



RTI and Mathematics – Webinar Transcript

November 18, 2009

Whitney Donaldson: Good afternoon. My name is Whitney Donaldson, and I'm pleased to welcome you to the webinar, "RTI in Mathematics." This webinar is presented on behalf of the National Center on Response to Intervention. The National Center on Response to Intervention is a technical assistance and dissemination center funded by the Office of Special Education Programs. The center's mission is to build the capacity of state education agencies to assist local education agencies in implementing proven and promising models for RTI. We are pleased you could join us today.

We will be getting started in just a few moments, but before we hear from our presenter, we would like to review a few technical details about today's event and offer a few suggestions and guidelines. We trust that you've had success logging in to the technology, but if you encounter any technical difficulties at any point during today's session, please contact the live meeting technical support staff at 1-866-493-2825. The number is posted in the Q&A window for your convenience.

Please use the Question and Answer window throughout this session to type a question regarding technical issues or presentation content. The Q&A tab is located at the top of your screen. Once you open the tab, in order to type a question, press your cursor in the smaller box on top, type your question and click "Ask." Please note that your name will not appear in the question box. If you prefer that your question be answered privately, specify in the text box. Dr. Gersten will pause two times during the session to read questions and provide answers. Please note that the webinar software only allows you to type in one question unless your previous question has already been answered.

We're pleased to have our event captioned in live time by a captioner who is joining us online today. You might have noticed that a special box popped up on your screen when you first entered the session. That is where you will be able to access the real time captioning transcript. You are prompted to enter your name and organization so the captioner will have that information. We encourage you to resize 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, feel free to close out of the window and it will disappear from your view.

A quick note about the audio portion of this session – we will be recording this event so that it can be available online later for those who missed it today. In order to produce the best quality recording, we have muted all of the phone lines to minimize background noise. If you have a comment or question for our presenter, please use the Question and Answer tab at the top of the screen.



We are fortunate to have Dr. Russell Gersten with us today. Dr. Gersten is the Executive Director of the Instructional Research Group, an educational research institute in Los Alamitos, California, as well as professor emeritus in the College of Education at the University of Oregon. He recently served as a member of the National Mathematics Advisory Panel, co-chairing the Instructional Practices component. He currently serves as a Principal Investigator for the What Works Clearinghouse and chairs the panel developing Practice Guides in Response to Intervention in mathematics and reading. He has written extensively about early intervention in mathematics and valid assessments for screening students who require additional help in learning mathematics and has conducted meta-analyses on effective instruction for students struggling to learn math.

We are very fortunate to have Dr. Gersten sharing his experience and his expertise with us today. So now, I turn the presentation over to Dr. Gersten.

Slide 1: IES Practice Guide - Response to Intervention in Mathematics

Dr. Russell Gersten: Good afternoon, everybody. I'll give you a quick overview of what I'm planning to do and focus on. As Whitney mentioned, we're going to have a couple of times for questions. What I'm going to do this afternoon is just give you a thumbnail sketch of the half dozen or so important areas to consider in either initiating, refining, or moving forward with RTI in math, and it's going to follow the structure of the RTI Practice Guide in math. I have the web address, which is at the end of the presentation. You can download it for free.

Slide 2: Panelists

I want to talk for a second about what Practice Guides are. I first quickly want to show you the co-panelists who helped us put this together. What we tried to do was have a mix of professional expertise of people in the field, researchers, and mathematicians. So what makes this a little different from other publications is that we are very clear about how much evidence there is behind each of the recommendations we make. The group here includes a mathematician; a former school psychologist with an assessment background; Anne Foegen, who has a big math ed., special ed. and assessment background; a math coach who's now an assistant principal in Maryland, more of an ed. psych, cognitive psych person who does a lot with middle school math; and Brad Witzel, who does a lot in math interventions for LD kids and has a forthcoming book on RTI in math coming out.

Slide 3: Structure of the Practice Guide

The practice guides, for those of you who aren't familiar with them, and they haven't been disseminated as widely as I think they should be, have, in this case, a set of eight recommendations, some ideas about how to carry them out, and we tried to make them as practical as possible, understanding we're dealing with the reality of all of K-8. So this is not a detailed procedural manual, but a guide that gives you an idea of the kinds of things, in terms of RTI, that you might want to think about, as a math coach, building principal, special ed teacher,



or member of the school leadership team. Then, it gives you some ideas of ones you might want to prioritize. It is different from others in that we have impartial people. Then, we talk about potential roadblocks and make some suggestions for how to address them.

