John Hattie, if you haven't read Hattie in 'Visible Learning', it's a must read for every teacher today. And John Hattie says on a daily basis, in your classroom, whether you're teaching JK or right through to grade 12, he says "everyday know thy impact". What impact did I have on my students? And of course it won't be one same impact on them all. So who were the ones I didn't impact today and why not? And of course, perhaps a lot of the reason is them but a big part of the reason is us. So Hattie's about don't look outwards and say, "if only those kids would have, if only they, if only I had a classroom such as, if only, if only, if only out there" how about look inward? Be a reflective practitioner and say what things can I change to increase my impact? So I mentioned backward planning, I'm a great devotee of backward planning. Who's familiar with backward planning; maybe backward understanding by design? Again, a must read. Because in today's information society, if we haven't got a tool that helps us, say at the end of the year, at the end of the unit, at the end of the term; what's critical for kids to have learnt? If we haven't got a tool that helps us do that, we will feel overwhelmed by all that we have to teach. So it's a wonderful framework, I believe deeply in backward planning. Beginning with that question, what's essential for kids to know, understand and to be able to do in 2015 in mathematics? And of course, for us in Ontario, we've also, don't leave the learning skills part out. We'll talk about that today. What behaviours must they acquire? And I'm on a personal mission to raise the profile of those learning skills because if you've been around a long time in education, you'll know that the origin of those things is none other than the conference board of Canada's employability skills profile. These are the things that kids get hired and fired on. Not their knowledge of specific expectations in the mathematics curriculum; so they are very, very important. There's all this focus right now on Ontario on learning those success criteria. Don't forget that on a daily basis which of the six learning skills will we focus on. And we need to highlight it for the kids. That's something we will be assessing during today's lesson. So we got to be clear on those learning targets, because if we are not clear on those, we won't know what or how to assess. And what we must make sure of course is that, absolutely what did I air tightly between those two things. And must not be any busy work here. One of my favourite questions to teachers is; this assessment the kids are working on now, what critical learning is it providing evidence for? If there's hesitation, there may be a problem. So we got to be really clear because what's the biggest problem teachers say they have? Whenever I ask the question, what's the biggest challenge you face? Absolutely! There you go! You prove it, by gatherable data this afternoon. Time! So if time is the critical variable that we don't have enough of, we cannot make more of it but we can use it differently. We can make sure that we don't spend any time and more importantly the kids don’t waste any time on assessments for whose purpose we're not clear. Once we got those in place, then it's what do I need to do in terms of opportunities, experiences, lesson plans, in of school, out of school, opportunities for kids; what must I plan, long range and short range to prepare the kids for these to prove they've learnt what's essential. Backward design in a nut shell. But we need to spend a little bit of time talking about that first question. And I know we're bound by our curriculum documents. We must follow them. But ladies and gentlemen I don't want us as teachers to be enslaved by them. Let's look at our curriculum documents as other professionals in other fields do,
be they doctors, or engineers or whatever. They're not enslaved by their textbooks, in terms of the things that provided the knowledge and skills they've acquired. They realized they study those things, they acquire the knowledge and skills, and when they meet a challenge, a patient; or a bridge they've got to design, they draw from their resources and their experience in terms of what they're going to use. How does that line up with our role as teachers? The ministry said the focus for grading and reporting are the overall. So what about all those specifics? Well we draw from those on the basis of student need. And we don't need to cover all of those for all of the kids all of the time. We have to take a more differentiated approach. Because what we do know as human beings is that when human beings are engaged, they will learn tons of stuff without it being covered. How many of you are parents? Absolutely. Look around the room; think of all that your child learns before ever setting foot in a school; is that because as a parent you spend hours on detailed lesson plans? For your infant, your preschooler, of course not. It's because human beings by virtue of their birth, their DNA, are wired to learn. But a newborn is curious, a newborn is innately curious to make sense of its world. In terms of objects, warmer objects that seem to move; human ... other human beings, so there is innate curiosity in this and we must make sure that everything we do in our classrooms, stimulates that curiosity and doesn't stifle it.

A DYNAMIC MODEL FOR ASSESSMENT

>> Ask yourself the question, do I create a safe environment in my classroom, where kids are not afraid to get it wrong? Because, of course, when we are talking formative assessment, the mistakes, the misconceptions are key to our teaching and the kids' learning. But we have got a massive job to do, because we have created an educational system, the royal "we," whereby any kind of mistake is wrong. There is a word I want to banish today-I'm-the overuse of the word "awesome" is incredible! But awesome is a summative word! And kids just want to hear "awesome" all the time. Most of their work, when learning is fragile, and you will be far short of awesome, and we've got to tell them that. And we've got to say and that is absolutely okay. We must-I want to confiscate all the erasers in primary schools [murmurs and chuckles] because the erasers are covering up the misconceptions that the teacher needs to see the next day. But there is this mindset, among kids, mindset-focussed at the conference-there is this mindset among teachers, kids, parents, everybody, that assessment by its very nature is summative. But we are missing the piece. The critical piece. Do we invite kids to wonder in the mathematics classroom? What does that look like? Well, here is an example, borrowing from the work of Carl Brighter, from 30 years ago, he said "invite children to pursue their own inquiries, in all subject areas," using that acronym INTU, INTU. I need to understand. What might that look like? Can we do that in math? Yes, we can! Here is a kid, in grade 11, when the teacher invited the students to pose their own questions as they were learning about measures and central tendency, this kid went straight to his own experience in his report card, and said "Whatever else we learn during this study of measures of central tendency, I want to answer that question." You want to talk about a kid who is engaged and invested? So you see, we can still address the curriculum. The teacher puts some limits around this, but invited the students to pose their own questions.
ASSESSMENT STRATEGIES

