ALBERT SHANKER INSTITUTE

Reading Disabilities, Reading Difficulties, and School-Based Interventions that Work: A Forum

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INTRODUCTION

Eugenia Kemble, Executive Director, Albert Shanker Institute

MODERATOR

Antonia Cortese, Executive Vice President, American Federation of Teachers; Board Member, Albert Shanker Institute

FEATURED SPEAKERS

- **Sally Shaywitz,** Professor of Pediatrics and Child Study, Yale University School of Medicine, and Co-director, Yale Center for the Study of Learning and Attention
- **Joe Torgeson,** Professor of Psychology, Florida State University, and Director, Center for the Study of Reading and Reading Disabilities

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EUGENIA KEMBLE: (In progress) – or practice lags because policy hasn't done enough to inform the people who have to do the practice, and this issue clearly fits that criteria. I know many of you are experts in the field and know that.

We also select our presenters very carefully. And while this method probably wouldn't survive a methodology test, we found that it works very well. We have an informal sort of peer review system where we start with names that are recognized in the field. Burnie Bond over here, who really handled this forum, did this work. And so, we talked to them about who they think the best people are on a particular topic. And we pick the names that we hear the most. And since we're asking respected researchers, we're pretty sure that we come out with the top people. And that is how we got the people that we have here today.

And as you know, we also select the participants. This is a group that is filled with expertise, with people who are working on the policy in this area. We do let participants refer their invitations but this is not a wide-open forum, and that way we are sure that we're getting a good discussion with people who count.

Handling this session this afternoon is Toni Cortese. She is the executive vice president of the American Federation of Teachers, elected newly last July. She comes to the AFT from the New York State United Teachers where she was a leader for many, many years. Her final position there was first vice president of New York State United Teachers, which is, I should say, the largest state-affiliate in the American Federation of Teachers, and her responsibilities there were in the area – she had many, many responsibilities but one of them certainly was education policy.

So she comes to us as a highly qualified moderator. She has in her background many of the kinds of roles that you would expect for somebody who has played that kind

of leading role in the union. She has been with the National Board for Professional Teaching Standards, the governing board of NAEP, and many, many roles in New York State before she came to the AFT. She is now also with Learning First Alliance.

Before she takes over, I just have to introduce Milt Goldberg over here that many of you may know. He is a founding board member of the Albert Shanker Institute, also the principle author of "A Nation at Risk." So he has been with these problems for – (chuckles) – many years and we are glad he could come today.

Okay, Toni.

ANTONIA CORTESE: Thank you, Genie. And thank you all of you for being here. I would like to welcome you to another one in a series of forums that the Shanker Institute will be sponsoring.

Today, the topic before us is reading disabilities, reading difficulties, and school-based interventions that work. And I would say that is enough – probably enough – to keep someone busy exploring each of those areas for a lifetime, but it's important work. Obviously you know that, in schooling, the most critical predictor of whether someone probably is going to drop out and certainly how well they are going to do in school, is reading. And so we feel that it's our crucial mission to make sure that every student learns how to read well. It really is the essential ingredient upon which all other learning depends.

Poor and minority students obviously account for a disproportionate share of struggling readers. But we know that wealth, in and of itself, isn't the only predictor – that we have lots of students who come from the kinds of backgrounds where you would expect there would be no problems, but who have them. In fact, NAEP tells us that about one-third of all our poorly performing fourth-grade readers are children of college-educated parents.

I guess the bottom line really is that we really don't need to have failure; we don't need to have it occur. It sounds like a simple statement. And probably if we were in another industry or business, we would say, well, that is just so true; how could you – (chuckles) – how could you want to underscore that; it's just a given. But for too many years, it has not been a given that failure shouldn't occur. I think at this point, we're at a really important benchmark because we're beginning to know a lot. And then the question is what are we going to be able to do in terms of implementing in our schools across the country the kind of intervention strategies and the kind of prevention strategies that are absolutely necessary.

So I guess the first step is being able to identify those students who are going to need help in the area of reading and to do that pretty quickly. And then the second step is to identify the most effective prevention and intervention strategies and to do this obviously at the earliest grade possible.

So today we are very lucky because we have two of the nation's top authorities on what effective prevention and early intervention strategies should look like, both for struggling readers and for most students who have been diagnosed with a reading disability such as dyslexia. Now, one of the things I think we are going to learn is that while the research field knows a good deal about what can be done to help problem readers, we still have got a long way to go in figuring out how to implement these steps as just a normal part of the operation of a school. Dr. Torgeson and I were talking just a little bit about that earlier, that what seems to be commonsense isn't always all that common. So I think we're very fortunate that we are going to be able to hear directly from them.

We're going to hear first from Dr. Sally Shaywitz, who, along with her husband, Bennett, conducted some fascinating research graphically linking children's brain activity to their cognitive function. And her recent research shows not just how the brains of struggling readers work but how their working can be changed through effective intervention practices. I also wanted to thank Dr. Shaywitz for allowing us an opportunity to – and giving us the opportunity to be able to have a copy of her book, *Overcoming Dyslexia*. These are for you take home with you if you haven't already picked up a copy.

And then we are going to hear from Dr. Joe Torgeson, who will provide an overview of other intervention research and discuss the implementation of these results for instructional practice.

One of the things that I hope maybe we'll get to today is something I alluded to just a few minutes earlier. And that is, even with the researchers helping us as much as they can, what are we going to do about the issue of capacity in our schools? We know that with No Child Left Behind – and the other accountability measures that schools and districts put into place even before the onset of No Child Left Behind – our schools are under increasing pressure to improve test scores, which serves to underscore reading. Because so much of what is measured on a fourth-grade test has to do with whether you learned how to read and how well you are doing in terms of your vocabulary and other things – in terms of the content area.

So we know that states and districts have done a lot to improve teacher-training programs. There has been some professional development involved in training teachers in the latest research and how to implement that in their classroom. And the AFT has worked very hard in being a partner in these areas. But I guess the question is, out of all of the schools across this country, how many schools really have the capacity to both have a staff skilled in the teaching of reading and also to provide the extra kind of supports that struggling readers need in order to be successful?

Well, having said that, I want to go to our first speaker, and what we are going to do is we're going to give each speaker about 20 minutes for their presentation And after each speaker, we'll allow a Q and A of about 15 minutes. Then when both speakers are done, they will have a few minutes just to add any extra comments they would like to

add, and then we're going to with the time left open it back up to you for any follow-up questions or anything that you think is important to say, especially on the capacity issue.

I suppose Dr. Shaywitz really doesn't need much introduction. I have on my briefing sheet here an abbreviated bio, but since it runs two pages – (scattered laughter) – I wouldn't want to see the full version. But I think most of us who have been involved at all in reading are very familiar with the kind of work that she has done. I just would remind you that she is a member of the Institute of Medicine and of the National Academy of Sciences, and is a professor of pediatrics at the Yale University School of Medicine.

She was a member of the National Reading Panel that was mandated by Congress to determine the most effective methods to teach reading. She has written for *Scientific American*, *The New York Times Magazine*, and certainly spends a lot of time carrying the bags that I saw her unloading across the room – (laughter) – throughout the country speaking to groups like this about her research. They – she and her husband, Bennett – have certainly done a lot to advance our knowledge on children and learning disabilities, particularly dyslexia.

So without further introduction – because I don't think she really needs one – I would like to present our first panel person and that is Dr. Shaywitz.

(Applause.)

DR. SALLY SHAYWITZ: Thank you – can you all hear me? Thank you very much, Toni. And I just want to say what a pleasure and a privilege really it is to be here with all of you this afternoon. And I want to particularly thank Eugenia and Burnie Bond for the graciousness in inviting Joe and myself and also in helping us whenever we needed help with bringing this about.

It is so difficult because you all are so important and the desire is to tell you so much, and the time is so little. And so I feel a little better knowing you have copies of *Overcoming Dyslexia* where I emptied my brain. (Chuckles.) And the purpose really of writing that book was to make accessible what we have learned from the science and show it can be translated into helpful things in identification and treatment of children.

There is so much I would like to tell you about the science of reading and dyslexia, but the time doesn't permit. But what I would like to tell you is that there really is a science, and what is important about science is that it's objective; it's not relative. Science is objective so that what I consider science is something that scientists in other disciplines and other laboratories all over the world say, yes, this is objective science. And the other thing I want to say about science is that it's unifying. It's not like you believe this and I believe that; what is beautiful about science is that its objective and the facts speak for themselves.

And so over the last, oh, several years or so, there has really come to be a science of reading and struggling readers and dyslexia that has told us something about the epidemiology; that is, who is affected, how many, and what happens over time – something about the cognitive mechanisms. Unfortunately there is no time to talk about that now, but at least to know that.

And particularly what those of us who have worried about children who struggle to read or they have taken care of a student in a class or have been a parent of a child have always wondered, well, why is this; why is it that otherwise intelligent children struggle to read. And of course the answer has been in the brain. But the challenge has been how you study the brain in otherwise healthy children. Thankfully, within the last five or 10 years, technology has been developed that allows us to do just that, and I'll tell you about that in the next few minutes.

What I want to say now is that the science of reading and dyslexia, including the epidemiology, the cognitive mechanisms and intervention studies, the neurobiology really converge to allow us to do a much better job in identifying children earlier and more accurately, and certainly in providing more effective evidenced-based reading instruction and intervention.

So what I am going to talk about now is what we have learned about the neuro-systems for reading – and don't let that scare you; it just means where in the brain reading takes place and what do these systems do. And we have been very fortunate that this wonderful new technology has become available – it's called functional magnetic resonance, FMRI. And for any of you who have ever had – how many of you here have ever had an MRI? We use – oh, boy – (laughter). This is a special group. (Laughter.) We use the same technology; it's the same – the imagery may look familiar to you but it's souped up – the hardware and the software is a little smaller. (Chuckles.) With Joe here I don't know if I can say it, but I will: I say it's a Yale scanner, so you expect it to be – (laughter) – whatever.

Here is the scanner and here is a little girl who participated in one of our studies, Casey; she is lying in the scanner. And she is going to – do you see where the arrow is? That is a prism and she is looking like a periscope and we are going to put a screen in front of her where we are going to project words and different stimuli. And she is holding a button box in her hand and we are going to ask her questions; for example, do these two words rhyme? Are they in the same category? And she will press the right button if it's yes and the left button if it's no. So we can see how accurate she is and how speedy she is.

