

DEBRA PICKERING: Thank you, I am happy to be here to have a chance to talk about one of my favorite topics, which is the combination of teaching and how technology is enhancing and expanding the abilities that we have in the classroom.

So we'll have some fun. I think you know this by now. A conference like this is more about what goes on at your table than actually about the speakers. I also know you're already full of ideas on, Doug Reeves is a good friend of mine. I know you have lots of things to think about right now. You're probably thinking, my brain is full. I can stop now.

But I have a few more things for you to think about this morning, and some of it, I hope, validates what you already know. I hope some of it nudges a little bit and maybe starts some conversations. To that end, I'm going to assume, you've probably already done this, so I'm only going to give you about 30 seconds. Would you make sure you know everybody sitting at your table, okay? Go.

Everyone please now raise your right hand please. Everyone raise your right hand. Point your index finger and when I count to three, point to your table leader. One, two, three. Okay. Now we've got that part done. Thank you.

Let me explain the job of the table leader. It's to bring everybody back together when I raise my hand. Here's the deal. Table leaders, your job is to keep everybody on task for the next hour and a half. And, hold on, hold on, wait a minute, wait a minute. When I'm going to have certain things that I just want you to talk about. When I put my hand up and say please come back together, table leaders would you please be the ones to help me bring everybody back together. That would be very appreciated. So you have a lot of responsibility and no power. But you're used to that, because you're in education. That's just the way life is for us.

So as we proceed, like I said, I'm going to have you talk about some things. Some of it, I think, especially if you're fairly techie-savvy, you'll say, gosh, we've known that for a long time. Sometimes, you know, when we talk about technology, people are in very different places. You see, I think I'm very modern because I now do text messaging. My children still think I'm lame because I spell out all the words in my text messages, and I put in punctuation. I edit my text messages. So I've now lost total credibility with them.

My daughter came in the other day, held up her cell phone with a text message I had sent her. She said, how long did it take you to compose that? I said, I'm sorry, I was a language arts teacher. I have to do that. It's just, you know, I can't stop myself. So like I said, I've lost credibility . . . confusing. She doesn't know technology. And we're all learning. Nobody knows technology.

What I want to kind of go over are some of the pros and cons, positives and negatives that we've seen in technology. I'll set some goals, and then I'll try to achieve all those goals in the time I have. I always plan more than I can possibly do because I can't let go of certain topics.

One thing I do need to point out to you, and this is just, you know, some of you, this is going to really annoy, and some of you won't care. The handout that you have from this, please just set it aside. Here's what happens. At the research lab, we're constantly, constantly changing and learning things. So what I did in December is not the same thing I've been doing in April. However, also let me ease your mind. All of my

slides I will make available to you. So I think for keynote, actually, it's better. There are a lot of recommendations out there in the research, by the way. Sit back. Take in some key points, and then act on those key points. All of the information will be available to you, okay. So hopefully you feel okay about that.

Let me kind of talk about the three areas that we work in. I've worked with Bob Marzano for almost 25 years. There are three areas. We call them three instructional commitments. That's to provide feedback through classroom formative assessment in grading. We do quite a lot of work in that area. Fostering and supporting effective teaching in every classroom. So it's instructional strategies, from classroom instruction that works to art and science of teaching. And building background knowledge for all students.

There are books that have been written. We keep working on this. My work is in the classroom with teachers, with administrators in leadership, and the implementation of these ideas. So we have a great time.

I'd say technology is, of course, a newer area for us, because we said, you know what? The classroom is changing. Bob Marzano is not terribly techie-oriented. However, he said, not too long ago, you know, we're going to have soon rewrite the books on instruction, because technology is going to give us so many other ways to achieve those same goals.

Having said that, what you'll hear today is we're not going to abandon what we know is effective instruction and assessment. We're just going to expand on that, and then we're going to enhance it. And that's the major message today.

Whenever technology gets hot, whenever anything gets popular, the critics come out everywhere. I'll kind of give you both sides of the coin. There are possibilities and there are cautions. One possibility is technologies can increase and enhance the use of effective instructional strategies. We've seen it happen. There's a however here. They can do, be used to perpetuate, even exacerbate, weak teaching too. That's the dark side. So there is no guarantee here. There is no miracle.

There's another possibility. Teachers using these technologies offer amazing extensive testimonials, anecdotes about the positive effects in the classroom. And we look at research, of course, but we'll always listen to anecdotes and testimonials from teachers.

However, critics offer testimonials too. They offer testimonials and say, yeah, what I've seen is a waste of money. For example, interactive white boards, which we've studied. They say, ah, just a colorful, fancy, expensive, you know, white board. What's the big deal? And they offer their own testimonials. So that's kind of the darker side.

Teachers who are using these technologies keep saying, I've just discovered some more things I can do. Now I can do this and more and more. Here's the however. However, if we start to do things more, we're going to have to say, what are we going to do less? So what are we going to do less often is a questions teachers have to ask and answer, because one complaint we're getting is I just don't have time now to do everything. Well, we have to let some things go. And I'll mention some of those things.

So there are the positives and there are the cautions, and that's what's going to be kind of a theme today as well. You're going to say, we know. I mean, technology is

here to stay. It's silly to think that we can actually ignore it, but as we proceed, we have to be very careful.

So let me set some goals for this morning. I want you to increase your understanding. I know you already have an understanding of the anecdotal evidence and the research that tells us the potential of technologies to significantly change the classroom.

Also understand this statement. We will not realize that potential soon enough, if we do not build on a strong instructional foundation. One of the things that we get excited about technology, and we don't go back to what we know about good instruction.

So to that end, I'm going to choose, I've chose four areas. I hope I get to all four of them this morning. Strategies that can be enhanced and expanded with classroom technologies including formative assessment and feedback, student engagement, focusing students on learning goals and interacting with knowledge. So those are the four areas that I hope to hit on.

