is the student on track toward meeting the long-term goal, and the way we do that is to device a trend line, or look at a line of best fit that shows our student's current rate of progress and we are going to compare that rate of progress to the goal line that we established for the student, and we can use a simple method called the -- for actually drawing the student's trend line, and we will follow the database decision rules then in evaluating whether the student's progress is on track towards meeting the long-term goal or whether our instruction isn't effective enough to help the student meet that end of year goal, we may need to modify our instruction, so this slide, standard decision rules regarding the trend line, this gives the information for making that decision if we look at the student's trend line or slope of performance progress that the student is currently making, we evaluate that trend line against the goal line. If the trend line shows that the student is doing very well that that trend line is actually steeper than the goal line, then we know that we've underestimated how well our student can do, so we may actually want to increase our goal, our end of year goal for the student. If the trend line is flatter than the goal line, so if etcetera a less steep than the goal line, then our decision is that we need to change the student's instructional program, we need to revise it or modify it in some way to try to bring about better performance on the part of our student. And if the trend line and the goal line are fairly equivalent, then we don't need to make any thanks we will give probe and evaluate student progress at a later date. -- change. In this graph, the question is what is our database decision then? Looking at the student information. What wee see on this graph are 8 data points, and we've used the -- what you see there, that dark black line going through the Xs, that's the student's trend line or rate of progress that the student is making in that phase. So if we look at that, we see the student is just barely improving, that goal, I'm sorry, that trend line is improving at a very slow rate. Our goal line though is the dotted line and that depict how well our student needs to be progressing in order to meet the year-end goal, if we compare this friend line to the goal line, we see the trend line is less steep so decision we make is that our instruction isn't working well enough for this student, we need to revise it, we need to modify it in some way to help the student do better. Where do we draw that trend line? We do it similarly to what I mentioned earlier where we are going to take the take the data points, and we are going to divide that data path into thirds and we are going to find the intersection between the middle score in level and the middle point in time and I'll illustrate what that looks like, we mark it with a X, and we do the same thing in the fired third of the data r or beginning part of the phase, and end part of the fades, the last third of the phase, we will find the intersection between the median score in level and the median point in time and mark that with a X and we draw a line through the two Xs, and that gives us our trend line. Again, there are additional examples, and explanation of how to do this on the national center for student progress monitoring website, going to the summer institute information for 2005 and 2006. Looking at this graph, there are 9 data points and so the vertical lines have divided the data points into thirds, be we are going to look at the first third and last third, and in the first third, we are going to find the middle point in time which would be the second score, and we are Alberto Gonzales to find the middle point in -- going to find the middle point in level, how high or low the scores are, so middle point, and we see it's the same point in that first third, so we've put at X on it, we are, at about 20 or actually just a little under 20, maybe 19, and then we look at the second, I'm sorry, the last third of the phase and we are trying to find the middle point in time, which would be the score that goes with week 8, and we find the middle score in level and it looks like the scores for, week 7 and 8 may be the same so we are talking about the same level, but we are marking a X at the intersection of the level and the middle point in time and then we are drawing a line through both of those Xs, and that line indicates the trend line or line of best fit that illustrates the path the student is making across the 9-week period of instruction. And we see that the student is progressing at a very nice rate this second standard decision rule that we can use, the Trent line rule or 4 point rule which is easier, because all you are looking at are the actual data points and comparing them against the goal line. Easier than drawing the trend line, if you look at the four point rule, you want to make sure that you have at least three weeks of instructions, the reason for that is the question we are asking is whether the instructional programs seems to be working for this student, it's not whether my lesson worked today, so we need to gather data across a period of time long enough that it's likely to have an effect on students overall performance, so we need to make sure that instruction is in place for at least three or four weeks before we stop to evaluate our data and how well the instructional program is working. The rule for using this 4 point rile as a wail of -- rule as evaluating the adequacy of student progress are these: We are going to look at three weeks of instruction that have, that they have occurred, and we are going to say that we need at least 6 data points so we need to have collected, we need to have given 6 assessments in this period of time. If our data meet both of those conditions, we have three weeks of instruction and we have at least 6 data points. Then we can look at the four most recent scores and we are going to compare them directly to the goal line that we've established, if all four of those most recent scores have fallen above the goal line, then we know that we United States estimated how well our student can do, students doing very well, scores are falling above the goal line, to we wants to to increase the student's year-end goal, if, however, all four of those most recent data points fall below the student's goal line, then our decision is we need to modify our program in some way to try to bring about better performance. If those most recent four data point fall above and below the goal line, we need to continue to collect data, until we can use the trend line rule, so we can draw a trend line, or until we have enough data where the four point rule can be used. I'm looping at this next student's graph, we see 8 data points, and we've had at least three weeks of instruction, in a in fact, 8 weeks of instruction with one data point being collected each week, and our decision, our question is has our instruction worked effectively for this student? If we use the 4 point rule, we count back the four most recent data points and compare them to the goal line, and those four most recent data points all fall above the goal line to the database decision would be, instruction is working well, in fact, our student is achieving better than we anticipated so we are going to actually improve our year end goal. You might notice that we actually, if we counted back five data points, we also see that that earlier data point was above the goal line. We could have made this decision one week earlier by using the four most recent data points, could you have made this decision after 7 weeks of data. Instead of 8 weeks of data. In the next graph, we see a different performance path, 8 data points for student, and 3 weeks of instruction, and at least 6 data points have been collected, in fact, we see 8 data point in 8 weeks of instruction, and we look at the last four, the most recent four data points, and see all four fall below the goal line so our decision is that our instructions not working at well as anticipated, so we need to modify our instruction to better meet student needs. I'm going to open up for questions in just a moment. But let me finish by saying there are a variety of computer and web based progress monitoring systems in math, and I anticipate that many more will be developed over the next five years or so, and that each one of these programs has its own version of probes, they have their own data, they have collected with those problems, so you would want to use the general recommendations in terms of benchmarks, or average rate of improvement, that would be provided with that particular system. And those systems vary in the times of information that are provided to teachers, some of the systems provide those raw scores and you see graphs, in other systems, you may see the graph for the entire class, and you may see graphs that depict how the low performs students are doing versus middle performing students in the class versus high performing students you may get statistics on class averages, or even a list of students who are identified as being in trouble that they need additional information, intervention because the information provided indicates that they are not doing very well compared to their peers. And then some programs provide information regarding specific skills, so level of mastery for specific skills for the problems that have been answered. All of these systems come with different programs for fees so you'll need to look into those programs to get more information so in summary, curriculum based measurement provides an easy method and a fairly efficient weigh for gathering student progress information across the year, where we can use that information to establish goals and adjust goals as necessary or make intervention changes with our instructional programs. It -- special will with web based versions, we can see how individual students compare with peers in the classroom, or compare with school and district data, or even comparing students to national norms. I think at this point in time, Rebecca is going to come in and talk about the tools chart and we'll open up for a few short questions.