Slide 4: The Research Evidence

The research evidence: what we did here, for the levels of evidence, was focus on the high quality experimental and quasi-experimental studies and examine them under a fine-toothed comb using the criteria that IES has established basically for large-scale research and evaluations. We also, for screening and progress monitoring, looked at the measurement research, not in the amount of depth and detail per measure that the RTI Center is currently doing in their reviews, but we definitely looked at the body of research in terms of qualitative and descriptive studies, including any multiple baseline studies. These were used to help us shape and frame our recommendations, but they are not counted as evidence.

Slide 5: Evidence Rating

Then, based on the research evidence, we rate things as strong, moderate or low. Low does not mean it's a bad idea or there are negative findings. Low means there just isn't any research yet on it, either because people just haven't prioritized it, or sometimes because there never was a standalone on that component. Motivation is an example. Several of the valid, high quality, gold standard studies had a motivational component, but there were also so many other things going on, we couldn't conclude that there was any evidence supporting the use of motivational systems. So we just said this is our belief as a panel. This is our consensus. Moderate means there's at least one gold standard or a couple of pretty good studies supporting it, and strong means there are three quality studies supporting it. Now, strong still doesn't mean it's been replicated around the country, but at least there's some evidence that something must be on the right track because again, these have been analyzed very, very thoroughly for methodological criteria.

Slide 6: Key Principles of RTI

Given the context in the center, I'm not going to spend any time on the key principles of RTI. Probably, some of you know these better than I do, but they're just listed here. I think at this point, it is time for the poll.

Poll 1: How would you describe the current status of RtI in your school or district or state?

Dr. Russell Gersten: There are just two questions. If you just fill them out, it should take you about twenty seconds. It just gives us a picture of where we are.

[Poll-taking]



Dr. Russell Gersten: Okay. Polls are closed. This is, in the scheme of things, a sophisticated audience in that the most popular option for about a third of you is that you have some interventions for struggling learners at some grade levels, and then about a sixth say you have reasonable implementation of RTI in math. So we've got a whole spectrum, but this is always good information for us to have, and I'll try to point out how the different parts of the guide can help people at all the different levels. Should we do the second poll item?

Poll 2: Which best describes you?

[Poll-taking]

Dr. Russell Gersten: Okay. [Polls are closed.] I'll tell you the reason I started doing this question: for a lot of us who love math, it's kind of like you're very "closey" about it because when you're around people (this is especially true in elementary education), they invariably say, "I'm not good at Math. I don't understand anything," and it just becomes kind of a norm. It's kind of nice to see a group where three-quarters of you like mathematics and virtually half of you love math. It's kind of nice to build a community and also to ever so slowly try to have an impact on the broader education communities so that math is valued at a level found more frequently in other cultures. People in other countries don't brag about not being good at math, while here, a lot of people do. No one does that about reading. If you're not a good reader or whatever, it's shameful and humiliating, but in math, people feel very comfortable about it. It was just a way to get a sense of where you are.

Slide 7: RTI Model

This is the triangle that, depending which state or district you're in, some people never want to see again because they're so sick of it. The numbers I put in here are based on some prevalence estimates. They're really rough estimates, and for some grade levels and/or schools the Tier 2 percent may be a lot higher than the 15 to 25%. This, I think, can be true in some middle schools, especially where there's a huge interest in math interventions in RTI. So, nothing thrilling here.

Slide 8: [Recommendation Chart]

This is a quick overview of the eight recommendations, and as you see, the levels of evidence go all over the place. We think they're all important, but I'm going to give you tidbits of each of these and talk especially about the evidence (because that is important for you to know) as well as the practical tips we could come up with.

Slide 9: Recommendation 1

The first recommendation is screening, and we said the evidence is moderate. It's pretty strong in the primary grades, especially kindergarten and grade one, and then it's kind of okay for a few studies here and there. There are a lot of holes – and I'll get to those in a second.