Now, I'm going to go fairly quickly, although you'll have time to think and to talk. You can go back to it and say, what are the areas that validate what you're doing? What are the areas that kind of suggest some new things? When we do this work, when we say all, we mean all students. I don't have to convince this audience how important it is for us to say all means all. All of my work has been in making sure that we meet the diverse needs of students.

I'm also wife and mother, by the way. I have three children. Their ages now are 22, 21, and 20. Yeah, they kind of grew up as a little gang. We let them outnumber us. That was the mistake that we made. I always tell people now, when they have that third child, you have to move from the man-to-man defense to the zone. And that's the big change it was in our lives.

My oldest child has some identified learning disabilities. We don't know if, now that he's out of school, that we still say he has learning disabilities, but he doesn't like to talk about that very much. He had some identified learning disabilities in school. He didn't like school much. He said, Mom, they think I'm stupid. Now I knew they did not think he was stupid. Here's what I had to ask myself. Why does he feel like that? We've got to figure this out. Why do you feel this? So we had a lot of conversations. He got some really good services, by the way. Very bright, but a lot of processing he had to do with extra help in the resource room. And it still continues to be, I mean, he can do anything he wants to. He just has to be persuaded of that.

My second child totally different. The best way to describe him, he was grounded most of his teenage years. You've got to have one of those to keep you humble. He was my naughty boy. His eighth-grade year he was suspended four times. I know, now I've lost credibility with another group of you now. He never did anything horrible, but he did little things a lot. His position was, Mom, they just overreact. They just need to calm down. I was just trying to get over the drinking fountain, and I made it. No one cared.

He went to an alternative high school. I had friends who said, ahh, you're going to let him go to school with those kids? I said, he is those kids. By the way, I got to know those kids, some of the best and brightest out there. They are amazing. It's just

they're not compliant, and they're not going to sit and listen to a 48-minute lecture on World War II battles thereof.

My third child, you have to have one of these too. A+'s all the way through. She was honors gifted, yeah, I know, you heard the pronoun, she, the girl. She was in AP honors and all of those gifted and talented programs. So I had to differentiate at my dinner table. We had LD BD and GT going on every night. So when I say all, I mean all. Everything is like, look, we work with all students. Absolutely. And I know that part of your job is to make sure we don't say, well, that's for those kids, and that's for those kids. We're talking about meeting the needs of kids where they are, their strengths and weaknesses.

I didn't like sitting at my dinner table and have one kid say, I'm learning disabled and one say I'm gifted and the third one says I don't care. But you know, those, I'd say, no, you're not. You know, it's a very hard conversation to have. It is as a parent, and I didn't realize that until I actually had to have that at the dinner table. But our job is to make sure we meet the needs of all students to the extent that we possibly can. So that's certainly the challenge that we have.

There are two kinds of technology I'm going to focus on the most, although I'm going to mention quite a number today. Interactive white boards and learner responses to them, so that's because we're doing some research for actually the company Promethium to find out if these things, they said, we want to know if these things actually make a difference and how they make a difference.

So we have just completed a study. Last spring, actually, we just completed a study. We're just in the process of doing phase two where we're looking at interactive white boards and learner response systems or clickers and saying, do they make a difference? And under what conditions? Because we had teachers videotape themselves, and we watched hundreds of hours of videotape and in the process of looking at some . . . and saying, okay, what makes these things work? But most of my comments you'll also know will apply to all the technologies.

Let me give a quick statistics lesson. Whenever anyone says something is research based, what they're telling you is that the experimental group, the average of the experimental group was so much more than the average of the control group. It's called percentile gain, usually reported that way. For every research-based strategy you ever here, there's also this pattern that the experimental group did less well than the control group. Usually it's between 25% and 35% of the studies for any strategy have a zero to negative effect on students.

So you go, do we know what to do? Sure, because the overall average, when it's positive, you say that's worth my time. There are no high-yield strategies. There are only high-probability strategies. So when people say high-yield strategies, we never use that term, although often it is associated with Marzano never used it, because that implies that if you do that, it will work. That's not true. However, if you look at the body of research for a strategy, given the zeros and negatives and all the positives, you have an overall positive effect, it's worth your time.

In phase one, it's early in the research, so you can't jump to conclusions here, but in phase one of looking at these technologies called interactive white boards, we tried to determine what kind of effect they had. And overall we found a 17-percentile

point gain. Now a 6-percentile point gain is considered research base. So they were very impressive. You know, these things work.

Now this isn't tightly, there's experimental control, pre- and post-test kinds of study, but not tight, tight, tight. You have to do what you can do. Teachers doing what they can, showing us what they saw, and then we watched the videotapes.

Now were there any, negative, zero to negative effects? Yes, 23% of the studies had a zero or negative effect in the classroom. So technology, that's exactly where it is with most strategies that are pretty strong. You have a high probability of them working, but there's a big however. The however is don't just reinforce yourselves, if you're using technology, because you may not be getting results.

One of the things that we do a lot is say, go look for a strategy. Wow, they're using technology. They must be a good teacher. No. We don't know, until we look at the evidence, the teacher, him or herself, does not know until they look at the evidence and say, okay, what am I seeing here? Is it working? Because you and I both know it will work one day and the next day it doesn't. It works in the morning, and it doesn't work in the afternoon. Is it still worth our time? You bet you. This research tells us this is worth our time.

As we're looking at phase two, we're seeing the same thing and getting similar kinds of results with the classroom clickers. And I think we've only begun to scratch the surface of it. So I mean, for us, it's do interactive white boards work? Yes, there's a high probability, but then there's a big if. And you're going to hear if in the room a lot. If, if, if we build on strong instructional foundation.

So we're pretty excited about the technology for sure. Just take one minute at your table. When you hear the use of classroom technology and all the different types from interactive white boards to clickers, to one-to-one laptops, to smart phones, what's your kind of visceral reaction? Do you say, I'm so excited, or are you saying, I'm a skeptic? Just confess at your table. One minute to buddy up with someone.