>> I really encourage primary teachers to talk with intermediate and high school teachers. We all have to talk together. Because, of course, when children are very young and they can't read or write, guess what? We have them talk and we have them do, and we watch. We are wonderfully observant, and wonderfully attentive when the children are too young to write. But the moment they can form those letters and numbers [murmurs and chuckles], boom! Default about written evidence. Writing assessments, our response to tests and quizzes and homework, is given to the student sometime after they have completed the performance. The next day, in the case of a test, a week later, maybe two weeks later. For a lot of kids, too little too late. But of course, when we ask a child a question about what they did it might be right there in the moment, while they're struggling, while they're confused. Oh, now I get it Mr. Cooper! This is what Dillion William and his colleagues call Assessment: Minute By Minute, Day By Day. It is on the fly. And it is critically important, especially for the children who are not getting it. Because for them, even the formative quiz is too little too late. So, and even better, of course, we can actually capture using the devices that you folks are using right now, these hand-held devices, the smart phones, with the video capability, and the tablets. Ladies and gentlemen, the work that I'm doing right now, the project that I'm working on that has got me more read than I've been for probably ten years, is called Validating Classroom Observation. And it is about, we have now got the technology that is affordable, and it is in most classrooms I visit, which enables us to capture, in the moment, the child solving a problem and demonstrating a misconception. The trouble is this stuff is new. And the other big trouble is we are afraid to let go of some of the written evidence. Doug Ries [assumed spelling], working out of the U.S. says teachers need to make a list of the things they can stop doing if they are going to start doing something new and different. Because without doing that, it is what causes the meltdown. So I am looking for going into mathematics classrooms where hand-held devices are being used to capture in the moment what children say and what they do, revealing their understanding or lack thereof. This is powerful stuff. And Wiggins and McTighe more than 20 years ago said if you say curriculum here, assessment here, these traditional approaches to assessment, tend to be pretty good at gathering data on the least important things in the curriculum [laughter]. And as we move down to the more important and the most important, really, from a validity and reliability perspective, we have to have kids show us. And tell us. And of course the metaphor I've been using here for years is the driver's test. Right? Is the multiple choice test, the young drivers required-must write-to get theirs, it was called G1? Is that a way to certify their proficiency with respect to driving the car? Of course not. It is a valid, valid and reliable test of knowledge. Which is, in no way, shape or form, sufficient evidence to certify proficiency of driving the car. And the same applies in every subject. It is obvious in music and in art that we have to have these, but it is equally the case in mathematics. So how do we do all of this? How do we plan this? Because, oh, Cooper, I'm getting overwhelmed now. I was kind of comfortable with my assessment plan. Well, we have to think big, start small. We have to take a backward planning approach. And that means in terms of just like sports, you begin with the summative. You don't begin as a
soccer coach by planning your drills and your practices. You begin by looking at the season schedule, and when is the first game of the season? The first summative? When is that? And then you plan backwards from there. In terms of your practice schedule. Within your practice schedule you plan backwards in terms of which players need to work on dribbling? Which players need to work on shooting? Which players need to work on throwing? Because they keep doing foul throws. You differentiate your teaching and your assessment within the practice. Powerful, powerful analogy folks. Let's play with it. Because that is, otherwise, we are going to get overwhelmed. Otherwise we are going to realize that the end of the year in mathematics, we don't have any evidence for the patterning and algebra unit. We have got too much evidence for the number sense and numeration, but we don't have any-and that is no good. So if we plan backwards, and say I've got to have summative evidence of everything for grading and reporting processes, think big picture. Think the game. The season schedule. And then work backwards. For those of you working in high schools, design the 30% first. Design the playoffs first. And please, tell me if you're teaching-how many of you are teaching high school? Please tell me your 30% is not all your eggs in the exam basket. Please tell me, because a lot of kids are like me, blew the exam. So triangulate your data. An exam, a performance task, and maybe an oral conference for five minutes.