And here you see one of our favorite stimuli, using nonsense words, because as many of you know, one of the big important factors in reading is to be able to understand the phonology, and so we use words that children could never have seen before and memorize, but they actually have to sound out. The only way you would know that "leet" (ph) and "ghete" (ph) rhyme is if you understand the relationship between letters and sounds in the English language.

So here "leet" (ph) and "ghete" (ph) rhyme so she presses yes, but "mobe" (ph) and "hayve" (ph) do not, and she presses no. What is so exciting is as she is doing that; the MRI is actually measuring what is happening in her brain. It is very – in principle, it's very straightforward; it depends on the fact that when you are using a specific area of the brain, more blood flow goes to that area. The more blood flow has more oxygenated blood and we are very fortunate that oxygen in the blood has a different magnetic signal than de-oxygenated blood, and that is what we use.

And when we first started, I said, oh, this – you know, this will never work, but it does work, and it has in fact been helpful. And why particularly FMRI is really helpful is because there is no radiation, there are no injections, and as you can see, when we carry out intervention studies, you can use it repeatedly. And just to show how friendly it is, here is Casey – (laughter) – after the imaging and as you can see she is none the worse for wear. (Scattered laughter.)

And, using this technology, we at the Yale Center for the Study of Learning and Attention and a community of scientists all over the country and all over the world have been able to really begin to understand the brain organization for learning, so that when I say "we" I mean it as the community – we have been able to identify and localize the specific systems within the brain that are used for reading. We have been able to determine differences between good and poor readers. We have been able to determine the computational role – that is the function of the role, particularly of one of the important systems used in fluent reading.

We have also been able to ask the key question that so many of you here I know would be interested in, that is the plasticity in these systems – how would they respond to an intervention – and I hope we can get to it. We have been able to identify, on the basis of brain imaging, potentially different types of reading disability, and this is just to introduce you to the brain. This is the left side, the outside of the brain. In green – oh, and also the jargon we use is anterior is the front of the brain and posterior is the back of the brain. The green is the frontal lobe.

This picture is in *Overcoming Dyslexia*. All of the figures I will be showing are in *Overcoming Dyslexia*. The pink is the parietal lobe, the blue is the occipital lobe, and the yellow is the temporal lobe. I am going to be showing you systems here that we found to be important in the front of the brain, systems here in the parietal and temporal lobes, and also systems here in the occipital and temporal lobes.

Now that you have had an introduction – this is going to be a fast course. Here again are the systems we are going to be particularly interested in. This is the left side of the outside of the brain. Here is the front and here is the back, and these three systems, one in the front of the brain and one in the parietal-temporal lobe and one in the occipital-temporal – don't worry about the words. The key thing to remember is one system in the front of the left side of the brain and two in the back.

And here, this is what it would look like if we were looking at a section through this area of the brain. Here is the region in the front of the brain, and here are the two in the back of the brain, and this is what they are going to look like on an MRI that you will be seeing. And one of our early studies – we had initially studied groups of adults, but then we wanted to know are these findings – what these findings hold for children, so in a particularly large study for an MRI study, we examined 144 children, half of whom are good readers and half of whom were struggling readers, and this is what we found.

These are three different images of the brain. This image here is the most akin to what you are seeing in the cartoon. This is what is called the coronal section, as if you were looking this way, and this is an axial, but don't worry about that. Wherever you see the yellow and red is where there was more activation in good readers compared to struggling readers. So we see here in the front of the brain on the left side, we see here in the parietal-temporal region, and we see here in the occipital-temporal region. Those areas are all more active in good readers compared to struggling readers.

So this has now been validated by investigators from around the world: in good readers, there are three systems being used, one in the front of the brain on the left side and two in the back of the brain. In struggling readers, there is sometimes increased activation in the front of the brain on the left side as well as areas on the right side but these two key areas in the back of the brain are under-activated; we think there is a glitch in these systems in struggling readers.

What we have also learned is that a particular brain region – this area here in yellow – jargon called anatomically occipital-temporal but named by a French neurologist, Loren Conen (ph), the word-form area, is particularly important in automatic fluent speedy reading. And let me just share some of that evidence with you, and this stands for evidence for left occipital-temporal word-form areas, the skilled reading area.

One is it increases activation with skill, so that here in one of our studies, we not only show children words while they are being imaged, we give them a whole comprehensive battery of standardized and experimental reading tests. So we ask the question, is there a relationship between individual differences in reading skill and individual differences in brain activation. And what we found was this area – this image has flipped; this is on the left; this is that word-form area and here you see it in the cartoon. The better a reader a person was, the more likely they were to activate this area of the brain, and this has been shown by others.

And interestingly, one of our colleagues did another study where he showed that if you show words subliminally – you know, really quickly so you're not aware you're seeing it but your brain knows, this is the area that lights up. So that means it's being used automatically without conscious thought. And what does the skilled reader do? When you get to be a fluent, skilled reader, you just have to look at the word and you know what it is. So what that means is that we now have a normal target for skilled reading and it is the left word-form area right over here.

Just to review, when I talk about skilled or fluent reading, I'm talking about reading that is rapid, that is automatic, that is not attention demanding where we believe that all of the important information about the word – how you pronounce it, how you spell it, and what it means – has all been integrated. So all you have to do is look at the word and you instantly know what it is, and that – we believe that a critical area for that – again, is this the left word-form area, the yellow area.

So what we know now is that in good readers, there are three areas of the brain all on the left side that are active in reading. In struggling readers, there is an area in front of the brain on the left side, but these two areas of the back of the brain do not seem to activate in struggling readers. So the question is, is there plasticity? What would happen if you provided children with an effective evidenced-based intervention? How would these systems respond?

Well, in a study carried out with colleagues at Syracuse University, we studied 77 children, seven-and-a-half to eight-and-a-half years of age, and there were three groups. One group was good readers; we called that group "community control." And then there were two experimental groups – two groups of impaired readers, one the experimental group which got the experimental intervention. Another group that we call "community intervention" received whatever the class – whatever their school was providing.

So what happened? Well, let me just share with you, the experimental intervention was explicit and systematic; it focused on the alphabetic principle; it was intensive individual tutoring 50 minutes a day in addition to whatever else they were getting, and it took the whole school year. We imaged the children and of course gave them a range of reading tests before the intervention and at the end of the year-long intervention, and then we waited and imaged them again a year after the intervention had finished. And what did we find?

First of all, we found that the experimental group, but not the community-based intervention improved in their accuracy, their fluency, and their comprehension. But what was particularly exciting to us is we found that one year after the intervention – let me just explain what you are seeing here. You are seeing one brain image on top of the other. That just means the one on top is a little higher; the one below is a little lower. And what we looked at was brain activation a year after the intervention ended compared to before the intervention began.

And what we found was that this group of children who received the experimental intervention were activating – this is the left side – they were activating a region in the front of the brain, in the parietal-temporal regions, and also in the word-form area. And so what we found was that this intervention had actually changed the brain; that the brain had reorganized. And the important message in that is that *teaching mattered*. Here I am a physician and I'm telling you about reading, and I'm showing you something that no neurosurgeon in the world can do but that a teacher can do – and that is that you can actually change the brain by providing excellent teaching and effective education.

There is one other finding that I am going to try to make time to tell people about and that is that we think we have been able to identify two different types of reading disability, and I'll tell you about that. I was born in New York so I can talk really fast if I have to. (Laughter.) And this data is based on a study that we did that I haven't had time to tell you about; some of you may know it. It is called the Connecticut Longitudinal Study, where we followed a representative sample of Connecticut school children from the time they entered kindergarten until now when they are in their mid- to late-20s.

So we wondered what we could learn from examining the brains of these children, looking at all of the data we had about reading and other things. Believe me, we collected data about everything you would ever want to know. This is a picture of Carlos, a big guy. Carlos has been with us since he was five years old and he came back when he was about 22 to participate in a brain-imaging study. This is his son, Aden; this is his wife, pregnant with the already-born Carlos, Junior. The findings in this study were particularly interesting when we asked about real words – for example, are corn and rice in the same category? Yes, they are both foods. Are lion and tree in the same category? No. And they were asked these questions during imaging.

And what we did was identify three different groups of readers. Because this was a prospectively acquired data set, we could say we want to see everybody who had never had a reading problem – grade two, grade four, and grade nine – and this is the group on the left, the non-impaired readers (NIR). Then we said, we would like to see a group of readers who struggled in second and fourth grade perhaps, but by ninth grade, they were reading accurately, but not necessarily fluently. So we, not surprisingly, named this group the accuracy-improved readers (AIR). And you'll guess that the last group – persistently poor readers (PPR). They were poor readers in second grade, fourth grade, and ninth grade.

And then we imaged them. When we imaged them with these nonsense words that I showed you a little while ago, "leet" (ph) and "ghete" (ph), they found just what I told you about. The good readers activated the three systems on the left side of the brain and the both AIR and PPR didn't activate the regions in the back of the brain. So here you see the non-impaired during real words – where is this – this is the left, this is the right side of the brain, this is the front, and this is the back. The non-impaired activated the region in the front of the brain and a region in the parietal-temporal and also in the occipital-temporal.

When we looked at the compensated, they were reading accurately but not fluently. They too activated a region on the left side of the front of the brain, but they didn't activate a word-form area on the back of the left side of the brain. This is visual cortex that everybody activates always.

But then we had a real surprise. When we looked at the images from the persistently poor group, look at what we saw: they activated the left side, the front, the parietal-temporal, and the word-form area. For all intents and purposes, they looked

exactly like the non-impaired readers when they were reading real words. Now, how – I mean, one of the excitements and one of the heart dropping moments of research is when you have an unexpected finding. So how can we understand this?

Well, one clue we have is we – as I said, we give many tests. One of the tests was reading a series of real words. And what we found when we did that – three minutes – oh, boy, even for New York this is going to be fast. (Laughter.) When we did this for accuracy-improved readers, they did well whether it was familiar or unfamiliar words. But when we did it for the persistently poor readers, they did fairly well with the familiar words but they did significantly poorer with the unfamiliar words. When you told me that, it made me stutter, so it's going to – you have got to give me four minutes. (Laughter.)