I have the difficult job of cutting off conversation. I always hate to do that when it's going well. But there are several topics that I want to bring up this morning. First of all, let me reframe what I think is our challenge. I'm going to frame it, and for some people it's going to be reframing. For others it's going to be, gosh, I've always framed it this way.

Here is what you hear all the time. I mean, rhetoric and books and all kinds of things. That first we had the industrial age. That was Industrial Revolution, late 1800s, early 1900s. We moved from the industrial age to the information age. That's with, you know, television, radio, newspapers, and then the Internet. Then the information age is sort of the term people used.

Now we're kind of coming out of that, and people are talking about what are we in right now? People love to, you know, have names for the era. So what are we in right now? The most common answer, at least in education and other places too, but in education, if you look at the rhetoric, look at the book titles, what is the word that keeps coming up, coming up? Digital, digital, digital, digital, digital. You hear it all the time. So you kind of say, what would most people put in that square? They'd say, we're in the digital age.

Now I'm an educator, so I kind of think, what does that mean to me? Is this a digital generation? And when I started to look at some of these pictures, I go, yes, all

these kids are interacting with some sort of digital device. Got it. But see, as an educator, I see something really different in these pictures. I see something that I would say is what we really are in which is the interaction age. Interaction age.

I first read that about three years ago. A guy who's designing spaces for colleges called it the interaction age . . . say, that's exactly what it is. They interact. They interact. I mean, young people, all of us, everything. You interact with your television. You interact, I mean, we vote for American Idol. We interact with the newspaper. We interact with everything that used to be something you just went to get information. Now we interact with it. And so it's all changed. And I think it's important.

So for me, as an educator, I would prefer to think about this whole kind of challenge as the interaction generation. Here's why. I mean, it might sound like semantics. Here's why. If you'd call them the digital age, then the challenge is kind of stated differently. What is the challenge, when you say it's a digital generation? It feels like sometimes we're striving for more and better digital devices. Let's see how many we can get in the classroom. Ooh, we have document cameras. We have interactive white boards. We have one-to-one. We have clickers. We have, you know, it's like, ooh, digital, ooh. You know, say wait a minute, wait, wait.

I think if you actually call it the interaction generation, the goal is different. We need to strive for more and better interactions, because that we can do. That we can do every day all the time without new devices. And the devices will help us do that. So we just have to use them well. So I just prefer to think of it, what kind of interactions am I seeing? Not, gosh, it's so cool that there's a bank of one, of laptops.

So that's the challenge that we have, which takes us back to, so what do we know? How are we going to do that? The challenge is this. We must use classroom technologies. And under interactive white board and clickers, I'm going to mention frequently, but you fill in the blank. Tons and tons of different kinds of, we can't even talk about. You know, Ipads will soon be in the classroom. I want one really bad. I don't know why though. I can do everything now that I need to do, but they're just so cool. I can't talk myself into buying one. But, so I'm kind of a geek about that. So I don't have one. I'm going to wait. But those kinds of things will change the classroom.

So we must use classroom technologies. And oh, the ones I wanted to add, there are blickies(?), blogs, all of the things that come through the Internet as well, podcasts, those things that we're all using. We must use these to enhance and expand students' interactions with knowledge and with people. So that's our work. That is our work to say, how can we do this? And that's the question.

We've always valued interaction. Somebody come up. And we've talked about hands-on and active learning forever. I'm not sure what's going on in that middle picture there. It's a little scary. I just thought it really kind of got an interaction there in a different way. So we've always valued interactions, but now the digital technologies add to the types of interactions that are possible. I mean, you go into classrooms now, and the kinds of interactions among students with knowledge are really enhanced, I mean potentially enhanced, which I find very, very exciting.

So that is our challenge, to make the focus not on the interactions with the digital technologies, but on the focus on the interactions that happen because of the digital technologies. Then we have our challenge laid out. So to do this, the challenge is

there, and that's our job as educators. Will be, by the way, for the rest of our careers. None of this is going away.

The question is how are we going to do it? How do we do it? Use what we know now about creating effective interactions. Now I'm pulling on two sources this morning. They're both Marzano's work, because I work with Marzano's research lab. You can fill in the blank with whatever resources you use. It doesn't have to be. These are the ones I'm putting in, but just to make my selections here, and then enhance and expand on what we know. So we're not going to replace what we know about instruction and assessment with technologies. We're going to enhance and expand on what we know about instruction and assessment by using technologies, and how are we going to do that?

That's kind of the four things that I said we're going to talk about. We're going to take what we know about formative assessment and feedback, about student engagement, about focusing students on learning goals, and about interacting with knowledge, and say, okay, all those have been there and for a long time, forever. How do technologies actually help us to enhance these? Okay, so that's our challenge.

Let's look first at formative assessment and feedback. In the formative assessment and standards-based grading book that I referred to, there are three terms, and certainly Marzano is not the only one who's used these. Summative assessment, formative assessment, and instructional feedback. That's our challenge, especially formative assessment and instructional feedback. That is the key to changing the classroom for all students, if we really understand what this means.

There are challenges. Here are the big challenges. The most important thing is what happens, the interactions, after the assessment results are in. That is what formative assessment and instructional feedback is about. It's not about how many assessments you do. It's not about the timing of them, whether they're common or individual to classrooms. The key is what happens after the results are in? That is the biggest challenge. It's a huge challenge.

Read this quote from John Hattie(?) in some of his early work when he looked at 8,000 studies on learning and instruction. Thirty-seven percentile points in the studies he looked at. Not studies he did, studies he looked at. Oh, my gosh. Does this get my attention? You bet you. Now let me show you what he said in the book that just came out last year. That was his aha. He said, I went back and looked at those studies and said, wait a minute. You know what it is? It's not inundating kids with feedback. It's getting feedback so that the teacher knows what to do next. So that is the key. That is what formative assessment is all about.

