

JANET SLOAND: And so it's my absolute pleasure to be introducing our closing keynote speaker, Dr. James Hiebert. Dr. Hiebert is the Robert J. Barkley Professor of Education at the University of Delaware, where he teaches in programs of teacher preparation, professional development, and doctoral studies. His professional interests focus on mathematics teaching and learning in classrooms. He has co-authored *Making Sense: Teaching and Learning Mathematics with Understanding* and *The Teaching Gap: Best Ideas from the World's Teachers for Improving Education in the Classroom*. He has served as the director of the mathematics portion of the TIMSS-R Video Study and currently is a principal investigator on the NSF-funded Mid-Atlantic Center for Teaching and Learning Mathematics and co-principal investigator on an NSF-funded project to assess the impact of specially designed preparation program in mathematics on graduates' teaching practices. I was very fortunate to hear Dr. Hiebert speak at a conference, and what I took away from it was -- from his speech was, really, that teaching is at the heart of the instructional process. And sometimes we get far-removed from focusing on how critical teachers are and teaching is to the teaching and learning process, which sounds so insane, but we do get away from it. So it's with great pleasure that introduce Dr. James Hiebert.

JAMES HIEBERT: Thank you. Can you hear me all right? Okay, it's a real pleasure to be here. Thanks for the invitation. What a great venue for a conference and thank you for all staying for the closing session. I'd like to spend the minutes I have addressing the theme of the conference, which is educational practices that work. And I'd like to bring what we know from research on teaching to help inform how we might think about that theme. Before we begin, though, I'd like to suggest that we need an aim for educational practices that work. They need to work for something, and this is especially crucial if we're talking about teaching because some teaching methods work really well for some goals, not so well for other goals. So it's really important to have in mind what we want the outcome of teaching to be, what our goal is for teaching. And I'm going to suggest a really ambitious goal, but I phrased it in as general terms as I could so that, hopefully, all of us can find some space in this goal and think about examples from our own work. My area is mathematics, and one of the goals that we all strive for in mathematics is some kind of deep learning that helps students integrate special skills they're learning, along with the understandings they develop. And I think in all subject areas, you might find a way to adapt that phrasing to think about goals, student-learning outcomes that you have in mind in your own work.

Okay, now I'd like to begin with a pretty sobering fact, and that is that teaching hasn't changed much in the United States for as long as we've kept records of teaching, which is about a hundred years. Now I need to quickly point out I'm not talking about your classroom. And I'm being serious by that remark, partly because you're here at this really great conference. My guess is that your classroom doesn't fit into this description. If you're a principal, it may not fit in with respect to classrooms in your school. But it turns out that if you look at

average classrooms around the United States, if you do a random sample of classrooms around the United States, the way we teach has changed very little in the last hundred years. And by teaching, I mean a very particular thing. I mean the way that teachers and students interact with each other about the content. That's, to me, the core of teaching, and that's remained surprisingly constant. We've changed a lot at the margins, so we do things like have students sit in small groups. We use more colorful textbooks. We use Smart Boards. We changed a lot of the trappings, but the way we interact with students about the content has remained very consistent over the years.

This isn't, by the way, for lack of trying. There have been waves of reform dating back to the early 1900's. Most of those have just not made it through the classroom door. They've affected a lot of things outside the classroom but again, inside the classroom, the way the teachers and students talk about the content has remained pretty much the same.

Okay, why is this? Why has it been so difficult to change teaching? I'd like to identify one reason. There are a lot of reasons for this, but I'd like to focus on one reason that I think is pretty powerful. And that is we can think of teaching as a cultural activity. And by a cultural activity, I mean it's something that has evolved over years as teachers respond to the demands of their daily practice. So imagine an average classroom. There's a teacher standing in front of the room with 30 students, some of whom don't want to be there, being asked to cover quite a bit of material, get kids ready for assessments. Those are all high demands made for teachers. The methods we use to teach have evolved to respond to those demands. And those demands have remained surprisingly stable over a long period of time. So the methods we use to teach have remained pretty much like they are. One interesting thing about cultural activities is the things that are the most common that we do every day without really thinking about them sort of fade into the background and become almost invisible. So if we want to think about how to change thinking, we often don't even notice some of the things we might want to change.