Slide 10: Evidence

People do two kinds of things in kindergarten and grade one. One, they look at one aspect of number sense or number knowledge because a lot of the work of K–3 is building knowledge of whole numbers – operations, the properties of numbers, how they fit on a number line, understanding how to do word problems, etcetera. So of all of the measures, our magnitude comparison is the one that probably has the strongest predictive validity if you’re going for a quick measure that takes a minute or two – some measure involving not just actually counting, but asking kids. I’ll show you an example in a second. It’s what I call “strategic counting.” It seems very important in kindergarten and grade one because it’s linked to basic proficiency and understanding of the properties of the number system and what addition and subtraction are. For grade two and up, we mainly have the work of Lynn Fuchs and her colleagues to guide us. What they tended to do is take a sample of items from the whole – for example, for a group of fourth graders, they took a sample from the grade four state standards. Because they’re in Tennessee, they took Tennessee standards and used some of those measures – paper and pencil measures – beginning even in first grade. They take five to ten minutes, and used those as a predictor, and it’s come out okay in the scheme of things. So we see the work of Fuchs et al. as a potential framework for those of you either developing measures or looking for measures, with the understanding that the research is still emerging there.

Slide 11: Examples of Missing Number Items

This is an example of what we call, sometimes, “missing number” or “strategic counting.” You can see that this top example could be a little tricky for kids, but that for the bottom example (9, 10), kids are going to know eleven, or many of them will know eleven – sometimes, in kindergarten, they won’t. The middle one would be the easiest, but this takes the ability to really be fluent with counting and be able to go backward as well as forward. So measures like this are just quick snapshots for initial screening.

Slide 12: Magnitude Comparison

Magnitude comparison is something that the late Robbie Case thought was critical for learning math – basically, the development of a mental number line. There’s increasing research showing how important this is. So this is one quick way to tap this kind of knowledge, at least in kindergarten and grade one. The actual numbers you use would vary. By second grade, you’d probably want to go into more of a measure of place value. It’s really significant to understand place value.

Slide 13: Roadblocks

One thing we have in the practice guide are roadblocks, and I just put this up as an example. This is a huge issue, and we’re aware of it in reading; the same seems to be true in math: there are a lot of false positives in kindergarten and first grade. A typical theory or rationale for this is that the playing field isn’t level. Some kids have a lot of number work in preschool. Some kids



didn't go to preschool, didn't get it at home. So the idea is that as kids are in kindergarten, and again, in first grade, and are surrounded by numbers and counting and whatever songs or games involving numbers or other activities, they're going to get better at it, so that a measure by November might well be a much cleaner predictor – the technical word for that is “specificity.”

Slide 14: Roadblocks

I think here, ideally, we'd have audience suggestions. If people have them, you may want to send them in as questions for this other concern at screening, and I've heard of this happening: where a fifth or sixth grade class has 17 out of 23 kids below benchmark on the screening measures. So if people have ideas of what to do, you could type them in and send them to Adam and Whitney and Hilary at AIR, and we can see what you came up with.

Slide 15: Tier II & Tier III

All the rest now are going to deal with Tier II and Tier III. So it's our famous triangle.

Slide 16: Recommendation 2 - What to Teach in Intervention

What to teach. Notice at the bottom, the level of evidence is low. This is based only on expert opinion, and in terms of what to teach kids in intervention, this is what we came up with, and this is where the role of Sybilla Beckmann, the research mathematician, was critical, that the core is number. You want to teach kids everything you can about number – the properties of numbers, obviously computation, word problems, how numbers fit on a number line, estimation, and the idea of whole numbers in kindergarten through grade six and rational numbers in grades four through eight, if possible. Now, it looks like in grades four, five and six, you do both, and that is exactly correct. You would do both. But, the key thing you would do is spend most of your time on numbers, so you wouldn't want, in an intervention, something that does a little bit of probability, a little bit of statistics, a little bit of whatever. You want things that really teach in depth – concepts about whole numbers and rational numbers (essentially fractions, decimals, ratios) because that way, you're getting kids ready for algebra and you're building the sense of abstraction in the students.

Slide 17: Evidence

The evidence was basically our opinion, but we're influenced by the National Math Panel, the NCTM [National Council of Teachers of Mathematics] Focal Points. This also seems aligned with the core standards that are being written – at least the draft standards – as we speak. They will be out in January. International comparisons tend to show that very high performing countries really hit number concepts and properties in incredibly intense units. They are intense, but they're not boring - there's a lot more time and attention and there is a real push to get kids to move towards abstraction with the understanding that math is always going from the concrete to the abstract. We made the leap – and we're influenced by an important paper by Jim Milgram



and Professor Wu at Berkeley. So we made the leap that for intervention curricula, it's even more important that you focus on these key critical topics.