So can classroom technologies help us with this? You bet you. The technology I'm going to focus on just this morning, there are other things too, are the learner response systems or the clickers. Some people love them. Some people hate them. But let me talk a minute about them. There's a caution here. The people who go, ah, I don't think they're such a big deal, Debra. What's the big deal with clickers? Most of the time, this is what they've seen. That the teacher uses some sort of device to assess the kids, multiple choice usually. And then there's a display on the screen about who got it right, who got it wrong. And then those results are exported to an Excel spreadsheet or a grade book, whatever.

Don't let me pooh-pooh this too much. I just talked to an AP Chemistry teacher who said, last semester I gave my final exam for the semester using the clickers. My students walked out that day knowing how they did, what they had learned, and what they hadn't. They know what they need to study in order to do the AP exam. He said, I would tell you that last semester I probably saved 40 to 50 hours of grading work by using the clickers. Now I go, that alone, it got my attention, okay, cool. He said the kids just loved that. I mean, he was really, and he went in as a skeptic.

However, let's talk about formative assessment and instructional feedback. You can still have content, but also you can have questions like, how competent are you? Formative assessment and instructional feedback doesn't just say, do you know A, B, C, or D? It mean, how are you doing? Are you ready to be assessed? Yes? No? The students are so much more involved. So, yeah, you can have content assessment, and you can have self-assessment or confidence scales with kids.

And then what happens to those results? They don't just go to an Excel spreadsheet. That's not the key. They actually, instead, go to new interactions, to effect new interactions in the classroom. What do teachers do once they see the kids got it and didn't? They have a whole bunch of options, and depending on the classroom, the size, where they are, they will choose those.

What do students do when they see, gosh, I got that wrong. Nobody knows except for me, but I got that wrong or I got that right. And they can decide what they need to do as well. We just started to scratch the surface of this.

So the challenge is that the most important thing that happens is what happens after the assessment. Let me do this. Would everyone just get a partner, buddy up with someone? I'm going to give you a content assessment, and I want you very quietly to decide, if you had a clicker right now, what would the answer be that you would click in? So kind of pretend you have a clicker, okay? I'm going to let you work with someone, but try to talk quietly at your tables so you don't influence too much.

All right, here's the item. Michelle is having fraternal twins. That just means they're not identical. Okay, I'm going to give you about 15 seconds do decide with your partner. Okay, come back. Thank you. Shhh. Now I'm going to pretend you have clickers. I push the button, and I get a display like that. Now I've done this with clickers, with smaller groups, obviously, and I get those kinds of results. Some people, you know, choose A or B. Most of them choose C or D. D usually is the most popular.

However, here's what I want you to do, and because I'm doing a simulation, I'm only going to give you a few seconds. What I want you to do is pretend that you still have the clickers. I'm going to give you some time to talk to your peers. You can talk to other people at your table, and no, everybody wasn't right. I've never been in a group, so I'm going to assume, pretend, that everyone wasn't right. Check your answer with somebody else now. And in about 15 seconds, I'm going to have you pretend you were voting again. Would you change, or would you stick with your original thought? Fifteen seconds, go.

Okay, stop, come back, thank you. Now, in a real life situation it would go a little further, but I'm just simulating here. Now let's say everybody, now you've had a chance to interact, you click in, and I get that result. Now, the green means that's the right answer. C is the correct answer. Yeah, some of you are going, yes. Some of you are

going, what? Some of you changed. Some people actually got convinced. All right. Come back. Let it go. Let it go. Some of you are saying, no, sir.

If you need to be persuaded, and you don't have somebody at your table to persuade you, if you were right up there, boy, one child, it could be a boy or a girl, and then on the horizontal, one could be boy or girl, and then you'd fill in the squares. Boy-boy, boy-girl, girl-boy, girl-girl, so it's twice as likely to be one boy and one girl.

All right, now, hang on, hang on, hang on. Here's my point. The most important part, there are kind of two important parts of what I just did. A, the message that I now have as teacher, what does this tell me? I've got some more teaching to do. B, one of the most important things that happened was your interactions at your tables and the interactions, we're not going to do it, but you would have now.

I just told you the answer, but I could say, at your table, tell me why C is the answer and give you time to do that. Peer instruction, peer interaction, if you look at the research on that, it is compelling how effective it can be, and I'm telling you there's something about the, you know, clickers that actually, students, there's a term called having skin in the game, kind of from sports. When you have a clicker in your hand and you're a part of that up there, you have skin in the game, and so the engagement factor and the wait-a-minute, I-don't-get-that kind of just changes.

There's no miracle for everyone, but the use of the clickers in the classroom is something that I have seen anecdotally, and we're just starting to get the data about the effect it has, especially a couple of books that college professors are writing about using clickers in college. Because you know what? Colleges are actually talking about trying to be better teachers. Yes. Yeah, whoo-hoo. I'm really excited about that.

I don't want to be negative, but, you know, I actually had a dean of a college of education tell me about two week ago, you know, we don't know much about teaching here at the university. I said, but doesn't that bother you? He said, we're getting there. Could you come over and help us? I said, yeah. Let's do some technology. Oh, they're not sure they want to use that technology stuff. They'll get over it. We'll be fine.

And there's something very private. See, if you had clickers, nobody knows whether you got it right or wrong until you started talking at your table, and if you got it wrong, you'd go, so did a bunch of other people, so I'm okay. So there's this whole kind of thing that happens with them.

You can do this a lot, and it's just, this is formative assessment. This is instructional feedback. I don't need to record this in the grade book. I've got my work cut out for me as a teacher. That's the most power you get. When people just say the clickers are just, you know, a scantron, I go, well, then they're not being used for formative assessment and instructional feedback.

And if we start to use them well, this technology will change how frequently we do what just happened in this room, because I know we could all say thumbs up, thumbs down and hold up the white boards, but it just doesn't hold a candle to what technology will do and the privacy that comes with that.