A second part of the cultural activity explanation is that learning to teach is also a cultural activity. The way most of us learn to teach is by being students. We have sat in a classroom for at least 16 years as passive apprentices watching our teachers teach. And being involved in a teacher preparation program at the University of Delaware, I'd like to think that we have this huge impact on how our teachers teach when they leave the program. Research suggests that many teachers, once they're in the field, teach like their favorite fourth grade teacher taught. They internalize what teaching looks like very early on in their school experience. Ask a group of 7-year-olds to play school. They pull it off surprisingly accurately. Someone goes to the front, they tell kids how to do things, they give kids problems to practice. It looks like a school room. So we learn to teach by growing up in the culture. We do get chances to attend workshops, conferences like this, to get some new ideas. Well, one

of the things we've learned is that in most classrooms, again, not yours, but in most classrooms, teachers will take really good ideas from conferences like this, and those ideas will get swamped by the general methods used to teach. They'll get severely adapted, and be almost unrecognizable from the form that they saw at the conference. So learning to teach is a cultural activity. We've been doing it the same way we have for a long time.

So I want to talk about how do we attack this problem. What are some of the ways that we might use to break this cycle? And one of the things I'm going to do is suggest, at least for a moment, stepping outside of our own culture. Now whenever I talk about stepping outside of our own culture, I'm sure that some of you are thinking, yeah, but when you go look at other cultures, there are so many differences that it would be silly to think that what you learn in one culture will work in another. And you're right. It would be silly to think that we could go and pull something from a very different culture and have the same effect in the U.S. There are differences in student demographics, there are differences in home life, there are differences in all kinds of things within cultures. The reason I think that it's useful to step outside of our own culture is that they -- looking at other cultures provides a really good contrast to our own. It's like holding up a mirror in front of ourselves and seeing some things that we never saw before because we didn't think to look there. Looking at the way other people do things can be a really good exercise in seeing ourselves more clearly. And then we can also, once in a while, pick up an idea that we say, wow, that -- I kind of like that. I wonder how we could adapt it and make it work in our own local setting? So what I'd like to do is to begin by looking at teaching in other cultures and then looking at the whole idea of learning to teach in other cultures and see if we can't get some ideas about what we do and how we might change some of those things.

So teaching in other cultures. I'd like to just look briefly at a study that I was involved with a number of years ago called the TIMSS 1999 Video Study. Some of you are, hopefully, familiar with this study. It took about five to six years to complete. In my opinion, it's still the sort of best, most vivid example contrasting teaching across different countries. And so I think there are some lessons that we can continue to learn from this study. In this particular study, we compared eighth grade math teaching in the U.S. with teaching in six higher-achieving countries. Some of them Asian countries, some of them European countries. Australia was included. And we videotaped a random sample of classrooms across each of these countries. Our intent was not to film exemplary teaching. We really wanted to get a national picture of what an average eighth grade student experiences on an ordinary day when they get up in the morning and trudge to school and sit in on their eighth grade class. What does it look like? What does the experience look like for an average eighth-grader in each of these countries? The Teaching Gap, the book that was mentioned earlier, is the report of an earlier study; this is the sequel to that. But it turns out some of the same lessons come out of this study as was the case with the

earlier study. So this was a large study. The results are really pretty complicated. I'm not going to go through all the details. I'd like to mention a few things though. One is that each of these seven countries taught mathematics in a quite different way. The high-achieving countries taught mathematics different from each other. So one of the things we learned is there's not a single way to teach mathematics that's associated with high achievement. A lot of different choices can be made and students can still achieve pretty well.

However, there were a few characteristics that were true across all of the high-achieving countries. And I'd like to focus on one of those because I think it's an important lesson for us to learn. So the finding that I would like to spend just a few minutes with comes out of looking at the kind of math problems that students in these countries solved during an average day in their eighth grade math lesson. It turns out that looking at problems, math problems, is a really good way to characterize what kind of experiences students are having in their classrooms. In all of the countries, in all seven countries, about 80% of the time, on average, during a lesson was spent with students solving math problems. Now some of them were pretty simple exercises, some of them were pretty challenging problems, but what we didn't find was a teacher doing what I'm doing now: standing up and lecturing to a group of students for extended period of time.