Slide 18: Evidence Continued

Even thinking of geometry measurement more as, in many cases, applications of number: basically, where kids tend to fall down isn't knowing what's a circle, what's a triangle, what's a hexagon, but how to figure out the area, how to figure out squaring things, doubling things. If any of you look at a program like Singapore Math, you'll notice right away that it involves procedures, concepts and word problems that are linked together, and they're kind of always linked together. That way of teaching seems to make a lot more sense, and less time is wasted rather than, for example, when you learn the formula for the area of your triangle and you compute the area for twelve triangles. Not that much math is going on - it just becomes an arithmetic lesson done in maybe the fifth grade. The idea here would be that you're really working on building the knowledge of the mathematical ideas or concepts tied in with the procedures and all these word problems.

Slide 19: Evidence

Number properties is what, back when I went to school, we called the "laws": the commutative property, the associative and distributive. Some of you probably know this in your sleep - others may think - I had this somewhere in high school. These are just basically what they look like, and basically, they're at the root of arithmetic. They're the properties of whole numbers, and you want kids to know these like the backs of their hands. So if you wake them up at 2:00 AM you want them to not only tell you what the distributive law is, but also show you how it applies to multi-digit multiplication or whatever. This is the key language of math - of beginning math. What I'm seeing now is textbooks that often have some material on this, but it might be a day here and there, and this, in an intervention, needs to be a core part so that kids understand what math is about.

Slide 20: Fractions Defined

These are definitions of fractions, and I think it gets more in there - and these slides will be downloadable from the center's website. It's just the idea - what we usually do with kids with fractions is we kind of tell them it's part of a whole, like there are eight slices of pizza. So there are eight slices, there are eight pieces, so it's $1/8$. If you have a pizza with six slices, it's $1/6$. But then you have this problem. So you tell them it's part of a whole in third grade, but then you're suddenly going $2/3$ of the houses in the neighborhood [second bullet on the slide]. Two-thirds of the houses in the neighborhood have wooden shingles. There are fifteen houses in the neighborhood. Then they're going, "Wait a minute. What is this? You told me it was part of a whole. What does this have to do with pizzas and whatever?" So if you go to mathematicians or books written by mathematicians, you get a much better definition of what a fraction is. So basically, that's the middle definition, that we tend to use the word of, but that's not a formal mathematical definition, but all fractions represent part of either an object, which is the pizza pie,



a collection of objects, or a quantity. So you're basically – and this is in Beckman's textbook, "Math for Elementary Ed Teachers," which is as useful, or more useful, for special ed teachers – you're basically giving kids a definition that's useful to them so that they can figure out a whole array of math problems. Now, the thing is how do you explain this to nine- and ten-year-olds? That is the art of teaching, the art of clear curricula, but these are exactly the kinds of things you'd want to look for in a good intervention curricula and you want to think about in terms of teaching students in the intervention because you want to give them accurate and precise mathematical definitions. Some of it involves making sure you, as a teacher, or your teacher team, understands the math that underlies this, and there are various ways to do that and we're beginning to see that the knowledge of math that teachers bring does correlate a little bit with the gains their students make. So that is an important issue.

Break for Questions

I think now we're going to take a little break for questions, and we're right at the halfway spot. So just type in, and then Whitney will read a few of them, or any ideas about what to do if you have 18 of your 23 kids in fifth or sixth grade needing help.

Whitney Donaldson: So Dr. Gersten, we have a few questions if you would like to stop for those?

Dr. Russell Gersten: Sure.

Whitney Donaldson: When you were talking about the roadblocks a few moments back, one question said, "Great point on the roadblocks. Would you suggest that a better screening time for next year's intervention starts would be during this spring's benchmarking as opposed to waiting for the fall assessment and forgetting over the summer?"

Dr. Russell Gersten: I could see a combination of the two (two pieces of information) being better. So, I think that would be my suggestion - to use both because usually after the second grade, you'll have the state assessment. Adding in the more current but briefer screening data would seem a good way to do it.

Do you have another one, Whitney?

Whitney Donaldson: Sure. Another question that we got was one that was emailed to us ahead of time. "My school district just began implementing RTI this school year. This year, we focused on reading and behavior at tiers two and three interventions. Should we begin implementing math tiers two and three intervention programs this year, next year, or wait until reading and behavior are on solid ground?"

Dr. Russell Gersten: Obviously it depends a lot on the situation, but I would probably start doing something in math - probably not at all grade levels, but trying something. Whether to go with the younger grades or the higher grades, I don't know. In some cases, people like going with the higher grades because of this concern of getting kids ready for algebra and the understanding that



the roots of that really are in the elementary grades, especially the upper elementary grades. So I'd recommend doing some things in math, maybe doing them in a limited scope. Also, in math, you will find less quality off-the-shelf materials than in reading, given the way the field has developed. So I'd recommend giving it a start though.