Anyway, so it suggested to us maybe what these persistently poor readers were doing was memorize the words because they knew the familiar words but they couldn't figure out the unfamiliar. And then we used a technique in imaging called connectivity analysis. What we basically did was take this area – the word-form area and we said, show me whatever areas can activate when this area activates also. And when we did this with the non-impaired readers, we found that this area in the left side of the front of the brain – this is the left side – activated, so the connectivity was to the reading system we expected.

However, when we did this for these persistently poor readers, we found something very special. They did not connect on the left side of the brain. In fact, this left-word form area connected to components on the right – in the right frontal cortex, the memory system. So that led us to suggest that maybe we're seeing two types of readers, the AIR, which are the compensated group. In that group, these posterior systems are disrupted and they develop alternatives – I haven't had time to show you neural pathways – but in this persistently poor group, their posterior systems are there but they have just never been connected properly. So that to us was very exciting because it's a very hopeful finding that the system is there.

And when we went back in our data and said, well, can we look at what we knew about them from early on, from kindergarten, first grade to try to figure out how did these two groups differ. What we found was that this accuracy-improved group, as early as kindergarten and first grade had higher verbal ability and they tended to go to less disadvantaged schools, whereas the persistently poor readers tended to have lower verbal ability and tended to attend more disadvantaged schools.

And so putting it together, and, again, this is a hypothesis, and we are doing studies to confirm or disconfirm it, is that perhaps these two groups represent, one – the compensated group represents a group that has an inherent difficulty. They have a disruption. They have had all of the advantages and yet they still struggle to read, whereas the persistently poor readers are born with a system intact. They also struggle, but it may be an environmental influence – maybe an early-on exposure to a less rich language environment. The kinds of data – I don't have time to show you that there is in

fact and perhaps having gone to less advantaged schools, what – and before I go one step further, I should say clearly in each one of us there is nothing that is totally genetic and totally environmental; there is a combination, and what I'm talking about here is where there is more of a predominance.

Two important take home messages: one is this persistent group accounts for two-thirds in our representative sample, and it is hopeful because it seems that they have the systems there. If we can get to these children early on and provide them with effective instruction, the systems are there – we could get it connected right.

So in summary, we have a neuro signature for dyslexia; that is the disruption in the posterior systems. There is a neuro target for skilled reading – that is this occipital-temporal region. The neuro systems for skilled reading are malleable; intervention studies show that and they respond to an evidenced-based reading intervention. And I just want to end by saying we have to be in a new era in education where reading instruction is driven by science, where there is reliance on evidence. But clearly we all know we are not there yet. We could be there and we are trying to get there but, as always, the devil is in the details.

And of course the implementation – I'll just end by saying reading is not religion. When you choose religion, you can choose it based on philosophy or theology, or whatever you like because your parents practice that religion, or if you're oppositional because they didn't practice that – but those kinds of choices you can make. But in reading, the choices should be based on evidence, not theology or philosophy. The evidence exists, but it's often not applied and I do believe we have the potential to help nearly all children become real readers.

Just to tell you, we have a number of studies in progress and I want to thank our collaborators at Yale and all over the country, and of course the National Institute of Child Health and Human Development, without whom we could not have done anything. And you should know that anything that I have said you will find in *Overcoming Dyslexia*. Thank you for your attention.

(Applause.)

MS. CORTESE: Thank you very much. We now are going to take about 15 minutes of questions. And I would just ask you since this meeting is being transcribed that you give us – you identify yourself and then we'll have a proper transcript of the meeting. Also, I just wanted to mention to Dr. Shaywitz that I know when you have important things to say it's kind of frustrating when you have to run through them very quickly at the end – that I am sure that you will be clever enough to put the information you wanted to give but weren't able to out into some of the questions. (Chuckles.) So they'll give you an opportunity.

I saw a hand up right there.

Q: I'm **Cathy Roller** and I'm with the International Reading Association. And I'm wondering have you begun to do imagining with children or adults reading in connected text?

DR. SHAYWITZ: I'm glad you brought that up. That has actually become a mission of NICHD and we and others are beginning to carry out those studies; it's a very good study – a very, very good question and that is exactly what is happening right now as we speak.

Q: Do you have any predictions about how brain activity will change?

DR. SHAYWITZ: Change in terms of –

Q: In terms of the activation in the different parts of the brain?

DR. SHAYWITZ: Well, I'm not sure that I understand your question.

Q: What I want to know is if you change the task from a yes, no, to comprehending in connected text, will the same areas of the brain be activated that are activated in good readers.

DR. SHAYWTIZ: Okay, I think there are two questions in what you are asking. One is you always have to have some sort of response; you can't just image someone's reading; you have to have a very discrete task – the constraints of imaging. So even if you're doing imaging of comprehension, you can image reading a sentence or so. You don't have a whole page. And you do want to ask a question because how do you know if they were really ready or if they were doing what you think they were doing. So there is always the question and it usually is a yes or a no question.

What we know is that we think the systems that are used in comprehension are along that same language loop. They may differ a little bit but they are along that same language loop and of course the question is will we see these same differences. We hypothesize that we will but, again, that is what science is about, and the studies are now underway, and hopefully we will soon know that answer.

MS. CORTESE: Another question by the gentleman right at the end of the table – middle of the table.

Q: Hi, I'm **Jeremy Ayers** with the Alliance for Excellent Education. My question is – you said initially, Dr. Shaywitz, that with the 144 kids in 2002, you had children ages even to 18. And so my question is: is there a significant or is there a difference between the older students? Our organization focuses on middle and high school students. So the question is: is there some difference in terms of the language loop for your older students and do you have thoughts about intervention – (inaudible, cross-talk).

DR. SHAYWITZ: Well, what we did find – a difference – there again, which seems to be theme. There are two answers and they are related. One is that what we found is if we compared -- just what you are asking – we looked at the younger compared to the older, and what we found was that the older tend to use compensatory areas, the front of the – on the left side of the brain and also systems all along the right side. But they did not develop that word-form area on the left. And what we hypothesize and the data seems to indicate is that without specific intervention, these kids can perhaps learn to read more accurately but they are not going to become fluent readers; they don't have the benefit of that system.

The other part of that question is we are actually analyzing our data right now and we are pretty much – we have come a far way to try to see what happens with maturation. And those results we hope will be available pretty soon.

MS. CORTESE: Okay, let's just continue around the table. The next hand that went up, right there, please.

Q: I was actually going to ask about the other end of the spectrum. My name is **Heather Biggar**. I work for NAEYC, which is the National Association for Education of Young Children. And we are interested in knowing how early are these difference evident. So the studies you talked about were starting with seven. Do you have – do you know of studies about younger ages?

DR. SHAYWITZ: Well, the difficulty in doing these studies is of course you require the cooperation of the child. (Laughter.) And we feel pretty lucky to have been able to study six-and-a-half year olds. I think that there are people who probably, and we included, would like to bring that down a little. There may be studies perhaps using some other technologies of younger children. I am not aware of those.

MS. CORTESE: Okay, next down the table.

Q: I am **Noel Gunther** from WETA and the Reading Rockets Project. And I'm wondering if you have thoughts about the degree to which speech problems early are an indication for reading problems later, and if so, what are the mechanisms that are the cause of that?

DR. SHAYWITZ: That is really not surprising; really a good question though. Well, clearly from – and there was no time to go into what we know about reading – really, you know, how do you read. You read by understanding how the letters reflect the sounds of spoken words, so the foundational skill of course – it's phonemic awareness and spoken language, so that some of the early indicators – actually there is a whole section (I think page 122) of my book that talks about preschool and even, you know, early indicators. And you can have those in terms of delayed language – children who don't appreciate the sounds of language, which can tell early on perhaps by not appreciating rhymes, by children who have difficulties not only sounding baby talk but

really with articulating spoken words, so that there is an incredibly strong relationship between spoken language and written language. Did I answer your question?

Q: I guess I was wondering more about sort of – (inaudible) – document that would make logical sense but would be able to demonstrate the mechanism that would indicate the connection between problems with spoken language and problems with reading.

DR. SHAYWITZ: Well, certainly the area in the front of the brain, the inferior frontal gyrus is classically – it's called Broca's region and it's classically known for expressive language; it's where we think articulation occurs. So that that area is involved in both spoken language and in written language – is not surprising at all, and some of the other area as well.

MS. CORTESE: Milt.

Q: I'm **Milt Goldberg** with the Shanker Board. Is there analogous research going on in the other core disciplines – science, mathematics?

DR. SHAYWITZ: Well, I can tell you that at our center at Yale we have an analogous study in math. What we are trying to do is identify the system – well, first of all, we use math as a holistic term, and there is many different components of mathematical ability. So what we are trying to do is see if we can parse mathematical ability into different components and identify the areas of the brain that might be involved because there may be some that really overlap with reading and there may be some that are quite different.

What I can say is I think that the research – and no offense to people who are doing that research. The knowledge we have is about maybe a decade or two behind what we know about reading.

MS. CORTESE: Yes. We'll go this way.

Q: Hi. **Peggy McCloud** from the Council of Chief State School Officers. I was wondering if the kids that you had done MRIs on were on monolingual or if you have had the chance to look at kids who were either bilingual or learning English as a second language.

DR. SHAYWITZ: That is a really good question. To try to rule out any kinds of confounding features, our children are all monolingual.

Q: Hi, I'm **Ilene Berman** with the National Governor's Association. And I was curious about what you said about the students who compensate versus the students who have persistent problems and seeing more compensators in more advantaged schools and persistent problems in kids who went to more disadvantaged schools. Can you talk a

little bit about how you defined advantage, disadvantaged, and what sort of experiences kids were getting in these schools?

DR. SHAYWITZ: Absolutely. What we used was the percentage of children getting free lunches.

Q: So you didn't look at practices – classroom practices, instruction.

DR. SHAYWITZ: We did get – we did obtain that information but that wasn't how we defined the group. So we do have that kind of information. We develop very specific forms where we take in information about classroom practices. But in terms of defining what we meant by disadvantage, we used a percentage of children receiving free lunch.