In eighth grade, in all countries, students solve math problems. That's what they do. So we looked pretty carefully at these problems, and it turned out we could classify them reliably into three different types. There was a type that's called stating facts. They're pretty uninteresting. They're the kind where a teacher will come into the classroom and say, okay kids, remember what's the definition of an equilateral triangle? And the kids will repeat something they were supposed to have memorized. A second kind of problem, and in fact, the one that's most common, that's used most frequently in countries, we called using procedures. You'll remember a lot of these from your own math classes. This is where the teacher says, today we're going to start solving quadratic equations, and here's how you do it. And then they would demonstrate a particular method for solving a problem, and they would say, now let's see if you can work that and here are 20 problems to try it. That would be a using procedures sort of problem.

And then there's a third kind that's sort of the more interesting type. We call these making connections problems. It was clear that the intent of these problems, when they were presented to students, was to have students think about relationships between facts and ideas and concepts and procedures and so on, to somehow connect things together. Now remember the learning goal that I mentioned that we were sort of after this morning, trying to help students integrate skills and concepts together, which is a really important thing to do, in mathematics anyway. These are the problems, these making connections problems, are where the action is, with regard to that learning goal. Right, I mean, you can sort of see that. If kids were working on these making connections problems, they would be involved in executing skills and also fitting them together

with things they understood.

So these making connections problems are especially important, and I'd like to illustrate what they look like in these classrooms. So here are two problems that we pulled out of lessons. Students working on these problems. The first one says, solve these two equations and describe what is different about their solutions. So take a minute to run those through in your head. So they end up looking very different when you start solving them. And what turns this into a making connections problem is the request to find out what's different about their solutions. So students were asked to try and explain how the solution set for one of these equations would be quite different than the solution set for another. Okay, or a second problem, find a pattern for the sum of the interior angles of a polygon. If it just said, find the sum of the interior angles of each of these polygons, that would be probably a using procedures problem. But when the problem says find a pattern, that's asking kids to do some additional work. Okay, so these are the problems that we became especially interested in.

Now with that sort of introduction, let's look at what kind of problems were presented to students in an average lesson across these countries. And we're just going to look at the using procedures and making connections problems because those are the ones that are most interesting and they occur most frequently in these classrooms. All right, here are the results of that analysis, and the blue bars show the using procedures problems and the yellow bars, the making connections problems. So along the bottom, the countries are Australia, the Czech Republic, Hong Kong, Japan, the Netherlands, and the U.S. So two interesting things about this result that I'd like you to notice. One is that Hong Kong and Japan are at the opposite ends of the spectrum here. And these were, within this set of seven, these were the two most highly-achieving countries. Isn't that interesting? So two countries that have very high achievement make very different choices about the percent of problems of these two very different types that they present to their students. That will come up again in just a minute, that choice that they make.

The second interesting thing about this graph is that the United States is right in there with the other high-achieving countries. Now remember, these are problems as they're presented to students, so this isn't, in a way, a reflection of the curriculum. So the curricula that are used in the United States on this dimension have very much the same character as the curricula used in eighth grades in other high-achieving countries. We were actually sort of surprised by this result because when we watched video tapes, as they were coming in from all these different countries, we were noticing very different things were going on in these different countries. Really different. They just look very different. And this graph shows that, percentage-wise, the allocation between these two problems was somewhat similar across many of the countries.