Whitney Donaldson: Okay. Thank you. One more.

Dr. Russell Gersten: Okay.

Whitney Donaldson: “Does the universal screening for math need to be a research-based assessment, or can it really be a teacher/school district pencil and paper assessment? There are many research-based assessments for reading, for example, DIBELS, Fountas and Pinnell. Do we need such a recognized test for math?”

Dr. Russell Gersten: Okay. This would be my sense. Right now, the person who submitted the question is correct. There are not a lot of great off-the-shelf measures. I think it would be fine to do something analogous to what Lynn Fuchs did, to look at your annual state standards and objectives and develop a measure, although what would be great is if you could work either with a local university or your research and evaluation department and see how well it predicts, and also have someone who has some basic knowledge of assessment psychometrics do an item analysis so you can refine the measure. So this would not be a big budget, heavy duty test because I think quite a few districts are doing it for that reason. So it's okay to do it, but be aware it's going to need some data to help refine it, and it is doable. It is doable and there are a lot of people around who have that skill who can help with that. Okay?

So I think with that, we'll go back to the presentation again. I will stop about eight minutes before the end for more questions. Okay?

Slide 21: Recommendation 3

Recommendation three. Now, we're getting more at the how to teach, which is nice because we have more experimental evidence on all of these. The key thing is – and when I really went back to the actual studies and went through them, they talked a lot about being explicit. But if I had to pick one thing about the studies that successfully helped either students with diagnosed LD or an at risk group of kids (because it was more limited – the number of RTI studies – as we were reviewing the research a year-and-a-half ago or so, because RTI is pretty new, especially in terms of math intervention) the key thing that came out is that the instruction needs to be systematic - that you do not drop things, that they're reviewed. In terms of looking at curricula programs, I think it's nice if they have a lot of explicitness, and a lot of work examples would be great because if the newer research is showing - at least for kids, let's say grades five to nine - huge advantages to using work examples, contrasting examples. Sometimes, kids can then refer to them (very nice models of proficient problem solving) instead of just having another student go to the board or do something on a whiteboard and work a problem. Kids need those models, but they need a lot of systematic work because some of the acquisition of proficiency in math is just using it a lot - counting a lot, counting backwards a lot, subtracting, applying subtraction to



word problems, applying it to a number line, applying it even to board games for young kids - so it's just this amount of practice. There's some data from a first grade RTI study showing that just having kids (who were very low on the initial screening and were not demonstrating much from core classroom instruction because they lacked the foundational kindergarten and preschool knowledge of numbers) practice counting, practice subtraction, practice that nine, ten, eleven thing, practice counting into teens, linking it to computation and getting a lot of feedback seemed incredibly important. The icing on the cake and the things that make for elegant interventions would be the models of proficient problem solving, verbalization of thought processes, having kids talk about what they did – and I'll give you an example of that – and giving them a lot of feedback. So you don't want the situation where kids are asking for help. You want to create smaller problem sets and give them feedback, and that is the core, and then frequent cumulative reviews. So sometimes – if you're using just a regular core textbook – it's just practicing some of the problems they had three months ago to make sure. So if you know fractions are coming up, you want kids to be reviewing some of the work in multiplication and division. So those are some of the things you could start doing in interventions. Those are the key principles and key things to look for as you look at materials.

Slide 22: Evidence

We found six randomized trials. Of the three key themes, the one that seems the most critical to me is number two, which says “Let students provide a rationale for their decisions.” Let me show you what I mean.

Slide 23: Example

This would be a somewhat typical response. This is a very frequent error for $1/2 + 1/3$, and they do $2/5$. Okay? The teacher could tell them they're wrong or the teacher could do it the right way for them, but what you want to do is ask kids how they made that decision to add those together. They probably did this because it's the quickest thing to do...

Slide 24: Explicit Instruction Helps with Understanding of Fractions

You can also remind them because you're using a lot of visual representations, which we'll talk more about. So you're always reminding them and they're seeing a lot of things like this. They'll occasionally get a straight computation problem, but first they see this much more prompted thing – and again, the degree of prompting in an intervention depends on where the students are and you'd want to pace (?) them and also have kids more and more create them. But initially, I'd prompt this pretty heavily. So rather than just tell them, “No, no, no. You do this,” you remind them of this idea here, which they're used to doing, especially if they've experienced something like Singapore Math, but even beyond that, they should be used to doing this kind of thing. So that's the idea - that kids are always making decisions; the curriculum and the interventionists are helping kids by having these kinds of prompts that show that computation is always linked to mathematical ideas and things like this, and also, that kids can, towards the end, create the problems themselves.