Yes, thank you, Dr. Stecker. We've included a slide about the national center off student progress monitoring tools chart because we always get questions about where can I get the probes and where can I find the stools, and the progress monitoring center has a technical review committee and they have reviewed a number of tools that have been submitted and they evaluate each tool against a number of different criteria, if you go to our website at www.studentprogress.org, you will see the tools chart and each stool tool has a number of dots, and that's what indicates when I criteria that tool -- which criteria that tool has met, it's an easy way to look across the different features of each tool and see what kind of criteria they need and how they might immediate your needs, and you can click on the tool itself, and learn more about the tool like what kinds of probes that they have, how they are administers, what grade levels they are appropriate nor, and what kind of support you need in terms of training and technology. So we invite you to visit the tools chart on the progress monitoring website, and learn more about the different vendors and tools that are available. At this point, I think we are ready ready for questions, it might be easier to ask questions if you typed them, so we will unmute phone lines now and open it up for questions for Dr. Stecker.

I hear clicking but no questions. We can stay on past 3:30 if we need to.

My question is in our state, we've been training teachers for computation using the MBSP probes to score them using digits correct per minute, and my question is do you think the technical adequacy of digits correct per minute is enough to outweigh the extra little bit of work to score them? As opposed to total digits correct. I'm not sure that I'm following your question. Are we talking about the same kind of data, just being divided by --

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by the number given by the probe

So -- still trying to clarify, let's say we've given a fourth grade probe and student has spent 3 minutes on it, what you are saying is that you graph information for one minute, you take that total score and divide it by three?

Yes

You are essentially looking at the same kind of information, you are just looking at much lower scores on the graph

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Right.

Yes. If you want to compare that information to normal tiff sample, or look at the benchmarks, though benchmarks are provided for the amount of time and looking at the total score. The total number of digits correct for that period of time that was alouded.

Okay. If you wants to make comparisons, you may have to go back then and take your digits per minute and multiply it in this case, the fourth grade probe by 3 if you can't to compare that score to a bench -- want to compare that to a benchmark. Essentially you are using the same kind of information.

There's really not a great benefit to looking at digits correct per minute as opposed to total digits?

Right.

Okay. Thank you.

You're welcome. Are there other questions? I know I covered a lot of information and a lot of technical aspects. You can get more information by looking at the manuals, and at the slide presentations, power point presentations for the summer institutes, so you can work through additional examples for applying the trend line or calculating slope for students, I know I went through that fairly quickly. Powerpoint other questions? I'm not hearing any, so Rebecca, are we at the end? I'm hearing discussion but not hearing any questions, do any of you have any questions for me? While I'm still online?

Hello?

I have a question regarding the correlation between math CBM probes and high stakes testing.

Uh-huh.

What are they?

I could not tell you offhand. You'd have to refer to some of the research reports on that, and one suggestion I'd have for looking at that information would be to go to the research institute on progress monitoring, that's at -- and they actually have a searchable database of research regarding CBM, so it would be an easy way of trying to do a search to uncover the particular studies. I have been working the past couple of years in collecting some of my own research data on one of the progress monitoring systems, and that is the yearly progress probe, and I can't quote without looking at my research reports, I can't quote the numbers for you, but the correlation between the yearly progress probe measures and standardized achievement tests are moderate to high.

In comparison to the reading probes, this re-grouping higher --

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Are they higher? Not that I've seen. In my research,

I have one more question regarding the conceptual items, do you have read them to the students who have trouble reading?

for concepts and applications would you read the questions? You could whoever -- just compare -- them themselves, that's if you are talking about the monitoring basic skills progress. I know there's a research form at grade 1 for concepts and applications and in that, in those probes, those problems are read allowed to students at the first grade level. Also, in yearly progress probe, a web based system for mathematics progress monitoring in that, the students do have an option of, if they have headsets, they do have an option of hearing that problem being read to them. So that has been included in some research.

Thank you very much.

You're welcome. Any other brave souls with questions for me?.

I'm not here anything other questions, so I will just thank you for your attention today.