So we went back and watched again. And then we realized that the differences we were seeing were

differences in the ways that teachers worked on these problems with the students. So the problem presented might look fairly similar, but the way teachers worked on the problems looked considerably different. So what we decided to do was to go back and code each problem a second time, based on how it was worked on with students. And it turns out that this is where teaching makes a big difference, right, because you present a problem to the students, and then you begin teaching with the problem. And you can do a lot of different things with the problem. You can transform it into something very different than its initial intent. Let's take an example of how that can work. So let's take a making connections problem and see two different ways that teachers could teach it and two different ways that we saw frequently in the video tapes that we looked at. Here's a problem that we saw before: find a pattern for the sum of the interior angles of a polygon. Here's one way teachers could work on that problem with students. They could say to the students, okay kids, get out your protractors and measure the three-sided figure and see what you get. The sum of the angles in the three-sided figure. Now try the four-sided one. Now try five sides. Do you notice anything? If you look at the numbers that you're getting, the sums, what would you predict if you drew a six-sided figure and measured that one? What do you think the result might be? And then you might have kids do that, and then you might talk about why some kids predicted correctly and not, what pattern they were finding. And then you might say, do you think there's a way? If I told you the number of sides that you were going to draw, is there a way that you could pretty quickly figure out what the sum of the angles inside were going to be? In other words, could you develop a general formula for the sum of the interior angles in a polygon?

We saw that method used in teaching this problem in a variety of countries. There are other ways you can actually do this too and retain the sort of making connections flavor of the problem. Here's another way you can teach that problem. Okay kids, there's actually a really easy way to find the answers. You don't have to do all that measuring stuff. You count up the sides and then you subtract two and you multiply it by 180. Voila! The answer. So go ahead and try that now and see if it works. We saw that method used regularly. Now notice what a different learning opportunity is presented to students when you teach that problem in different ways. In the second case, it doesn't -- it's not even a geometry problem anymore. It has become an arithmetic exercise where you subtract two, multiply by 180 a bunch of times. So the character of the problem, the learning opportunities provided by the problem, can change dramatically depending on how it's taught.

All right, so let's see what happens when we code these problems a second time. Remember, this is the way the graph looked if you're just looking at how problems are presented. Now we're going to look at the yellow bars, all the making connections problems. When we went back and recoded all of those and asked how they were worked on during the lesson, what do you think? Wow, two things to notice again. Look at Japan and Hong Kong. Remember the percentage of problems that they presented of each was considerably different, but

when teachers in those countries presented a making connections problem, they implemented it in very much the same way as each other. Similarly, for the other high-achieving countries. But now the U.S. There were a very few instances where teachers implemented as making connections, but it rounded to zero. There was so few cases that we could find.

And let me tell you exactly how that happens. Teachers are not being mean-spirited, they're not trying to teach in poor ways when they do this. Here's exactly how this happens. The teacher presents a set of problems to students and says, okay, work on, you know, numbers 17 through 23 in your textbook. And number 22 might be a really challenging problem that involves this sort of making connections idea, and the teacher will walk around the room, and students will raise their hand as students are working. And the teacher goes to the first student who raised their hand and the student says, uh, teacher, I'm having a lot of trouble with number 22. I can't quite get number 22. And the teacher says, yeah, you know, that is a challenging problem, but I want you to stick with it. See what you can do. And then looks around the room and there's another student with a hand up and the teacher walks over and the kid says, 22's a bummer. I can't do 22. And the teacher says, yeah, you know, that is hard. Let me give you a little hint, and the teacher gives you a little hint, but you can tell the teacher's a little more nervous at this point. And then the third person raises their hand, and the teacher walks over and the student says, 22, I can't get it. And you can tell the teacher's face, they can withstand three questions on the same problem, but that's about it.

So the teacher will say, okay, class, just pause for a minute here. We seem to be having a lot of trouble with problem 22, so let's work on that one together. And the teacher goes up to the front of the room and basically works through the problem and the students sort of copy the method and the teacher has done the mathematical work for the students. So if you want to identify something that is so common in a math classroom that it becomes invisible, that's one of the things. That teachers have a really hard time dealing with more than three students who have trouble with the same problem. At the core, I think, we have a really difficult time knowing how to deal with confusion in a math class. And I don't know about you, but I remember when I was going through teacher training, the idea in being a really good math teacher was having things run really smoothly. Being a poor math teacher meant there was confusion in the class, and kids were struggling and didn't know what to do and so on. So the smoother things ran, the better teacher you were.