Q: Thanks.

MS. CORTESE: Next?

Q: Hi, Dr. Shaywitz. My name is **Boyce Williams** and I'm with the National Council for Accreditation of Teacher Education, better known as NCATE, and I'm joined by colleague, Jane Leibbrand, back there. But just a couple of questions – why with the evidence I guess being so clear as you articulated in your findings and those kinds of things – why is there so much dissension – (scattered laughter) -- among those of us who are teacher educators or in the field and then –

DR. SHAYWTIZ: Okay, let me – and clearly I think if we went around the room, everybody would want to have their two cents – (scattered laughter) -- that is an important question that clearly is open to much interpretation. And clearly my own background as a scientist and as a physician will affect my own response.

I think until really recently – and I have a slide that I use in some other talks – in terms of – I think it goes back to 1989 when there was a national conference on learning disabilities, and there as a committee on learning disabilities that Duane Alexander chaired. And to say, well, what do we do about learning disabilities, and the report on the National Committee on Learning Disabilities said, well, we have reached a really crucial term.

One is that learning problems are prevalent enough, but there is also a critical science that we need to put the full energy of the NIH and the Department of Education to really rigorously examine that. And as a result of that, I think there has been a real paradigm shift. We have had objective science; we have had evidence; we have had the national reading panel, we have had others, so that – which didn't exist before – which didn't mean that teachers weren't teaching their classes – so we had to go on what your best judgment was or what intuition was.

And so that people here don't feel bad, at a meeting this fall, I arranged a seminar on evidenced-based education which was good because unless you have to teach it, you really don't know it, so that is when I learned about evidence-based medicine. (Chuckles.) And what I learned is that the idea has been around a lot but it only really started in 1992 – don't tell any of my doctor colleagues. (Laughter.) So that has been pretty new. So before that – I trained a little bit before 1992 so how did I know what to do? (Chuckles.) I used my best judgment, maybe some evidence. But now in medicine, everybody is supposed to look at the evidence. What is the scientific literature tell us.

I think in education, that is just coming online, and it is a whole different thing. And I think people have come up becoming very good teachers using their best judgment, their best institution, but we haven't had that kind of evidence, and evidence that has been directly relevant to teaching kinds of studies Joe does where you go into a classroom and you actually use the strongest scientific methodology. So I think that has been a whole paradigm shift, and I think things take a while to change. I think even though there are differences of opinion, people share the opinion that they want to help children.

Q: (**Boyce Williams**) Yes, and I just wanted to echo what you said in terms of the partnership and if I might just share that we do have a partnership with NICHD [National Institute of Child Health and Human Development] in Texas – it's a grant funded through the U.S. Department of Education and Reid Lyon and it's to look at SBRR [scientifically based reading research] and reading and applying that with HBCUs [Historically Black Colleges and Universities], HSIs [Hispanic Serving Institutions], and tribal colleges, and it is not without a lot of angst. It's probably the most painful thing that we have ever been engaged in because everyone is on us – our friends whom we thought were our friends – but a little safe to some extent because you are dealing with the have-nots, and who cares about this little black colleges over there. So we can kind of get away with it to some extent, but it is still very, very painful. So anyway I can appreciate what you're saying – but [the program] is evidence-based driven and it's all of the things you talked about.

DR. SHAYWITZ: Right. And it's something – and just to give an example – in medicine, if somebody brings a child to see me with a medical problem, they will expect that I'll pick the most effective treatment. And how will I know that? I'll look at the literature where treatment A has been compared to treatment B and pick the one that works best. And up until now, we just haven't had that available in education. But now it is available. We need lots more but we have enough to at least begin to implement it in a serious way. Yes.

Q: Thank you very much for your presentation and the research. I'm **Vinetta Jones** from Howard University. And I would like to know if you found any gender differences, and particularly, in addition to – as main effects in interaction between disadvantaged and advantaged on gender or –

DR. SHAYWITZ: No, I don't know the answer to that but that is such a good question I'm going to go back and look at our data – (laughter) – and make sure that we have actually examined that. I have been interested in gender differences for quite a while, but your question – and I understand it totally – makes you think, gee, that is a – why didn't I – (laughter). We may have done it but I'm not aware of it, but we will do it and I'll make sure that you get those results.

Q: Thank you. Beyond gender difference – I'm still on the – (scattered laughter) – most gender research compounds gender and ethnic group. So when you're looking at gender, you need to look within racial or ethnic group – at gender because it goes in different directions in different groups.

DR. SHAYWITZ: That is very helpful. I think we have a new collaborator. (Laughter.)

MS. CORTESE: Genie is going to ask a question, then I'm going to go back to you because I know you have had your hand up again, and then those will be the last two questions.

Q: (**Eugenia Kemble)** I have one research piece and one policy piece. On the accuracy-improved readers who did not develop the word-form center, is the fact that they have compensated so strongly with their memorization ability mean that they are unlikely to be able to learn those other strategies late in the day. That is one question; the other question is a policy question, which is –

DR. SHAYWITZ: Let's do one at a time; my short-term memory is – (laughter) – with one at a time. The accuracy-improved readers were not memorizing. It was the persistently poor readers who were memorizing. So does that – do you want to ask me the question again?

Q: (**Eugenia Kemble**) No, I guess I have to ponder. (Laughter.) I must have misunderstood something. The policy question is what kind of receptivity are you getting from the policy community on this? I mean, assuming that you are talking to them somewhat. It just strikes me that the implications are huge. I mean, if you could save some of these kids from the special ed track and get them to be good readers early on, there are savings in money and savings in lives in terms of their futures.

DR. SHAYWITZ: Well, I think that – as I said, everybody wants to do the best they can for children. And in my own mind – obviously it's complex but a major issue is just having the knowledge and the information. That is why I was so delighted to be able to be here with my good colleague and friend Joe Torgeson to present what we know because I think that speaks so loudly.

And just in terms of being more specific, Dr. Bennett Shaywitz and I were invited to something called the Colorado Reading Summit in October, where 1,000 educators, including the state commissioner of education and others involved in making policy in

Colorado attended and presented an expanded version of what I have talked about. And they told me that that was the – you know, clearly, it's not our presentation but the knowledge that was the tipping point, so that they are now revamping what they are doing in Colorado.

So I think it's getting the knowledge out in an accessible way that people, when they know it, every – it's objective but it's so hard to be able to reach everyone and have this kind of wonderful forum where people can question, so it's not just shot at people but there is a chance for interaction.

MS. CORTESE: Okay, one more question.

Q: **Cathy Roller**. In your intervention studies, are you able – do you have kids who finish intervention sort of parallel to the older readers that you were talking about in terms of some of them who are accurate but not fluent? Or is there a group in the intervention study that actually develops the word-form center and becomes fluent?

DR. SHAYWITZ: No, what we found – again, Cathy, that is a very good question. What we found – and again I'm speaking in terms of a group. What we found that was so exciting was that, as a group, they did develop the word-forming area, and they significantly improved not only in their accuracy but in their fluency and in their comprehension.

Q: Thank you.

MS. CORTESE: Thank you for all of your good questions.

It is my pleasure now to introduce Dr. Joe Torgeson from Florida State University. He is currently a distinguished research professor of psychology and education at Florida State University and director of the Florida Center for Reading Research. For the last 10 years he has been part of a research effort sponsored by the National Institutes of Health to identify the nature, cause, and best approaches to instruction for children with moderate to severe reading problems.

I guess I'm going to dispense with the rest, because you also have a very long bio, and I think people will be very interested on spending the time on hearing what you have to say.

DR. JOE TORGESON: Thank you. Well, I am delighted to be here. It was interesting to listen to Sally again and some of this very, very interesting research about the brain. We're going to switch gears now. I'm not going to show you any brain slides. I hopefully will show you a couple of videos of teachers teaching, which would be fun to watch if I can use my mike here to get the sound from my computer. I also want to adjust my sound so that it's high.

I'm going to talk about reading problems with a little broader set of strokes than Sally was talking about, and I'll try to place the kinds of reading problems she was talking about in the context of a couple of my slides that I am going to show you. But I would like to start out with this sort of broad question, and this is a question that everybody here has seen in the papers and it is on everybody's mind these days. Because we're all familiar with this goal – we have now ways of helping a child read at grade level by the third grade or the fourth grade, but we also want them to be reading at grade level in ninth grade and 10th grade, don't we?

And so what do we mean by that? Well, here is what I think we mean in a very simple way. It just means that we would like them to be able to pick up a book at grade level and read it with reasonable understanding – comprehend it, get the meaning out of it. We would also like them to do that relatively fluently because when you read fluently it doesn't take as much time and it's more enjoyable. So we want the kids to be able to comprehend; we would also like them to read reasonably fluently.

And we would also like them to enjoy reading, right, because if you enjoy reading then you're going to read more. And one of the things we know from science is that the more you read after third grade, the better reader you become. In fact, that is one of the keys to being a grade-level reader in eighth grade – if you are a grade-level reader in third grade – you have to do a lot of reading between third and eighth grade. Kids who learn how to read and can read well, but don't do very much reading, they gradually fall further and further behind in some critical reading skills like fluency at grade level, like comprehension at grade level, okay.

So since we are talking about reading comprehension, now I'm going to show you what I think are the main skills and knowledge kids have to have in order to meet those grade-level requirements in reading. And this will help me put I think part of Sally was talking about in context. Of course the first thing you have to do if you're going to pick up a grade-level text and read it with comprehension is you should have a good facility at reading those words accurately and fluently, and that is primarily what Sally was talking about in terms of the kind of imaging they have done. They have looked at word-level reading problems. And that is a good place to start, because that is actually the problem that is most characteristic of dyslexic kids. That is their critical kind of problem and I'll show you that in another context.

But that is only one of many skills and kinds of knowledge you have to have in order to be a grade-level reader at third grade or fifth grade, or seventh grade. For example, it's also helpful to have good oral language skills, to have a big vocabulary because when you're reading text for meaning. There are a lot of words there; if you don't know their meaning, you're going to really have a hard time constructing the meaning or getting the meaning out of the text. And, again, that is not something that has been studied yet by FMRI, but Sally was starting to allude to the fact that may be moving in that area.