Slide 25: Roadblocks

Here's a roadblock that comes up. Some of the intervention curricula you use may be limited by just using a core textbook. They may not have the explicit instruction and may not have enough practice and review and cumulative review. All our team could think of is that it's certainly possible (if you have a large district that's using whatever program, Holt, Connected Math, whatever it is) to develop guides with additional problems that go along with the program, cover the key topics that I quickly talked about, and that are shared among personnel in the district.

Slide 26: Recommendation 4

There's another one we got strong evidence on, which is nice. I think if we had done this five years ago that would not have been the case. What kids need to learn for word problems – and it's the way few of us learned math – is that there are common underlying structures. Now, some of you are probably wondering, what in God's heaven does he mean by common underlying structure?

Slide 27: Suggestions

Well, this is the key insight that, instead of giving a word problem and saying, "Tell me, is it addition or subtraction?" (because this was done under the more basic addition and subtraction), you have this new middle step about how to analyze a word problem. These are two types. There are other types, but a lot of them have to do with quantity and change over time. So you turn your kids into analysts. Before they're doing any computations, they're analyzing. So they see a word problem, and then they say, "Is this dealing with quantity? Is this dealing with change over time?" and then there are different figures and schemas that they can use.

Slide 28: Compare Problems (Quantity)

This is one that comes from Singapore, which is a good one – Strip Diagrams – basically, by analyzing the problem, and then doing a figure like this for the problem about the 21 hamsters and the 32 kittens, they get used to analyzing and using this kind of thing, rather than the broad way that many of us learn. You figure out what kind of problem it is and what information you have and you write it out verbally. You're starting to create a representation of the problem because you've analyzed it as a quantity problem, and then you have a way to map it out and think about it, and of course, you're setting the stage for the kind of problem solving that kids will do in algebra and physical science, etcetera.

Slide 29: Solving Similar Problems that Appear Different

Some of the newer research shows that – and this, of course, is no surprise – if there's extraneous information or the wording changes, kids, especially those in intervention, will tend to struggle. So, by having kids live these common underlying structures or schemas, or whatever you want to call them, they'll be thinking about their analysis of the word problem. So they'll learn that there



can be irrelevant information in there. They'll learn that concept, and if something doesn't fit in there, they'll be used to giving as their reason for the decision, "This is not relevant to . . . ; here is my structure. This is really a quantity problem, and I don't care how old the boy is who's in the pet store because all I care about is the quantity of animals. It's not relevant to my problem. It's irrelevant." And the same thing with wording, because they'll be rewording problems anyway.

Slide 30: Recommendation 5

So the idea is that there is intentional instruction in this. Kids miss these items on tests, and also could miss them throughout their lives. We've found moderate evidence for visual representations. I think the research on this is just beginning. It's very exciting. It's critical.

Slide 31: Strip Diagrams Can Help Students Make Sense of Fractions

These include the number line and other things. This is the same Strip Diagram that you saw before; it can also be used for fractions. Here, you can see how it could be used for fractions, but it could be used for all kinds of problems. But again, it's practice in using. There are ones with circles; there are really colorful ones; and drab, but quick and easy ones. The idea is that kids are representing a problem and analyzing the problem before they get to the computation, and these visuals seem useful.

Slide 32: Suggestions

Another insight we got from Brad Witzel's research and Cecil Mercer's earlier research is this – we usually have this rule: manipulatives are used in elementary school, and in middle school, they're not used. I mean, it's a rule, a tradition. What Brad did was expeditiously use concrete manipulatives for kids, maybe seventh or eighth graders, even ninth graders getting ready for algebra, and some special ed students. Usually in algebra and pre-algebra, you tend to do more visual representations, often graphs as soon as possible and the equations or symbols, but you leave out the concrete phase. So he expeditiously does the manipulatives so that kids understand the visual representation.

Slide 33: [Image]

We have a figure that illustrates it, but it lost something in translation. You see these – the ones on the left – it's really a photo that has got shrunk; these are actual popsicle sticks that are used. Kids get used to the visual representation, and then they do the abstract kind of thing, but the basic idea is you just use them very, very quickly, and they really work wonders.