And if a student has trouble, needed more time. I, as a teacher, can go to the printout and see who's struggling, and then go back to them, say, I notice you didn't click in any of those. I want you to have some time to spend with these other questions. I can see that. But it's not like exposed to the world. And when they start to see that it's private, more and more say, I'm going to give this one a shot.

So the whole thing about formative assessment, instructional feedback technology, one-to-one laptops, you can do the same thing. You can, you know, it's certainly not just with clickers in the classroom. That's just one example.

True formative assessment is where we're headed. Technology is going to take us there. True formative assessment looks like this. If you kind of imagine a kid's record through four quarters and there are 20 topics that are being taught during the year, and the teacher says, okay, first quarter, I'm going to teach these topics, and this is how the student does on a scale of zero to four. Do you see how the student is doing? That's where it ended, okay. The next quarter looks like this.

Why did some of those in those first six topics turn color? Because the student continued to learn on those topics even in the second quarter when there were new topics. There's the third quarter. There's the fourth quarter. Let me blow it up a little bit. See, what happens is you don't say, I'm sorry, you didn't learn it by October 30th. You're done.

What we say is, in formative assessment systems, is we're going to assess all year long on these topics. If you didn't get it first quarter, you can come back and get it second quarter, and it doesn't mean you're going to average the two scores. That's ridiculous. That's not formative assessment. It means what I'm going to track is whether you've learned what I want you to learn in the time that we have. That's the message of formative assessment. This is where we're headed.

Now are we going to get there right away? There are schools getting there, and what they're finding is technology is the key. Because if you have a classroom that looks like that, the kids can learn those topics all year, then your plan book is going to look like sometimes you have whole class, sometimes you have what is called here learning lab.

Let me show you what that means. This might be what the classroom looks like during assessment. Kids are sitting at the desks doing the assessment whether it's clickers or paper and pencil. This is what it looks like after the assessment. Kids are taking in the results from the assessment and relearning, teaching each other, peer interactions, getting ready to be reassessed. Now you'll notice in this classroom, you can see the little images of, there's computer bank. And then there's an interactive white board up in the corner, and students are gathered around that. And students are gathered around textbooks.

But for us, when we work with teachers to try to get to be their classrooms like this that is constantly going back and relearning what you didn't learn, technology has been a breakthrough. They say, I can do that much assessment if you give me some tools to make it less cumbersome and feasible, more feasible to do. So, you see, I think we're getting there. I'm really, really excited. I think we're on the cusp of classrooms all changing to the point. It's not, I have hoops for you to jump through, kids, and here are my assignments. Instead, it's here's what you're going to learn, and I'm going to everything I possibly can to make sure that you learn it. And I'm going to track not when you learn it but that you did. And that's going to be a breakthrough for so many different kids.

So when we start to look at the power of the technology, we say, can classroom technologies lead us to formative assessment and instructional feedback? Can they enhance it? Yes, if we build on our understanding of effective instruction and

assessment strategies. Okay, just take a second and react to that. What are you thinking right now in terms of true formative assessment systems, which means I can assess you multiple times, and I'm not averaging those? I'm just trying to get you to learn what you need to learn, and the use of technologies to do that. Do you think that's feasible at your school, or is it already happening at your school? Just talk at your table for a second, and we'll switch topics.

So again, you can fit technologies in the classroom. When people don't understand formative assessment and it's just a fancy scantron. You know, it's faster. When they do understand formative assessment, they go, oh, my gosh. Now I actually can keep reassessing until they learn it, and I'm not trying to keep track of 100-point scale. Sometimes assessment becomes score keeping. That's not what we're trying to do here. We're just trying to determine what to do next? Any questions or comments? Yes?

[Inaudible audience member question.]

DEBRA PICKERING: So what technologies would work best? So like assistive technologies where you could call someone and say, here's my situation. What's best for me? Can you call on someone and say, what are the technologies best? Not really yet in the classroom. I think we'll get there, but that's an excellent question, because people say, wow, we're going to get a whole bunch of, and then they fill in the blank. They go, what are you going to do with those? Well, we're going to get them, and then we're going to go, but what are you going to do? Well, can't you assess with those clickers? Well, are you trying to do formative assessment? Well, yeah, isn't that when you assess a whole bunch? Nope.

See, we have a long way to go, which is why some people who criticize technology say the reason is because they're doing that without asking the question that you just asked, which is, what is it we're trying to do here? And how will technologies get us there? As opposed to, whoo, we've got it. But we're getting there. And you know what? If the instructional people and the technology people in the district don't get in the room together every day, it's less likely to happen.

One of the things that annoys me to no end is I go to do a presentation on instruction. The tech people come, set up everything, say, well, bye, we're going to go. Whoa, whoa, whoa, whoa. Get back here. How are you going to help people use this technology if you don't even know the instructional challenges we're trying to take on. So excellent question. So you can call me. That was my answer. I'll tell you what you need. So we must use classroom technologies to enhance and expand.

Let's go to a different topic, student engagement. Now I want to talk about this, because people say, oh, yeah, it's engaging. Technology's really engaging. These one-to-one laptops and the interactive white boards, but that's just not worth the money. You know, just because pretty soon they're not going to be engaged anymore. They're fine. Well, let's kind of look at engagement.

If you look at engagement . . . science teacher, I'm just going to take a piece of engagement, and please know I know I'm just taking a piece. Let's look at the challenges. I'm going to do a visual to kind of illustrate the challenges of engagement. We all have sensory memory. We all have working memory. We all have permanent

memory. Messages come in to us through sensory memory, and if you actually are paying attention to it, then that means it's in your working memory. What you're paying attention to right now is in your working memory.

If you're paying attention to me, what I'm saying is in your working memory. If you're checking your e-mails, that's in your working memory. It's whatever you're doing. And I know that during the morning, you will come and go. You won't be here all the time. You'll think, oh, I've got to remember to be sure and, that kind of stuff. You know, so I know everyone's not in the room all morning, but I try to bring you back. By the way, I haven't been in the room all morning either, and I'm the speaker. I kind of go, wait a minute, I've got to come back here. What am I doing here?