Something else that is really important is to know is something about the area you are reading in. Of course this is particularly true in science and social studies, and history – any of those content areas: the more you know about something, the better able you are to comprehend the meaning of something new in that area. And, again, another real important thing – and this comes out of the science of reading – in the last 15 years is we have learned that – you know, something that everybody sort of already knew but scientists now have demonstrated it – that when you read for comprehension, your brain is actually working pretty hard.

It's really – you're really doing a lot of thinking, you're going back and trying to fill in the gaps for something you didn't understand; you're asking yourself, gee, am I understanding what I am reading and if you don't, then you stop and you go back or you check with somebody. You are doing a lot of sort of strategic things. Sometimes when you pick up a history book or a social studies book to read it, you scan through the headings ahead of time to give yourself some idea of what is this going to be about – that is a strategy to improve comprehension.

And as kids get older, they get more strategic; they know more about how to read for comprehension. And it's very important on the seventh-grade reading comprehension test to be able to read strategically, to be able to notice when you do not comprehend, to be able to go back and reread and things like that.

Reasoning and inferential skills are really helpful when you are reading a difficult text because sometimes you have to fill in the gaps; the authors often aren't really explicit about what they mean. You have to connect things in one paragraph with things in another paragraph and you have to fill in the gaps.

Then of course motivation to understand and interest in what you're reading is also very important. The way I can demonstrate that for you is to ask you to think about the last time you were reading something because you had to read it. You know, you had to read it and you were reading along and you looked up and all of a sudden you – (audio break, tape change) – word reading just kept going right merrily along because we don't have to think about that too much if we're skilled readers. But you really have to be thinking about you are reading in order to comprehend it. That takes motivation, interest, and a desire to comprehend.

Okay, so I put these into three broad areas. How well they read the words on the page; this is a big area; the huge area that Sally was talking about. It is an area that a lot of kids struggle with when they begin to read in school. They don't connect with how words are represented in print and so they are inaccurate, they stumble, and then that sort of snowballs and they become worse and worse at reading. But that is only one of the skills.

Then there is whole other big set of things in the middle that we often categorize as thinking, reasoning, and knowledge. These skills are equally important if not more

important. They actually become increasingly important as you go up the grade levels. And then, finally, we have this other area that is motivation and interest in the task.

So here is the way I would say it to my mother – (chuckles) – this is what comprehension depends on: how well you read the words on the page; how much knowledge you have and how well you think; and how motivated you are to do the work of comprehension – those three things. Word-level reading problems are only one part of the whole package of what it means to be a good reader.

You know, Chuck Perfetti who is an eminent reading psychologist at the University of Pittsburgh – he defined reading, as you go up the grades, as you get into fourth and fifth and six grade – he defined it as thinking guided by print. Think about that. That is a very apt characterization of what it takes to read at grade level – to be a proficient reader in eighth grade. If the test is a test of reading comprehension, you have to be a good thinker as well as being able to read the words.

So now we are going to talk about – this is just sort of an introduction – and now I want to talk about the challenge of teaching all children to read. And I love this statement from Dick Olsen – he made it in a talk a few years ago. He said, "The central problem we face in our schools in teaching all children to read arises not from the absolute level of children's preparation but from the diversity of their levels of preparation."

So here is the way you think about that. If every child came to school not knowing any letters of the alphabet, not knowing how to rhyme, having a low vocabulary, we would have figured out a way by now how to engineer our schools to teach all of those kids to read. The problem is that only 30 or 40 percent of the kids come to school that way, or sometimes in schools in the inner city or some rural schools, it's 60 or 70 percent of kids – but it is only part of the kids who come to school not well prepared for learning to read.

And so we can become distracted by our success in teaching that middle 30 percent or 40 percent. A teacher can say, well, my class is reading on average at the 60th percentile; I must be a good reading teacher – although in that class there are four, five, or six kids who are very poor readers. And we get distracted by the success of the kids who come to school well prepared and then we don't have the systems in place really to handle the kids who are not so well prepared either biologically or experientially because of those factors that enter in as Sally was saying.

So what are the most important ways that kids are diverse from one another when it comes to learning to read? Well, I have already sort of prefigured that, but one of the ways that they are very diverse from one another is in their talent, and that is partly what Sally was talking about – the biologically based talent in the phonological language domain – their talent or their preparation. Certain kinds of rich language experience in the home prepare you to be more sensitive to the sound structure of words in Standard English. And so either a lack of talent or a lack of preparation can make you very unprepared.

I mean, you don't have to look very hard in many kindergarten classes to find kids who come to school not knowing a single letter name. They don't know the alphabet song either. Then in the very same classroom you have kids who can read already – you know, they can sound out simple words. The diversity there is enormous both in terms of talent and preparation.

Another way they are very diverse from one another is in their oral language, knowledge, and skills. How much they know about the world, the extent of their vocabulary. I don't know if I mentioned this before but, you know, those who study vocabulary estimate that kids from lower SES homes – kids from a lower wealth environment – come to school with a vocabulary half the size of middle-class or upper-class kids. That is an enormous difference when you are talking about first-grade kids.

And then they are also very diverse in their abilities to manage their own learning behaviors – to stay concentrated – and how engaged they are in the learning process.

Okay, so those three areas of diversity translate into three broad areas of struggle in learning to read, and Sally talked a lot about this. And this is the difficulty that many kids have when they come to school in basically connecting with the code, figuring out what those black marks on the page mean, how to sound out words, and then how to practice and how to read accurately. And then that translates eventually into becoming fluent. That is a big difficulty and that is the primary difficulty for classically dyslexic kids; kids who have IQs in the general average range but really struggle in reading, that is where their problem lies and it is because they have a lack of talent in this phonological language domain, which makes it hard for them to learn about sounds and words, and so forth.

And then another large group of kids come to school with lower vocabulary, low world knowledge, lack of development of their thinking and reasoning skills, and that makes it very hard for them, particularly as they get to the upper grades in – let's say after third grade, fourth grade, fifth grade, when the demands of comprehension tests become much more heavily weighted towards thinking and reasoning than they are in first grade.

You know, I like to say this: there is actually no penalty to a first-grade teacher who doesn't teach reading comprehension strategies because the reading comprehension test in first grade depends mostly on how well you read the words. But you pay the price if you don't do that in first grade when the kids are in third grade and fourth grade, when the text becomes more complex, when the ideas are more complex, and the vocabulary is much more extensive.

And then of course other kids come to school without a motivation to learn to read or they lose it very quickly because they don't catch on to reading; they define reading as something that is not for them or it's – you know, they are not so good at it; they are going to develop their talents in some other area.

So now I want to show you two examples of the impact of effective interventions. One is going to be from a study we did and the other one is going to be from work with a school I did over a period of five years. This is the design of the studies just real quickly. We screened every first-grade child in five schools and picked the bottom 18 percent of kids who were low in their phonological skills, the early knowledge of letters and phonemic awareness and things like that. We wanted them to have a general average estimated verbal ability in the broadly normal range.

So we limited how low their scores on the Peabody Picture Vocabulary Test could be. And then we further defined them as having beginning word-level reading skills below the 25th percentile at the beginning of first grade, and so you can see what the characteristics of the kids were. Their IQ ranged from 72 to 122 and the average was the 32nd percentile, which by the way, I have worked a lot in Reading First now in Florida – we have 30,000 kids in our Reading First schools in Florida and that is their average percentile on the PPVT, so this is a sample very much like you would have in Reading First Schools – in these schools.

Reading First, for those of you who don't know – how many don't know what Reading First is? Oh, okay, so that is good. (Laughter.) Yeah, that is great; it's a really well informed group. And so we provided instructions – now, we provided what we called initial – I mean, tier two interventions to these kids but it was heavier than you will find in almost any elementary school. We gave these kids 45 minutes a day of small group instruction, groups of three or five kids taught by either a teacher or a paraprofessional, which they got from October through May. That's a total of about 85 hours of small group instruction in groups of three or five.

I am going to show you some examples on a video now of what that instruction looked like; it had a number of important characteristics. And here is where we are going to see if this microphone works, or even if this video works on this machine.

(Plays video.)

Okay, so fast-paced instruction with lots of opportunity to respond – and it was very explicit, and there was not only explicit instruction in phonics sorts of skills but there was also explicit instruction in vocabulary comprehension. Most of my examples have to do with letters and sounds – they are easier to get. Let me just – (garbled) systematic review.

(Plays video.)

This little boy in this group really always gives me a little pain. (Scattered laughter.)

(Plays video.)

Notice what the teacher did there? That was good scaffolding because she directed his attention to what was wrong about his response, using that (unclear) to change his (unclear).

(Plays video.)

Okay, so now I want to show you what happened to these kids. These are the word-level reading skills, that is how accurately you can read words. And I'm going to – that blue band across this graph shows you the broad average range; it goes from the 30th to the 70th percentile. And all these kids started below the 25th percentile in October. This is their test on the measure we were using. By January, this is what the distribution of the group looked like.

Now, this doesn't mean they are – they are not only getting better but they are closing the gap here because we are talking about their percentile score. So everybody started below the 25th percentile. By February, a lot of them had moved up into that broad blue band. And by May, we had a nice chunk of them that are actually above average in that skill. And notice down here we still have a few that are very difficult and will need more instruction like this or even more powerful instruction in second grade if we expect them to have any chance at all of reading at grade level by third grade.

And this is the growth of their oral reading fluency. This graph shows you that it didn't really matter whether you were taught by a teacher – that is the Ts – or a paraprofessional or whether you taught in a group of three or a group of five. All of the kids made essentially the same growth in oral reading fluency in this group. And they went from a very high-risk status down here up to – this is actually above average for oral reading fluency for a passage by the end of the year.

So essentially, this shows you that we know how to prevent word-level reading problems in almost every child. If they get the kind of classroom instruction that these kids got and they get the same kind of small-group instruction, we calculate that you would only have – you would have less than one percent of your kids going on to second grade at below the – about the 40th percentile in their word-level reading skills. And, by the way, the comprehension, this group's comprehension performance on the SAT-9 was at the 50th percentile at the end of the year.