Okay, if we're going to engage kids in working on these kind of problems, this is something we're going to have to change. There are ways of dealing with confusion, and there are ways of encouraging kids to struggle, but we haven't emphasized those in our teacher training program, in our sort of passive apprentice model as students watch other teachers. It's not something we do regularly in mathematics in the U.S. And it's almost become invisible. All right, so lessons learned from comparing across countries. One of the things that's

clear is that teaching trumps the curriculum. So we can have terrific curricula, but it all -- what matters, in terms of students' learning opportunities, is how those curricula are implemented in the classroom.

Okay, and then we've also learned a few other things, that each of these high-achieving countries teaches in somewhat different ways. We haven't gone through the details of that. You'll just have to trust me that that's the case. There are a lot of surface-level differences among countries. One of the interesting things is that in the United States, we spend a lot of time arguing about surface-level differences. So we argue a lot about how much time students should spend in small groups versus whole class. We argue about how much math should be connected to real life versus just mathematics. There are a number of things -- what sort of audiovisuals are most effective for students. A lot of these high-achieving countries make very different choices along those lines, and those don't seem to matter so much. What seems to matter a lot and what they all seem to agree on, without having gotten together and make this agreement explicit, they seem to have sort of discovered themselves, that there are a few very deep-level features of teaching that really influence the learning opportunities students have. In mathematics, problems that allow students to integrate skills and concepts are really important. That means problems that are more challenging where kids execute skills while they're developing some understandings are really important kind of problems. And encouraging students to struggle with those, not jumping in too quickly to give them answer, seems to be a really key idea.

So if we wanted to move toward this, what would we do? First of all, remember that learning to teach is a cultural activity. So if we're going to change, I think we need to change how we learn to teach. Comparisons with other countries and also a lot of good research in the United States suggests a somewhat different model for professional development in learning to teach. And my guess is that quite a few of you in this room are engaged in something like this already. So your job is to help spread the word and help your neighbors, help your peers engage in somewhat the same kind of thing. Saying it most starkly, in my opinion, is saying the following, what we need to do is engage teachers in studying their practice directly. That's what teachers need to do. Study their practice directly. Their learning will be a byproduct of doing that, so I don't think we need to set up separate learning activities; I think we need to find a way to create settings so teachers can study how they teach.

Okay, how do we do that? One of the main things we need to do is slow teaching down. I think the richest opportunities for teachers to study their teaching to improve their practice lies squarely in what they do all the time. We don't need exotic new materials. We don't need big new resources. We need to create settings where teachers work that allow them to slow down their practice and think about it more deliberately. So there's this cycle of teaching that all teachers go through in some form when they teach. So they do some planning, and then they go into the classroom and implement their plan. They do some assessment, and you've

heard a lot about assessment during this conference. And then they reflect on what they found out. Now all teachers do this in some way. Some of them do it as they're running to the class, and they run through their head real quick what their plan's going to be and how they're going to implement it. Often it's done haphazardly, but it's not alien to teachers. This is something that we do on an everyday basis. So for starts, what we need to do is slow down this cycle. Find a way to support teachers in analyzing this practice more carefully, more deliberately. And by doing that, bringing to awareness, the methods they routinely use to teach, like jumping in when the third student has a question on the same problem.

Let me mention a few basic assumptions that we often buy into in the United States, and again, not people in this room, but many of our colleagues, many of the public that we interact with, buy into several assumptions about teaching which I think have to change if we're going to slow down teaching and study it carefully. The first thing is we have to actually believe the teaching can be learned. Now that might sound weird because what we're all here to learn about how to teach more effectively, ultimately. But, you know, we have this idea in the U.S. that teaching is an innate skill. Teachers are born. They're naturally gifted. Haven't you heard that kind of thing? I mean, you've probably even thought that about either yourself or one of your peers when you see them teach. Wow, they're just a gifted teacher. We offload a lot of expertise in teaching onto this notion that you're sort of born with it or not. You have this great personality, you're entertaining, whatever. But that's not very helpful. It actually turns out that teaching is very complicated but it's something like any other skill that we can all continue to study and practice and improve over time.