So working memory is very fragile. And so then if you actually pay attention to it, it goes into permanent memory, okay? Now the whole thing is, messages come in from the world, they get into working memory, and they, you know, do or do not get into permanent memory, but if you work it, they usually do. Then you've got to take it back out and work it some more. And then it goes back a little stronger. Take it back out, work it some more, it goes back a little stronger. My son who had the challenges in school, he had to have that happen more often in order for it to stick in permanent memory. That was the major issue.

Now here is what we do as teachers. It's the battle for working memory. We're in a battle. Here's the battle. See the world? It's a very interesting place. And sometimes kids would rather be thinking about all that stuff. By the way, there's a bunch of stuff internally too that kids would rather be thinking about than what the teacher has to say. So here's the classroom teacher trying to get through this melee. So that's our challenge. There are a thousand things a kid would rather be paying attention to. So we have to get in to working memory. That's our challenge.

Now winning the battle for working memory is part of engagement. To get into working memory, there are three things that teachers can do. One is get the students' attention. Two is convince the students that what they're doing is important, and three, convince students to be successful. That's the three. Now I'm not going to do a big thing on engagement, but if we did, we'd look at all three of those. I want to just look at one piece. I told you one piece.

Notice where the triangle that says attention is. It is the gatekeeper, because you can try to convince kids what you're doing is important and they'll be successful. If you don't have their attention, the ballgame's over. So attention is actually the gatekeeper to engagement. So I'll kind of talk about that a little bit. One of the things, more than the other two parts of engagement, it comes and goes. You're a teacher, say, I got their attention. Oops, it went away. Oh, now I've got them. They're gone. Yeah, it's just always, always trying to work, so it's a challenge. It's a huge challenge. So as a result, teachers have to have a repertoire of easily accessible resources to gain and sustain students' attention.

Now remember, it's not all of engagement. This is a piece of it. But it's a really key piece. Do technologies help us to get students' attention? Absolutely. I mean there's anecdotal research over and over, so it's part of the battle, you know. So there are a bunch of things that teachers do in order to keep, to gain, and sustain attention. Any of these sound, look familiar? So I like to say, have for years, you've got to have these in your hip pocket, ready to pull them out at any time.

Here's what is now the language. Have them on the screen and ready to pull up any time. So when I'm doing training with interactive white boards, always at the bottom I have activities I can pull up when I go, boy, energy just went out of the room. Or, you know, we need to kind of come back at it a different way. You've got to have these things. And what I love is technology makes this so much easier. I've been doing this for years, and I'm going, this is so much easier now. I used to carry around transparencies. And I go, this is just great.

Let me give you an example. When we say, can classroom technologies help teachers engage students, specifically gain and sustain their attention, let me give you a couple of examples. Let's take games and inconsequential competition. So I notice there's a little, you know, losing kids and I go, oh, God, they're staring at the ceiling. Okay, I need to bring them back.

Here, let's do this. Would everyone please get a partner again? One of you is A, one of you is B. Okay, do that quickly. Okay, that has nothing to do with your grade, okay, in the class. A, listen carefully. I'm going to, you're going to be looking at the screen. B, you don't have to move. Just turn your head so you can't see any of the screens. Now listen up. I haven't finished directions. Hello. I haven't finished directions. Teachers are the worst. If you can hear me, raise your hand. Thank you. Let me finish directions.

A, you're going to be looking at the screen, and I'm going to put, in this case, seven pictures of famous people. You have to get B to say the names of those seven people, which means, hold it, I haven't finished. Okay, if you can hear me, raise your hand. So if a picture of Abraham Lincoln came up there, A, you would first of all, step one, have to recognize it's Abraham Lincoln. B, you would have to get B to say Abraham Lincoln, and you can't say anything like, rhymes with Babraham Bincoln, or you know, honest Abe, or anything. You could say, oh, the President who signed the Emancipation Proclamation, then you're good.

Whenever people play this game they say, Debra, but if you don't know all those people, you're not going to get them all. Yes, that's the game. Second, someone says, yeah, but if you were older, you would know more of those people. Yes, and your point is, so if you win, you're probably really old. Okay? Here's how I know you'll win. When your partner has said all seven, I want you to shoot your hand up and call out, got it. I will then take the screen to black. Everyone's time's up.

The next set, B, don't laugh at them. You're next. The next set you'll switch roles, and there will be pictures of math terms. Are you ready? B, turn your head. Ready? Ready? Go. All right, let's see if you're right. That says Martin Luther King, sorry. Switch roles. Ready? Go. Okay, thank you.

Now there's always a classroom management challenge. The use of games and inconsequential competition has a lot of research behind it. What I love about technology, whether you have them on laptops or you have white boards or you have just projectors and PowerPoint, my pictures kept, you know, I can now create them. I can get pictures online. It just makes it all so much easier. And notice, in just a few seconds, how much academic language is used. I mean, I have academic language here, but now although I keep talking about academic, why is George Clooney on the list? Because he's hot. I have standards, you know.

Okay, okay, another part of engagement, questioning and response rates. Notice how many people respond when I, you were even just pretending to have clickers. You go, okay, I . . . that increases much more than individual single white boards and thumbs up, thumbs down. Those are still possible, but technology just makes it so much easier.

Another way to get response rates, there's a teacher, secondary teacher, who said she used to assign the kids to read novels in the evening, and then she tried to have discussions in class. So she said the problem was many of the kids did not read the novels in the evenings, the chapters they were supposed to. So here's what she did. She said, I have a different generation here. She said they did other things in the classroom, but they spent a lot of time in the classroom during the day reading, and they had the discussions online at night. And she said, I heard from people, heard from students, and heard qualities from students that I had never ever known were there in the classroom.