So here is broadly what we think schools have to do in order to accomplish what we did in this study. The first thing – and this is what we are really trying to do in Reading First – is increase the quality of what happens in the classroom and also its reach. That is regular classroom teachers – we have to work with them to reach more children than they have been able to reach in the past. And there are a variety of ways and things that they are being taught and trained in to help them do that.

But I also believe that in most Reading First schools – many have lots of high-risk kids that a regular classroom teacher by herself doesn't have the time or the capability to lift into the average range. And so what we also need is to do really valid and timely

assessments to identify kids who are struggling, and then we need to find ways to bring even more intensive interventions into these kids' lives starting as early as we can. That might be small-group instruction starting in first grade or kindergarten; it might be bringing special education teachers down to the regular classroom during the differentiated instruction time; there are lots of strategies.

This is the number one challenge that Reading First schools are facing now. Where are the people going to come from to do the massive amount of extra instruction that is required to make up these knowledge gaps and skill gaps for the kids who are struggling? Prevention reading programs are really a school-level challenge; it takes a whole school system – a school working together; individual teachers find it very difficult to do it by themselves.

Here is what happened in the school where we actually did that over a period of five years. This is Hartsfield Elementary School in Tallahassee and these are the characteristics of the kids in the school where we began working. The principal said let's form a little partnership; you tell me what to do and I'll do it. And he was really a good principal – wasn't a charismatic guy, but he really knew how to work with teachers cooperatively and convince people and so forth.

And so the staff all met together and they decided that they – most of them – that they needed to change the way that they were teaching their children in kindergarten and grades one, two, and three because, prior to this, they were a very typical school. They had four kindergarten classes and every kindergarten teacher had her own philosophy about what should happen in kindergarten. Some of them thought it might not hurt kids to teach them about letters – and I'm saying that sort of jokingly – (chuckles) – and others actually thought that would be bad for them to do that. And this actually would tend to increase the diversity of kids as you got to first grade.

They decided to adopt a core reading program – a core reading curriculum that would help teachers learn how to do explicit and systematic instruction and about the major skills and knowledge kids have to learn. They began to train teachers to do that in 1995. They didn't get a full implementation; the first year they had lot of – a fair amount of resistance. Some teachers didn't want to teach this way, but the principal kept working with them; and some teachers actually moved to other schools, and other teachers came in and so forth. So within a couple of years, they got a pretty good implementation of the curriculum. But that wasn't enough. Then they decided that they had to start screening in first grade and do intensive interventions for some of the kids through first grade and second grade.

Okay, so let me show you what happened. I'm just going to show you what proportion of the kids fell below the 25th percentile in word-reading ability. Again, that is all we are looking at right now at the end of first grade. I'll show you how that changed over five years. How am I doing on time?

MS. CORTESE: You have three minutes.

DR. TORGESON: Okay, all right. I can do it in three minutes if I talk real fast. (Laughter.) And so the first year – after the first year of implementation of the core reading program that they all agreed to do, they had 32 percent of their kids finishing below the 25th percentile. After a better implementation in the next year, they had 20 percent finishing below.

Then they started to do these interventions. They screened kids at the beginning and did interventions sort of like I showed you – the pictures I showed you there – in groups of three to six kids. So they went from 20 percent down to 11 percent the next year. It was 7 percent the year after; and it was 3.5 percent after five years. The same kids, same neighborhood, same parents, but they were really changing the way they worked during the school day to get this done.

If you looked at kids who were in that school, both first grade and second grade – that is what the bottom graph shows, by 1999, they had only 2.5 percent of their kids finishing second grade below this mark, this 25th percentile mark. Now, the question I know that Cathy Roller wants to have the answer to is, well, how did this affect their reading comprehension, right? And so, here, let me show you how they did on Florida's FCAT.

Now, you know, the states have these reading comprehension tests and they are very different from one another; some are real easy, some are difficult. Florida has a difficult one; our test is harder than the NAEP in terms of their basic grade level standards. We know that by the fact that more kids are successful on the NAEP than are successful on the FCAT on average. And so, in 2003, Hartsfield had – and you can characterize kids at five levels on the FCAT – level one, two, three, four, five. Level one of course is the lowest, and if you are level one you are not allowed to go to third, fourth grade in Florida. They have a mandatory retention policy.

Hartsfield had 7 percent of their kids at level one. Remember, they only have 2.5 percent of their kids scoring really low on word reading – 7 percent at level one. But the state, with a less-impaired overall population, in that year had 25 percent of their kids at level one. So what Hartsfield did had a massive effect on preventing kids – moving kids out of the very lowest category of reading ability on this difficult demanding test of reading comprehension. Hartsfield had 25 percent of their kids still below grade level on the FCAT – that is below level three; the state had 40 percent below level three.

Okay. Now, of course the question that we were going to ask is how could you be doing so well on those word-level reading skills and yet still have 25 percent of your kids below grade level. Well, the answer is that it's really much more difficult to close the gap in the broad knowledge and verbal skills than it is in word-level reading skills. Actually the kinds of reading skills Sally was talking about are the easiest to teach if it is done well, right. The hardest ones to teach are vocabulary, comprehension, reasoning, and thinking, all of that stuff.

Tests of reading comprehension at third grade are increasingly sensitive to individual differences in verbal knowledge and reasoning. And so you can – I am proud of Hartsfield; I would never say you are spending too much time teaching phonics because you saw they got the number of kids out of that bottom category; they reduced it by three times compared to the state as a whole.

But just look right now – this is from 30,000 kids in kindergarten, first, and second grade from our Reading First data – and this is their average percentile ranking on a vocabulary measure is. It doesn't change much across the grade, and you can see that we're not closing the gap in vocabulary; it is staying pretty much the same. That's the good news actually; it's not getting worse. But it's not closing. And how about kids who are in the bottom 20 percent of our kids in Reading First schools? Well, they were at 12th percentile, the 8th percentile, the 9th percentile and the 12th percentile in terms of their verbal abilities. So we're not lifting the lower kids. This is the thousand-pound gorilla in the system: figuring out how to close this gap in terms of their broad knowledge and reasoning.

So here are the biggest challenges to preventing reading difficulties in all students. Although we are beginning to do better, most schools at this point are not doing what we know how to do – that is to prevent word reading difficulties in almost all students. That is the shame; I mean, that is the problem. But I'll tell you, it's not easy. Because we're asking teachers and principals to work much harder than they have been used to working. It is much more difficult to raise those – to teach the bottom 20 percent than it is to teach the middle 20 percent. So we have to find better ways to motivate and support and build strength into those systems if we are going to get that job done consistently.

Then here is the next thing: we have to discover the conditions that must be in place to rapidly accelerate the development of verbal, knowledge, and reasoning skills in preparation for the demands of reading comprehension at third grade and higher. That is it. Thanks.

(Applause.)

MS. CORTESE: Thank you very much for laying out what it is that needs to be done. I am going to start on this side of the table and work around because last time I started on that side. So if you would go ahead, please; and please remember again to state your name and organization.

Q: Thank you. I'm **Laura Kaloi**. I am the public policy director for the National Center for Learning Disabilities. And I just have a question, Joe, for this Hartsfield data. I have seen it – I have seen you present it a few times but remind me, what is the percentage of special ed students or the referral after the work? Is there an explicit place where you refer kids to special ed after you have tried these interventions?

DR. TORGESON: We didn't collect that data formerly but I'll tell you what happened in actuality. When we began this work in 1995, there were a couple of learning disabilities resource rooms in Hartsfield. Five years later, there weren't any resource rooms in the school; there were some ad-hoc small groups to provide intensive reading instruction to kids who were still struggling. Basically, they massively reduced their need for special education classes in Hartsfield over those five years.

Q: Okay, thank you.

MS. CORTESE: Okay, does somebody else have a question? Yes, go ahead, please.

Q: Hello, Dr. Torgeson. I'm **Toks Fashola** with American Institutes Research and Johns Hopkins University. I had a lot of questions but I'm only going to ask two.

DR. TORGESON: Okay. (Scattered laughter.)

Q: How do you distinguish between ability, skills, and talent – (scattered laughter) – as they relate to closing the gap? In other words, which of them can you tweak – and which can you not tweak?

DR. TORGESON: Well, this is a little bit like what Sally was talking about and it's a really good question. So the reason I use the word talent is because I want people to connect to something that is really based in a person's biology but can be improved – where you can learn in that area but it just takes more training and perhaps a more explicit kind of instruction. So I think of talent and ability as the same thing; it's sort of what the child brings to the situation in terms of the way their brain works – the gifts that they were given by nature. That is my commonsense way of thinking about that. It does not mean that you cannot learn and become proficient in that area; it just means that you need more powerful instruction. That is what we know about the word level.

I have got some nice graphs I couldn't – didn't have chance – like Sally, I had like a thousand graphs in my machine here but didn't have time to show them. But, you know, phonological ability is distributed normally in the population. So you can have – and most of the kids have about 50th percentile phonological talent or ability. Okay, and you can – if you are down at the second percentile for your phonological ability, you end up being identified as dyslexic and you need very specialized, very heavy duty, very careful instruction in the alphabetic principle and other things to help you master that domain of reading.

If you are at the 30th percentile – I have known kids like this – you probably won't learn to read very well if you are taught in a classroom that doesn't provide any explicit instruction, which just kind of assumes that you are going to figure these things out on your own. And I have known lots of kids like that and, boy, you get those kids in an intervention study and they learn just like that, right, because what they require is some good, explicit instruction and practice opportunities.

So the first thing to understand is that this talent is distributed along a continuum and what we're trying to do – what we would really like to do is reach almost all of the kids, but through the efforts of the regular classroom teacher, acknowledging that there are going to be some kids that have such talent difficulties that they are going to need extra support.

Now, the interesting thing is that you can have low phonological skill – that is the outcome – that is the demonstrated thing – both because of biology and because of experience, lack of experience. And it's actually very difficult to distinguish those kids from one another in kindergarten. We can look at their home background and we can say, well, here is a child who comes from college-educated parents; they read to him every day; all of his brothers and sisters really do this well and yet they can't do it, we might make an inference that maybe it is biological for them. Here is a child who comes from a – who doesn't even speak English when they come to school and obviously is not connected to the English phonology so maybe that is an explanation for them.