A second assumption, teaching is something that's owned by each individual teacher. You do your own thing, so we close the classroom doors when we begin teaching. Wouldn't it be weird if you were teaching and people just sort of walked in and sat down and watched you teach? That's like violates all the conventions that we've set up in the United States. But if we're going to get serious about improving teaching, we have to move it into the public arena. We have to think of teaching as a publicly shared activity, as a publicly shared skill, and we're all trying to figure out how to do it together. That means we have to open our classroom doors, we have to observe each other teach, not to evaluate each other, but to learn. Here's another thing that's really hard to do for us. That is watch someone teach without doing any evaluation. Just think about that for a moment. That's really hard to do. We've worked a lot at that at the University of Delaware with some projects we're working on with our pre-service teachers, but that's a really hard concept to enact, where you're really not evaluating the teacher at all. You're just simply learning about teaching by observing each other teach.

A third assumption, we often think teaching is entertaining performance in front of students. That's a little piece of teaching. Most of the teaching occurs outside the classroom, and we should call it teaching. We shouldn't give it a special name like planning or reflecting. That's teaching. So really good teaching means really

good preparation to go into the classroom, and really good reflection after it's over. That's all part of teaching. So good teachers are teachers who can plan really well. If I was going to place my bets on a teacher, I'd prefer a teacher who can plan really well than a teacher who is a great performer in the classroom. But that's another one of these assumptions that I think we have to sort of reexamine.

And then finally, and this one's for the principals in the audience, we've got to turn schools into places where teachers learn, not just students. Schools have become places where we think teachers have all the knowledge and then students need to learn it from the teachers. Schools need to be places where teachers are learning right along with the students, learning different things but learning equally legitimately as the students are.

Okay, I'd like to close by mentioning three kind of guidelines that are supported by research on improving teaching. And these are really nitty-gritty things, but it's surprising how much the nitty-gritty makes a huge difference in actually pulling off a system at a local site where you want teachers to be involved in improving their teaching. So the guideline one, this has to do with logistics. Okay, teachers need to organize themselves into work groups of three to six members. Two isn't enough, seven is too many. Seriously, it needs to be a number three to six, those are the most optimal work groups. And what's more important is that these teachers need to agree on the specific learning goals that they're trying to help students achieve. So often these need to be grade-level groups, subject-level groups, where they're working toward the same learning -- same specific learning goals, because if this group, people in this group don't have the same learning goals, then what Marie does doesn't help me because I'm really trying to work on a different learning goal. These groups only work if what everybody learns has tremendous payoff for everybody else in the group. Okay, if you're working at a small school where you don't have enough teachers sharing the same learning goal, then create a virtual community with a neighboring school where you can communicate about these things in various ways. It's really important to have the group share the same specific learning goals.

Teachers meet weekly, not monthly. Monthly isn't enough. You lose momentum. You need to meet once a week for an hour. And those meetings need to be focused on helping students achieve whatever learning goals you've identified are critical for your study. The weekly meetings must begin and end on time. Sounds sort of silly, right? But it's not. It's really important. Nobody's absent, nobody's tardy, this is serious work. Follow an agenda developed beforehand with clear goals that you're going to accomplish during that meeting. Okay, so you can take ten minutes to complain about students, but that's it. Focus most of the meeting on working toward improving your teaching to meet specific learning goals. Often teachers find it helpful to focus several meetings on just one lesson that they're all trying to improve, tweak, make it better, and then they're all going to try it out together down the road. So focused, specific, targeted learning goals is a key. And then don't assign

each other homework. You're busy enough already. Spend the hour during the week and that's it. Okay, but it needs to be a really serious intense hour.