Now some people hate that. Well, you can't do that. She said, look, some of these kids were weighing in on issues around the novel like at 11:30 at night. If they had picked up the book at 11:30, what would have happened? Yeah, snoring. But she said there was the most incredible interactions and responses that I got just by sort of saying, wait a minute. I've got to mix it up. We've got technology that changes things a lot. So does she have a higher level of engagement? You bet you.

We did whenever I've done this with people actually having clickers, it's amazing how absolutely engaged people get, like what do you mean? They say, I don't think it's, you know, and they're with you.

Friendly controversy, let me show you a quick study. Researchers looked at fifth- and sixth-graders involved in discussions of controversial topics. Each time group one, the discussion was designed to come to consensus. In group two, it was designed to so not resolve. So they ended the discussion without it being resolved. And then when they came back together, they continued that one. In group one, they always came to consensus, some compromise, or something like that.

Then they watched students' behaviors in the studies. The interest in the topic, and they had criteria. If you read the study, the study is described in the book called *Made to Stick*. Interest in topic, which group do you think showed the greater interest in the topics? Group two. Which group do you think spent more study time, you know, in between the discussions? Group two. Which group do you think was likely to visit the library to get additional information? Group two. In one of the discussions, they showed a film at recess and told the kids that the film was on the topic. It was volunteer. You could go to recess or you could stay in. Eighteen percent from group one and 45% in group two.

So you kind of say, well, how do you get into the controversial topics? Again, I can go to any kind of response system, any learner response system, or if you have older kids, they have cell phones. If you've ever used *polleverywhere.com*, kids can just do it. That's kind of the way you vote for American Idol. And anyone can use that website. And then you have them take a position. They have skin in the game, and they just kind of participate in a very different way.

This was an interesting one I read on a blog where they had discussed a lot of warriors, among other things. And the question the teacher proposed is, if a Viking and

a Samurai had a battle, who would win? A, Viking, B, Samurai. They had to click in, and then they were to go online and get any evidence to show, based on what you know about these cultures, about the technologies that they used, what do you think? Can you see that as engaging? Technologies, you could do that without technology. Technology just makes it so much easier and smooth to do.

Opportunities for students to personalize learning, there's a teacher in Wyoming who has kids bring in pictures of what they did on the weekend. I mean, these aren't his actual pictures, but snowmobiling, skateboarding, skiing, and he's a math teacher. What he does is take their pictures from their cell phones. They send them to him. He puts them up on the screen. He pulls up graph paper behind them with his interactive white board, and then creates questions like, what was the slope of the hill that the guy said they actually were snowmobiling?

He actually goes to *Google Earth*, and some kid said, we were snowmobiling on this hill and I was, you know, I caught air. And you know, he goes to *Google Earth*, finds the hill, puts it up on the screen, puts the graph paper and says, what's the slope of that hill? How fast would he have had to be going to catch that much air? And they use all of their formulas to do it. It just is seamless. It just happens all the time. He said they're very highly engaged using these math calculations for slope and angle and curve and all those things that are going on.

Unusual information. Everyone can do this, but it's just so much more accessible online now. If you were doing a unit on economics and talking about kids understanding that the government's raising the national debt ceiling to above the previous \$12 trillion, you're trillioning all the time. Those kids are not interested. Say, wait a minute, I have a few little things I found online. Here's one. How does a trillion compare to a million or a billion? A million seconds is 12 days. A billion seconds is 31 years. A trillion seconds is 31,688 years. So we throw around these terms and go, oh, what? Okay, I've got your attention back? Then we're good to go. So all of these are examples of these things have been with us forever. They're just easier to do now with technology. So you can't ignore the technologies that we can use in order to make these work.

There's always a caution here. Those things that gain students' attention, do not necessarily sustain students' attention. So kind of keep that in mind. Can the classroom technologies help teachers? You bet you, if we build on our understanding of effective instruction and assessment strategies. I start there and go, now how can I do this easier? Just one minute at your table, just react to the use of technologies to gain students' attention as part of engagement. What have you seen? What have you done? What do you hope we do more? Just discuss that at your table.

Come back together. I told you always have too many topics. I'm skipping one topic, focusing students on learning goals, because actually that's part of my homework presentation as well. I'm going to talk about interacting with knowledge. So this is the last area.

We've always known we want students to interact with knowledge, be active learners, hands on. Technologies can certainly help us do that. So as you look at these pictures, can you see the interaction that is going on here? Here's the challenge. For every one of these, there's a big challenge. Here's the challenge. What you're seeing here are all physical interactions. They're touching. They're moving things

around. They're going to the board. I love that. I get that. But just like hands on, only as good if something else is happening.

Interaction with knowledge, using technology, just because they all have a computer, just because they're all touching the keys, just because students are going to the board, just because they're clicking, doesn't mean that we're facing the real challenge which is this. So we have to take the challenge of cognitive interaction and say, how can we use technologies to get cognitive interaction? Can they actually help? Yeah, let me start with a caution right away. Just like any strategy, the technologies have been used in a way I go, I don't really think this is the kind of interaction that we value most highly. It doesn't mean it's bad, but let me give you an example.

There is a slide that I saw created through technology on the book *Night* by Elie Wiesel. Now here is the essence of what the slides were after. Can you kind of see what the question, it's a very, very factual, who said what to whom on page 22? Is this interaction? Yeah, but this isn't the interaction that I'm most excited about. Likewise, let me show you some *Romeo and Juliet* activities. This was sort of the cover page. These were some of the things that, you know, now you could do it real fancy. It's like, okay, but, blah. Here's another one. Who am I? That assumes they care. And he answer is revealed. Okay, it's just that this is technology using interactions that are not going to enhance and expand. This is technology kind of doing with sort of, you know, bells and whistles some stuff that really wasn't very interactive to begin with. You kind of agree with this? That make sense?

Can we do it? Yeah, but we have to do something different. Let me show you a different teacher's use of technology. This was put up on the screen. And then what the kids do with the interactive boards is come up and write their reactions to that quote over time, as they get more and more into the characters who said those things. Can you see that as interactive in a very different way? Now I'm excited, because you can save what the kids said.