But in practical terms on a test, you can't tell the difference. It would be interesting to see if you could tell the difference in their brains and my prediction would be that you wouldn't see the difference because the left region wouldn't be activated in either one of those kids early on. I don't know if that corresponds with what you think about it – (laughter) – but you can give me a rejoinder when you are done.

So skill is what you demonstrate; talent and ability are things that you bring, and you can be low in skill either because of a lack of talent or because of a lack of experience.

Q: People tend to mix them.

DR. TORGESON: They do; they do.

Q: I just had one more and then I won't ask anymore until there are no more questions. (Scattered laughter.) You know, we did a study like that – I was involved in randomized field study with first graders who had one-on-one instruction and it's yet – one of these days it will come out. Our requirement, though, was that the teachers be certified. We didn't let first-grade teachers do it; we trained third-grade teachers who were not necessarily – so our requirement was that the teachers had to be certified.

I know a pervious seminar that the institute had talked about – pre-school education, background, and language that the instructor or the caretaker participates in, the expressive language. As you have the Para professionals working with the children, is there a difference between the rates of improvement among the Para professionals or is there a limit in terms of language skills?

DR. TORGESON: There wasn't any different at all in the power of the instruction provided by the Para, but these weren't typical school Para professionals that

you often see; these were – actually they were all ladies that we recruited through advertisements and they were all stay-at-home moms, and most of them are college educated, okay, and they wanted to come in and work for $10 and hour to teach kids in school; their kids had just gone to school, and so they were all quite verbal and they were all good readers. We actually tested their reading ability; we didn't want to have a Para professional who wasn't good at decoding.

We also used a highly structured instructional program; that is very important. You saw there how structured – what those teachers were doing; it is very effective in first grade. I would feel much more comfortable using Para professionals for this kind of work in first grade than I would, for example, in fourth grade, because the difficulties of fourth-grade kids are so imbedded, they are so deep, and they are so varied that skill I think matters even more, although you can still do a lot with a good Para professional in fourth grade if they are working in a structured program, okay.

MS. CORTESE: Okay, another question. Yes. Oh, I'm sorry. That is right, I was going this way, I'm sorry! (Laughter.)

Q: That is okay, good afternoon, Dr. Torgeson and guests. My name is **Linda Rorbaugh**. I am the reading coordinator with the State Improvement Grant with D.C. Public Schools. And so I appreciate the question because that leads into the question that I would like to ask. It goes back to what you said about the massive amounts of time – in D.C., we are personnel challenged, meaning we don't have those extra hands to do the interventions, you know, as you presented.

In Florida do you have some other models that schools might be using when they don't have extra hands, they don't have those Para professionals and they don't have teachers who can do that three-to-five-student intervention?

DR. TORGESON: You are asking me if we know about magic? (Laughter.)

Q: Yes. (Laughter.)

DR. TORGESON: There is no magic to it. I mean, here is the way I think about it: if you come to school and you're enormously impoverished in your experience, that is, you know much, much less in all of the things that are required to learn to read, all right, you're going to need five-times or six-times, or seven-times the amount of reading instruction in kindergarten, first, and second, third grade than a kid who comes to school with average levels. How do you get that?

Well, there is only a couple of ways to do it. You can lengthen the school day and go to school on Saturdays; this provides more instructional time but that is not so good because oftentimes these kids are lost in a whole class situation because they are targeting sort of everybody can do and these kids can't do it. So it really demands you to find a way to do small-group instruction.

Now, I said this in the middle of my talk. This is probably the – at least one of the highest levels of challenge we face right now. You know, we have never really tried before to teach every child to read, right. We have never really taken that seriously. And I know that one of things we're going to learn is that – as we move forward with this is we're going to have to have more hands down in Kindergarten, first, and second third grade for these kids who were so different in their talent and in their preparation.

So you have to find a solution to the problem – (laughter) – and that is the politicians – I mean, I'm serious; you can't just say we don't have them. I mean, but we are working on a number of ways to do it. For example, we need to use our special education teachers creatively – the new IDEA sort of – it's in line with this – bring them down into first grade; let them work with kids in small groups during the differentiated instruction time.

We also are working on the idea of intervention classes in second and third grade where you have got five second grade teachers – everybody agrees that two of them are going to be intervention teachers. They are going to have fewer kids but the lowest kids and everybody else is going to have more kids but they are going to have the higher kids. It's called walk and read; for that one – for that 90-minute reading block, you do homogeneously group the kids, okay, because homogeneous grouping is the most powerful way to give instruction in the mechanics of reading. It's not necessary so much for vocabulary instruction and maybe comprehension because you can have discussions and kids can learn from one another. But a kid who is really low in phonics can't learn much from a kid who is good in phonics, okay, being in the same group because that instruction has to be very well targeted right at their level.

So you use special education teachers, you use Paraprofessionals, you use technology to a limited extent but that is not the solution right now because those technology programs are not powerful enough.

MS. CORTESE: Thank you. Did you have a question?

Q: **Stephanie Wood-Garnett** also from D.C. Public Schools, director of the State Improvement Grant. And my question is going back to your references now to the new IDEA. Our district is about 20 percent special ed of whom 50 percent of the students are labeled as LD. So I would want to know if there are some promising practices in Florida – our goal of course is to provide services for students but if possible to also exit students who could be back on the general education setting, so it's more of a special ed issue. What are the implications for the new IDEA and also what are some promising practices in serving students who are LD?

DR. TORGESON: Well, if you could get every school in the Washington, D.C. School District to do like Hartsfield did, you wouldn't have near the special problem you have now. That is my best answer. Florida doesn't have any statewide magical solutions; I told you basically in my talk what we need to do. We need to identify the kids early and we need to find a way to get more intensive, responsive, focused, explicit

instruction with lots of good practice up into their lives. And if you do that, you will reduce the number of kids who qualify for learning disability services, okay.

So you need to study schools like Hartsfield and learn – the big job is how do you get all of the schools in D.C. to do that? That is the challenge. I spoke about this in another meeting. We are talking about massively increasing the capacity for schools to do work because it is very heavy lifting to teach children who are so massively under-prepared. And so we have to be able to deliver a lot more instructional interactions during the school day, and that requires more work; it requires more people.

MS. CORTESE: Okay, I'm going to take one more question back here and then I'll continue around the table.

Q: Ruth Wattenberg, American Educator Magazine at AFT.

DR. TORGESON: Hey, Ruth.

Q: I'm like Toks, I have a whole bunch of questions – (scattered laughter) – but I'll limit myself to one quick and then two related one. The quick one, which follows – (laughter) –

DR. TORGESON: There is a strategy.

Q: Okay, the quick question is just whether there is any evidence beyond Hartsfield, which would answer the question of how much you could drop the special-ed referral rate. That is my quick question. My other question is on there, you indicate – the slide actually said it's harder to close the vocabulary-and-knowledge-comprehension gap than to close the word-level gap. And I am sure at some level that is certainly true, but my question really is, is to what extent do we actually know how hard it is, or to what extent have we not even really focused on trying to figure out how we would do that and what it would accomplish if we did it?

DR. TORGESON: There have been lots of efforts to try to do that. That is what Head Start has really been about for many years. Now, you could argue, is that a good – is that an intervention – I guess you could argue that. But we have worked on this problem of trying to close the knowledge, verbal ability, and verbal knowledge gap – all of the early childhood things. You know, when – there have been a couple of successes but they started when kids were one year old, you know, and they worked with them in really massive ways with their parents as well.

We are learning a lot now about how to teach vocabulary in more effective ways – ways it will translate into reading comprehension, but those ways or those kinds of strategies are only kind of being developed and they are not being applied in a broad scale by any sense. It's interesting to look at all of the comprehensive core reading programs that are being used in Reading First schools right now, and there are some pretty good ones. There are no perfect ones but they are much better than they were eight

years ago. They provide more explicit scaffolds for teachers, better instructional routines, the manuals are better, they have a better instructional sequence in them and so forth, but the universally -- consistently the weakest part in all of those core reading programs is vocabulary instruction, okay.

But here is another way to think about it – Catherine Snow uses this example; she says, there are 44 phonemes in the English language, all right; there are 26 letters, right; there are 50,000 words – you know, some number; some real high number. When you come to school and your vocabulary is half the size of your classmates, you have to remember that your classmate is learning new vocabulary words at a very rapid rate each day in first grade or each month in first grade, and you are way down here and you are trying to catch up. And it's harder for you when you start low to learn new words because the more vocabulary words you know the easier it is to learn new words, right. And these kids who are low in vocabulary also tend to be weak in the word-level kinds of skills, so they are not doing as much reading, right.

But the real problem is vocabulary is a massively distributed domain of knowledge. You have to learn vocabulary words one at a time, whereas you learn the algorithm for phonics – 44 phonemes, 26 letters – you learn some blending, and you get some motivation going and that empowers you to read almost any word. The same is not true of vocabulary; you learn those words one at a time. It seems not true of content knowledge; you have to learn that bit by bit, by bit.

And so there is a huge difference in the experiential preparation for kids from age two to age five that translates into this big gap. We know we can do a better job closing it but just logically as well as empirically, there is good reason to think it's going to be much harder to close.

MS. CORTESE: All right, we're going to have time for just two more questions. Yes. Was there somebody along this side? I'm sorry I keep –

Q: Hi. I'm **Maria Tolesca**. I'm from the National Board for Professional Teaching Standards. And I found myself curious if there were any implications for the writing program at Hartford and if, you know – I'm not even aware how Florida tests writing skills – and if you have seen any positive carry over and what is the writing program at Hartford.

DR. TORGESON: Hartsfield.

Q: Excuse me.

DR. TORGESON: I don't ever want Hartsfield to become this kind of example; there are actually in fact lots of examples in other schools that have done very similar things to Hartsfield. There is a book called "No Excuses"; it's got eight or 10 of them in it and so forth. And it's interesting that the characteristics of what happens in these schools are really quite similar to have a very strong instructional leader and bring in

instructional – they bring in assessment early and start talking about accountability for student performance. They work towards more uniform and consistent instructional strategies in their schools; they develop this environment of success in their schools.