Slide 34: Recommendation 6

Facts. There is a tradition that you hear a lot about - that some schools feel that kids should practice facts at home and that kids should really be doing concepts and problems in school.



Well, this is one of the bedrock findings: students with learning disabilities in mathematics almost invariably have huge problems with accurate, quick fact retrieval. So, we set ten minutes a day to work on it. It depends how long you have – you might only have 25 minutes. If you have 45 minutes, you have more time for it, but just basically every day, work on building facts, whether it's done by computer, with flashcards, etc. I mean, there are a lot of ways to do it, and I'll talk a little about the research.

Slide 35: Suggestions

So we have moderate research there. One thing you want to do for younger students who have to use their fingers to figure out facts is help them count efficiently. For example, $2 + 11$. Because of our commutative law, that's exactly the same as $11 + 2$. They can just count up in their head from 11; they can just go 11, 12, 13, and the answer is 13. So they become much more efficient and much more accurate because they're using this counting up strategy, taking advantage of the commutative property of numbers. Basically, that would be it in grades two to eight, deriving facts in their head by basically using the distributive law. Number families is another way.

Slide 36: Recommendation 7

You might ask which is better ... pure fact retrieval on the computer, or flashcards or doing it more strategically. The answer is it's unclear. It's not like one is vastly superior to the other. That's probably the most honest answer. My suggestion, and what the panel leans towards, is probably that doing both would be good, especially for older students when you get to multiplication, and even for younger students. So they're both just practicing getting automatic with it, but also seeing how this is relating to increasingly efficient computation.

I'll be very quick with the last two because we have only three or four minutes before questions. We said the evidence was low for monitoring the progress of students receiving supplemental intervention. Why did we do that?

Slide 37: Evidence

Though some studies showed that there are reasonably valid progress monitoring measures (so we think it's a promising idea), there isn't much research there.

Slide 38: Suggestions

... and also, another problem with the evidence is when we read the actual intervention reports, they were monitoring kids' progress using either the unit test or many had daily checkouts to see if kids were ready to go on. They were not using the kind of progress monitoring that people are used to in reading from AIMSweb or DIBELS or other measures of fluent oral reading. Our suggestion though, and this is given the low evidence, is you want to probably monitor the progress of three types of students in your school. It's certainly great if you could monitor everybody. If resources are limited, [monitor] your students in tier three and tier two, because



this will give you a picture of how all the pieces of their program fit – because you might have a kid who’s in core math instruction, in a tier two more of a support group, but then has some special tier three time to really go back and fill in holes for math knowledge, and you just want to see how this whole mosaic of things works together. So we said once a month. If it’s twice a month, it’s better in terms of getting an accurate slope, and also certainly using what I’m calling “curriculum-embedded assessments and intervention materials.” Why not use them - you have small groups, it’s pretty easy to score and we’ll see how kids are doing – so there’s no reason not to use those.

Slide 39: Recommendation 8

Including motivational, we wish we could’ve said, like the National Math Panel, that this is critical. We all felt it is. We noted from some of the work done by cognitive psychologists that many of the kids who have pretty serious problems in math also have attention problems. So for that reason, we thought work with motivation, if it’s points, happy faces or whatever – there are all kinds of little things – would be good for older kids. There are ways they can check their own graphs and monitor their own progress. However, we couldn’t find any hardcore research...

Slide 40: Roadblocks

...and one roadblock is saying it’s going to kill kids’ interest in math and there’s no evidence that it does.

Slide 41: Questions?

I think now, I’m going to open it up for questions. We’ll give you maybe a minute or two, and then Whitney can start with the next seven minutes, any questions that come up.

Slide 42: Resources

I’ll show this. This is a resource thing just for folks to look at while you’re thinking of questions and I’m answering them.

Break for Questions

Whitney Donaldson: Okay. So we have had a couple come in. One is, “Would you agree that early numeracy screening in kindergarten is okay to do in September, provided interventions are held off for at least a couple of months?”

Dr. Russell Gersten: That could be good. I’d recommend doing it in November though, because if you’re going to hold the interventions off, why not hold the assessments off to late October or so. The other thing that could be done is – and I think this is what the questioner is getting at – in differentiated tier one instruction, for the kids who in their September screen seemed very weak, just doing some additional practice in counting – it could just be eight minutes, or even



board games, understanding number lines and that kind of thing. So I'd probably still do the assessment in November.