Let me give you some other examples. Go to nationalgeographic.com and you get some really compelling questions to start a unit. And then ask it again part way through the unit, and then ask it again at the end. Can you see this as a very different kind of interaction? Here's something I found online. Technology led me to this. Kind of got everyone. We'll see *Let's Make a Deal*. So they open the door, and there's two left. Now some of you are sitting there, wait a minute. They got me on the last one. So you're not thinking in terms of . . . but here's what's interesting. And this is what I would do in the classroom.

Let me just share with you. The correct answer is B. Change your guess. The odds are better. Now some of you are going, no, sir. In the class, I would do this. Go online and see if you can get the reasoning behind why B is the answer, and be ready to defend that as the answer, or if you are sure that that is wrong, that's not the answer, bring your evidence tomorrow, and we'll continue. Can you see this as interaction with knowledge? Here's what I know. If you go online, you can find a PhD in physics who will tell you that B is not the right answer. And then you'll find a PhD in physics who will tell you, yes, it is.

Now, why did I discover this? I went online. It helps me a great deal. I'll give you one other example. This is an adaptation from an assignment that a guy named Gallagher did in a book called *Readicide*. Rather than having kids read every act and

scene in *Hamlet*, they said, you know, let's just choose certain things about *Hamlet*, because these kids are not going, his kids were not going to all read every line of *Hamlet* or should they.

So this is what he did instead. He had an interactive white board. Here was the learning goal. And he took lines from Polonius's speech to his son Laertes and he put them up on the board, and then at various times, the kids could go up and write how you would say that today. So if you take this where it says, "give thy thoughts no tongue nor any unproportioned thought his act", this is a couple of examples of what kids could write. And on another part of the interactive white board he put this one up. "Beware of entrance to a quarrel, but being in it, beware that they opposed may be beware of thee." "Neither a borrower nor a lender be, for loan oft loses both self and friend." Can you see this as interaction using technology is the kind you want?

One last example. Everyone knows *Google Lit Trips*? Again, *Google Earth* combined with literature in a way that builds on what we know about good instruction. Not just, wow, look at *Google Earth*. Instead, we want to say, what can you do? In *Google Lit Trips*, what they've created is *Google Earth* shows you where the books take place and the journeys in the book. So in *Grapes of Wrath*, you have these little arrows then take you to key ideas like roadside cafés that the Joads would have encountered in *Grapes of Wrath*. These tools here take you down, and you can actually go on the journey with the Joads as you're reading the novel and kind of see what's going on.

This is another one done with *Big Anthony*. I just saw one done with *Make Way for Ducklings*. And you actually go to Central Park on *Google Earth* and you're right there. You can't compete with that. It's amazing. We can build on our understanding of effective instruction and assessment strategies.

Let me give you one caution, however. Sorry, I'm going to skip to this. When you're starting to look at the wow things we can do, just talk among yourselves there for a second. Ah, where'd it go? Where'd it go? Doggone it. Got it, got it. Okay, come back together. Sorry about that. I apologize. The slide I wanted to get to so I can just explain it.

When you ask how we can work with the interaction generation using technologies, and we always go back to what we understand, one of the things that I hear very frequently now is that, and I'm just going to call it this, the danger of the wow factor. I have seen *Google Earth* used in a way, and I'm going, yeah, you could do that, but I don't know why you'd do that. Sometimes I look at people say, I just read an article called *Ten Things You Can Do with Twitter in the Classroom*. And I read them and said, yeah, you could do that, but why would you do that? You can embed three videos to any lesson you have using the technology. Yeah, you could do that, but why would you do that? The entire video on Steinbeck is not necessary for the point you're trying to make? You see the point?

You kind of get excited about some of these things. But watch out. There's this seduction quality of technology. We're trying to enhance interactions, not just do cooler assignments. You see, sometimes we get so caught up in assignments and activities. Now technology can do the same thing to us, if we're not careful.

My daughter, if she were here, she would tell you that one of the ways to make A's in school is to have really cool poster board. Now she wasn't in the technology area, so it was all on poster board. Now she would probably say, you need to be able

to do really cool PowerPoint, you know and dioramas. Now the new diorama is PowerPoint. But when she was in school, it was poster board. We had tri-fold poster board underneath our couch in the living room for, like, 12 years.

When I talk to new mothers, they say, how do you make sure your kids are successful in school. They don't know my son, but they say, how do you make sure your kids are successful in school? I say get a bunch of cool poster board. I actually take poster board to baby showers. And the mother says, what's this? I say, don't ask. Just put this under your couch in the living room, and don't write me a thank you note, because you will write me a thank you note in about 10 years, and it will be midnight on a Sunday night. Wal-Mart will be closed, and you'll bless my name.

There's a second thing I've been telling them. Learn how to burn the edges of the paper right now. Here's a third thing I tell them. Do your family tree once and save it, because that puppy's going to come up about five times. My daughter was a sophomore in high school. She came in one night and said, oh, I have the family tree assignment. She said, what was great-grandma's name? I said, finally, you know what I did? I made it up. I figured, what are they going to do, go check? So I said, Helen Miller. She said, that doesn't ring a bell. I said, Helen Miller. She said, okay, when was she born? I said 1892 in Italy. I finally had a good time with that assignment.

Here's what we don't want. We don't want in 10 or 15 years people having that same conversation except saying, what you need to do is get in PowerPoint . . . time and save it and subscribe to and, you know, we don't want technology to replace those kinds of assignments. So when we talk about technologies, this is the frame I want to put on it. You need to enhance and expand students' interactions, not just replace it with something else kind of goofy, and make sure we're talking about their interactions with knowledge and with people.

Can we do this? Absolutely, by building on our understanding of effective instruction and assessment strategies anyway. So that is the message, that is the challenge I think we have. And I'm very excited about the possibilities. But until we admit and commit to building on good instruction and assessment, technologies won't reach their potential.

Thank you very much.