And that literature as a research literature is very weak because it has not been done systematically but there are lots of examples that you can draw upon. There is a very famous example from a school in Texas that broke all of the records because of a very dynamic principal.

So I have lost track at what the question was – (laughter) – I was – oh, the writing, writing, writing, yeah.

Q: Have you seen any – how did it effect – (inaudible, cross-talk)?

DR. TORGESON: Writing in Florida – it's interesting because a lot of schools for a while stopped teaching reading to teach writing because writing was much easier to change on the state assessment than reading was because they have a formula. So you have to have main points and you have to have examples, and you can teach that formula and bump kids up very nicely on their score on the state writing test, right. They actually become slightly better writers in the process, you know, at least in terms of some formal standard.

The answer is, no, we didn't mention their writing. (Laughter.)

MS. CORTESE: One more question over here. Go ahead.

(**Boyce Williams)**: (Off mike) – partially funded a grant that we have – (off mike) – reading force teacher education network grant; it's the only one they funded in higher education – I'm sorry for $4.5 million, and we are in 17 states, and we are partnering with 32 institutions. And I just want to say for the woman in Washington, D.C., and for those of you, we are building capacity and we are changing cultures, and the presidents have signed on at those 32 institutions. And what they believe is that reading is the responsibility of every faculty person on that campus, that every faculty person and every teacher is responsible for teaching reading, not only in the early grades but up through and including college teaching throughout the content area.

So the goal is to empower each teacher in terms of having the responsibility. So we have created a model whereby our teacher candidates are actually being trained in DIBELS and all other kinds of -- so that when you're saying you're looking for – that we actually have students in teacher ed programs that are actually saying that they are Reading First Teacher Education Network tutors – And they're doing internships and the field experiences and those kinds of things. So you may want to look on www.RFTEN.org. There is streaming video –

Q: Would you write that down? Oh, I'll write it down. What was that?

(**Boyce Williams**): It's RFTEN.org. Bethune-Cookman and FIU are two schools in Florida; Cal State Northridge, the – I mean, you can go on the website. It's all up there. I mean, everything's up there. It's an open book. It's an invaluable resource. It's in Spanish – Lakota – and English. I mean, I'm not trying to make a plug for it, but I'm just saying we're trying to – (laughter) – no, I'm not, I'm really not, but we're trying to build capacity.

(Cross talk.)

MS. CORTESE: Spell the email address.

(**Boyce Williams**): Oh, oh, right. www.RFTEN -- R-F-T-E-N – Reading First Teacher Education Network – .org.

MS. CORTESE: I did pass over you so I'm going to let you ask one quick question and then we'll let them sum up and they may be able to address some of the remaining questions. If you, again, would identify yourself.

Q: Okay. **Laura Kaloi**, policy director with the National Center for Learning Disabilities. Understanding what you said about implementing all of this change very early on, we still have a huge number of kids that do go into special ed and our outcomes aren't so great. Is there work being done that you're aware of that can help – you know, we're really trying to ramp up the interventions for those older kids to bring them up to grade level because their ability, we know, to be able to take a high-stakes test and get a regular diploma is increasingly becoming more diminished.

DR. TORGESON: Sure. Sure, there's work. And we've done some of that. I actually have a whole other set of slides I could talk about that. (Laughter.) And the bottom line is we actually know a lot about how to dramatically increase the reading skills of our most struggling readers, and we've demonstrated that in several studies, but the level of intensity, the instruction in those studies is way outside the realm of what kids are typically provided, okay? So if we're serious about closing the gap with older kids, we have to remember that when you talk about closing the gap on an older child who's three years behind, you've got the gap – the average up here – and they're going along like this and this child out here has to go much faster than that if we want them to catch up to grade-level performance.

So they have to be learning much faster than one year's growth for one year in instruction, which means we have to figure out how to – and so here's my recommendation for middle school programs to deal with struggling readers in middle school. Your worst readers – your most struggling readers should have a three-hour reading block and there should be no more than about 15 kids in that class for three hours. There ought to be a paraprofessional in there, okay? Your next most struggling group of kids who are like one year below ought to have a 90-minute reading block, and focusing on the skills that they don't have.

But that's not going to be enough. Then we're also going to have to work with our content area teachers – this is the comprehensive solution – and they're going to have to be reinforcing in the way of strategies – the strategic reading – what the intensive reading teachers are teaching their struggling readers. So you give them two or three strategies to master, all right?

Then also we have to work with them to teach their content. This is a huge challenge, to use content in a more focused way so that everybody in their class gets the big ideas. You know, they're not going to get everything because they're not reading but one of the huge problems for struggling readers is that every year they miss out on essential content knowledge because they're not able to read. But there are ways – the University of Kansas, Don Deschler and that group, have pioneered these content-enhancement routines. And there's a lot of work being done now – Florida is doing this in a lot of their schools and other places where they're trying to get their history and their social studies and their science teachers to teach in a more focused way, to pull out the big ideas, be sure those thing are taught more powerfully. So, yes.

MS. CORTESE: Well, thank you very much. I'm going to give both of you an opportunity – about five minutes if you wish; you don't have to – if there was something you wanted to add based on the questions that you heard and anything that might have come into your mind about what you neglected to be able to get across in your presentation.

DR. SHAYWITZ: Okay, I think one of the important points and one that Joe brought out is that, you know, reading is really a comprehensive process, and there is such strong data now about the importance of vocabulary and how children – I have it here somewhere; I'm not finding it as quickly as I'd like to – but how children from different backgrounds differed so much in their language development. You know, it's the Hart and Risley studies from 1995 that show children from professional families, by the time they are four – (cross talk) – know about 50 million words, where children from families on welfare have 12 million words.

DR. TORGESON: That's the words they're exposed to.

DR. SHAYWITZ: The words they're exposed to, right – they were keeping track of that – and how this really increases. And my point is that we really have to start thinking really early because it's really unfair when children come to school – and Joe was making the really good point of how hard it is to teach vocabulary and how it grow exponentially. So in terms of having children catch up, Joe did a really nice job of saying what are all the components of reading is that we have to focus on the alphabetic principle, but we also have to focus on vocabulary, and also background knowledge. You know, when you read, these are all important, and somehow we transport those to fourth grade and above, not thinking that these are things that build and grow, so that even early on we need to be thinking and teaching background knowledge, vocabulary, strategies as well as the alphabetic principle.

I mean, it's really a whole – you know, as Cathy would be happy to hear, I'm sure, comprehension is critical and it needs all of these components. So I think we wait too long to acknowledge and to provide those, so that we need to think of even at the kindergarten level, kids are coming in really, really behind and it's only going to get worse, and it's a terrible burden to put on children when they come into school wanting to learn and then, as Joe pointed out again, the motivation goes away.

So I think being aware of this we can do – there's a lot we have to learn but we really can do a lot better.

MS. CORTESE: Thank you, Dr. Shaywitz,

Dr. Shaywitz has also agreed to sign books if you'd like to stay after and have her do that. And I'm going to give the last work to Dr. Torgeson.

DR. TORGESON: Okay, I'll just say one other thing. I already said this once but I believe in it so strongly. You know, it's great to have all this good science, and I really believe we have a whole new level of scientific understanding about reading that has very specific implications for how we ought to teach reading to kindergarten kids. And even in preschool there are some very significant things we can do with four-year-olds to prepare them better for kindergarten in the reading domain.

And so we have all this wonderful knowledge, but the thing that just hits you right between the eyes as soon as you start to try to scale up this knowledge and really do it broadly, like we're trying to do in Reading First, you know, Washington, D.C. has a Reading First grant now, and I think I'm coming here a little later this spring to give a talk to one of your meetings, and in Florida we have 400 Reading First schools, and you're just so impressed with how to get the work done, you know? – Even how to get this knowledge applied, because there's a knowledge problem in that it's people not knowing about it.

So we have principals who don't know about three tiers of intervention or don't know how to go into a classroom and tell whether or not a classroom teacher is doing a good job or not because they're not instructional people. So we have knowledge problems at the teacher level as well, not knowing how to do the instructional routines or how to do the correction.

Then there's also the motivation problem, because it's very hard work. That's something that everybody needs to understand. A principal like Hartsfield – Ray King is a very hardworking guy, very hard-working guy. He's also pretty smart, and he could talk to his teachers and get them – encourage them to do things. He would monitor, he would sit and look at data with them and he'd say, well, you know, Johnny and Freddie and Sally, why are they in this group, you know; they ought to be in this group. And he would really be in – and it was very hard work for him. So how are we going to get that kind of work done by people that maybe aren't used to working in quite that way? I think that's easily as big a challenge as the knowledge problem.

We talked mostly about the knowledge problem but I'm becoming more and more worried about the motivation problem, because, you know, the reward system in schools isn't all that great. In Florida – our principals in Florida are paid at the same rate as their teachers are. They make more because they have a 12-month contract but they make less per hour sometimes. Why would that ever be the case? There's no business in the world that would exist with a CEO making as much as the workers, right? CEOs make five – why not pay – well, this is a hobbyhorse so I'm getting off the track. (Laughter.) But I mean, so there's lots of problems with the way we've even structured the reward system in our schools in terms of teacher career ladders. What's the reward for working really hard and become a proficient teacher? Usually it's you get to move up to the District, you know? You get to become a coach.

Well, Cathy, you know all these problems, these challenges that we have. So do all of you because those of you who work with teachers in schools know what these are.

MS. CORTESE: Well, thank you both very much, and I think if other people are feeling the same way I am it's a combination of awe in terms of what we've learned today but also a sense of frustration that we know so much and so little has been accomplished. And so I guess we have to deal at some point with –

DR. TORGESON: Can I say one thing? Actually, I do want to say that Reading First schools in Florida are doing better this year than they did last year. So we're seeing some improvement. We actually have data to show that. And the same thing's true in a couple other states that I know of. So that's good, right?

MS. CORTESE: That's good. (Laughter.) Now the question is how we expand that so that there isn't any school across the United States that doesn't endorse the failure-is-no-option model.

Thank you very much for coming today. We really appreciate your being here, and your questions have, I'm sure, given both our presenters and the rest of us a lot of ideas for what needs to be done and what needs to be looked into. So we appreciate your being here. Thank you. And thank you to our presenters who did a great job.

(Applause.)

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