We're doing a study this year and seeing if we can up our predictive validity and our "specificity" of the measure by doing it in November. So that's a reasonable way to go, but I think the whole idea is not to be setting up all these one semester groups, starting with the September screen.

Whitney Donaldson: Okay. Thank you. The next question is, "When explicitly teaching or modeling problem solving strategies, how do you reconcile the research done with cognitively-guided instruction in which students at different levels, you've used different strategies, such as direct modeling, counting on, or derived facts? Is this where pre-assessment comes into play?"

Dr. Russell Gersten: I think that for interventions, that would make a lot of sense that these screens are just screens. It's like in medicine, your blood pressure or your cholesterol level is just an initial screen, and then you look for more. So yes. Yes. I think pre-assessments would make a lot of sense, and you may even want to pair kids across classrooms for interventions, if that's feasible, so that they're a more homogenous group for the small group instruction. Yes. So that's excellent.

Whitney Donaldson: Here's another question: "What would the recommendation be for a building whose at risk students exceed the available future resources? Who would interventions be directed to first?"

Dr. Russell Gersten: That's kind of what I was asking in that one roadblock. That is a dicey issue. There are two ways to approach that. One is, if you see - like that case where 70% of your fifth graders are coming out really low on your beginning of fifth grade screen - one approach, and maybe you could do both at once, one would be well, something is missing from the fourth grade tier one instruction. So you might want to really work with the fourth grade team to see what is missing. What are the skills that the students lack, which could come from the state assessment or from the screening measure, or a combination of the two. So that would be one way to really move in a preventative way, and it could be, for example, too little time is spent on problem solving or on really serious work with fractions. Some programs go through it much too quickly.

The second thing would be I'd probably start with the neediest kids because the one thing I would not do when I heard of a school doing it is have a "small group instruction" of seventeen students because it's a joke. It's not what it's intended to do. So I'd probably do both of those. Start with the kids who are really at the low end to give them some support. It's almost like a triage. Then really try to look at what might be root causes in grades three and four.

Whitney Donaldson: Thank you. So we have time for one or maybe two more questions. One is, "Do you have any suggestions as to good places to find math interventions?"



Dr. Russell Gersten: Because we're operating the Center as a federal grant, we can't recommend specific interventions. You can look at the What Works Clearinghouse because those are impartial technical reviews of evaluation reports. The only downside to that is you're not going to find that much. I think they've begun to look at math interventions. I'm pretty sure there are some. Beyond that, I know some are around – and I would just look at either publishers' catalogues – I don't know – Whitney, you may know what the Center does, if they are thinking of providing some resource there. I know they may be prohibited by federal law.

Whitney Donaldson: The National Center on Response to Intervention is doing a review of interventions that will happen in the coming year, in 2010. So there will be a tools chart of interventions within this coming year.

Dr. Russell Gersten: So that would be great. So I would trust them, and for now, I think just trying to use some of these principles and seeing if they're present or absent in what's around. I know you'll run into, especially as kids get older, a lot of technology-based things, and basically, the verdict is out on them. There's only one, and that has been reviewed in the What Works Clearinghouse, that has had consistent, strong effects or significant effects. So it sounds like it's forthcoming, but I can't give you an answer now.

Whitney Donaldson: Okay. Thank you. Well, we have reached our time. So we'd like to thank Dr. Gersten for sharing his presentation with us today.

Dr. Russell Gersten: Thank you. Bye-bye all.

Slide 43: Thank you

Whitney Donaldson: If you would like to print a copy of the PowerPoint slides from today's presentation, you may do so by clicking on the small printer icon at the bottom right-hand side of your screen. This will allow you to print the PDF, and the slides will also be available on the National Center on Response to Intervention's website, which is www.rti4success.org. If you have additional questions about RTI in Math, please feel free to email them to us at rtiwebinars@air.org.

I would like to invite you to join us for our next webinar, Interventions in RTI, that will be on December 9, 2009 at 2:00 PM, Eastern Time. During this webinar, Dr. Erica Lembke, Professor of Special Education at the University of Missouri, will discuss primary, secondary and tertiary interventions within an RTI framework. The examples discussed will primarily focus on the five components of reading at the elementary and secondary levels. Some information will also be provided regarding strategies for math.

We would appreciate your feedback about today's session. Please take a few minutes to complete the webinar evaluation that you see on the screen. We value your feedback, and ultimately your suggestions will assist us in making decisions for future webinars. Once again, thank you for participating today.