Okay, a lot of you in here will need to do the following kind of thing if you want to get serious about this because you're going to be the leaders. So you're going to need to organize the group and keep the focus on studying teaching. Here's a really important finding from research. Teachers get very motivated to continue this kind of work if they make a small change in a lesson, like maybe they decide to present a little different problem at the beginning of the lesson than they had originally planned, or they decide to ask the question in a little different way. And then they notice that it makes a difference to students, that students actually learn something different than they would've otherwise. They don't have to be big changes. They can be small changes. So leaders need to help teachers recognize the sort of grain-size that's useful to work together on. Once you see that if you make a change in this lesson, students are going to respond differently, they're going to learn a little better, it's incredibly motivating. And it keeps teachers engaged in doing this kind of work. You need to help feed the group new ideas, find them in other books, from other teachers, online. There are a lot of ways to solicit new ideas to feed to the group about how you might shift or adjust the lesson. And then you need to work yourself out of a job. So when you can hand over leadership to somebody else in the group, you do that and move on.

Okay, the third guideline. This is the nitty-gritty. What teachers would actually be doing in these kind of groups. They'd begin by designing or redesigning a few lessons with incredible care, specifying the learning goals for those lessons as precisely and explicitly as they can. They would include some instructional activities that require attending simultaneously to skills and concepts. So those making connections kind of problems, whatever they look like in your subject area, each lesson needs to include at least one of those. Then what often is not done but what it turns out to be terribly helpful to teachers is predict how students are going to respond to those problems, to those special problems, because a lot of instruction is going to depend on using student responses to extend a little further. And if you can predict what students are going to respond, how they're going to respond to those problems, you can plan ahead of time how to use those responses in your lesson. That's a really critical part of improving lessons for kids. And then you gather evidence through various kinds of assessments, by looking at students' work, and you record what you learned so that you can change that lesson so the next time you teach it, it'll be a little better than the time you taught it this time. And then you accumulate those lessons and share them with other teachers who have the same learning goals.

This is very tedious, thankless work, but it's the only strategy that I've seen that's well supported by research that's used by a variety of countries that has effects that last. But won't this take years? Yep, it'll take years. And if you're one of those typical Americans who are addicted to quick fixes, it's not for you. We love to

have solutions that would fix the problems for next year. I have a better question. If you wanted to make sure that teaching in your school was better 20 years from now than it is today, what would you do tomorrow? I think what you would do tomorrow is you would begin organizing teachers in the way we've described to improve their teaching. One of the problems is we have tried almost everything else you can imagine, and the track record isn't very good. So yeah, what we've just talked about is going to take years, but, you know, the other things we've tried haven't worked so well, so maybe it's time to enlist the person power that you get from engaging the thousands of teachers that go to work every day, do their damndest to have students learn, and beginning to study and improve their own practice. Find a setting that allows them to do this.

Okay, the last words I'm going to let two of my favorite people have. So in terms of, you know, starting something now that might have an effect 20 years from now, that seems like almost unimaginable, right? That's not the way we usually think. But Elton Trueblood, some of you might know him, he's actually a Quaker theologian. He said a really great thing about this and he said, I'm paraphrasing here, but if you want to contribute to something that really matters, the way you need to think of it is planting a shade tree under which you know you will not sit. So you begin a process at your local school and you're probably not going to see the ultimate payoff for it, but if it's a lasting process, if it's something that gets built into the culture, it's going to have huge effects down the road. Okay and the last quote is from John Wooden. I'm going to tell you just a quick snippet about John Wooden before I put up the quote, so you listen to me instead of reading the quote. John Wooden, some of you will know that is considered the greatest basketball coach of all time. Coached at UCLA for years. Died recently at the great age of 99. He viewed himself as a teacher, and he tried to improve his coaching practice every year. And he did very much the same kind of thing that we've been talking about today, studying his own practice, taking notes, improving every practice the following year. He was incredibly detailed and careful and took a lot of time to study how he coached. And he thought of it as teaching, he always thought of himself as a teacher. And here's what he said, when you improve a little each day, eventually, big things occur. Not tomorrow, not the next day, but eventually a big gain is made. Don't look for the big quick improvement. Seek the small improvement, one day at a time. That's the only way it happens. And when it happens, it lasts. Isn't that great? All right, thank you very much.

JANET SLOAND: Thank you so much. Please join me in thanking Dr. Hiebert again.

JAMES HIEBERT: Thank you.