AUTHENTIC ASSESSMENT

>> I really encourage primary teachers to talk with intermediate and high school teachers. We all have to talk together. Because, of course, when children are very young and they can't read or write, guess what? We have them talk and we have them do, and we watch. We are wonderfully observant, and wonderfully attentive when the children are too young to write. But the moment they can form those letters and numbers [murmurs and chuckles], boom! Default about written evidence. Writing assessments, our response to tests and quizzes and homework, is given to the student sometime after they have completed the performance. The next day, in the case of a test, a week later, maybe two weeks later. For a lot of kids, too little too late. But of course, when we ask a child a question about what they did it might be right there in the moment, while they're struggling, while they're confused. Oh, now I get it Mr. Cooper! This is what Dillion William and his colleagues call Assessment: Minute By Minute, Day By Day. It is on the fly. And it is critically important, especially for the children who are not getting it. Because for them, even the formative quiz is too little too late. So, and even better, of course, we can actually capture using the devices that you folks are using right now, these hand-held devices, the smart phones, with the video capability, and the tablets. Ladies and gentlemen, the work that I'm doing right now, the project that I'm working on that has got me more read than I've been for probably ten years, is called Validating Classroom Observation. And it is about, we have now got the technology that is affordable, and it is in most classrooms I visit, which enables us to capture, in the moment, the child solving a problem and demonstrating a misconception. The trouble is this stuff is new. And the other big trouble is we are afraid to let go of some of the written evidence. Doug Ries [assumed spelling], working out of the U.S. says teachers need to make a list of the things they can stop doing if they are going to
start doing something new and different. Because without doing that, it is what causes the meltdown. So I am looking for going into mathematics classrooms where hand-held devices are being used to capture in the moment what children say and what they do, revealing their understanding or lack thereof. This is powerful stuff. And Wiggins and McTighe more than 20 years ago said if you say curriculum here, assessment here, these traditional approaches to assessment, tend to be pretty good at gathering data on the least important things in the curriculum [laughter]. And as we move down to the more important and the most important, really, from a validity and reliability perspective, we have to have kids show us. And tell us. And of course the metaphor I've been using here for years is the driver's test. Right? Is the multiple choice test, the young drivers required-must write-to get theirs, it was called G1? Is that a way to certify their proficiency with respect to driving the car? Of course not. It is a valid, valid and reliable test of knowledge. Which is, in no way, shape or form, sufficient evidence to certify proficiency of driving the car. And the same applies in every subject. It is obvious in music and in art that we have to have these, but it is equally the case in mathematics. So how do we do all of this? How do we plan this? Because, oh, Cooper, I'm getting overwhelmed now. I was kind of comfortable with my assessment plan. Well, we have to think big, start small. We have to take a backward planning approach. And that means in terms of just like sports, you begin with the summative. You don't begin as a soccer coach by planning your drills and your practices. You begin by looking at the season schedule, and when is the first game of the season? The first summative? When is that? And then you plan backwards from there. In terms of your practice schedule. Within your practice schedule you plan backwards in terms of which players need to work on dribbling? Which players need to work on shooting? Which players need to work on throwing? Because they keep doing foul throws. You differentiate your teaching and your assessment within the practice. Powerful, powerful analogy folks. Let's play with it. Because that is, otherwise, we are going to get overwhelmed. Otherwise we are going to realize that the end of the year in mathematics, we don't have any evidence for the patterning and algebra unit. We have got too much evidence for the number sense and numeration, but we don't have any-and that is no good. So if we plan backwards, and say I've got to have summative evidence of everything for grading and reporting processes, think big picture. Think the game. The season schedule. And then work backwards. For those of you working in high schools, design the playoffs first. And please, tell me if you're teaching-how many of you are teaching high school? Please tell me your 30% is not all your eggs in the exam basket. Please tell me, because a lot of kids are like me, blew the exam. So triangulate your data. An exam, a performance task, and maybe an oral conference for five minutes.

CULMINATING TASK

>> This is a school in Hamilton. It's a vocational school in a tough area of the city, full of kids who previously hated math. Danny and his family for years have been running a landscaping and sort of gardening carpentry business in summertime. And so Danny whatever he can make sure that his accommodating task present kids with what real-world kinds of challenges. So if we look at another chunk of his Grade 9 curriculum for
his applied math course, by the end of this course students will determine through investigation optimum values of various measurements, solve problems involving measurements of two-dimensional shapes, volumes of three-dimensional, et cetera. What does Danny do? He comes in enrolled and he talks to the kids enrolled and he says your job is to convince me to go with your design for either a pergola or a storage shed. You're going to be working in teams of two, and your goal is to beat out the others with respect to your design. Get me to go with your specs. Okay. So the kids actually rise to the occasion, the competition. They do dress up. They're careful of their P's and Q's and all the rest of it. I was in there when they were trying to get Mr. [inaudible] to go with their designs. And there was a spirited sense of competition in that room. And these were kids who were not only learning important mathematics, essential learning, but they were also learning much-needed lessons with respect to behaviour because Danny is also highlighting the relevant learning skills here in terms of responsibility. So once a teacher like Danny does that the problems that I get presented with all the time by teachers with respect to performance assessment in an area like mathematics is yes, but what if on the day of the presentation group, some group members don't show up? Well, you see, if we not just pretend but we actually turn the classroom into this authentic business, then the likelihood of some kids not showing up is significantly reduced. But Danny has spent time talking ahead of time about what if on the day of your -- when you were making a pitch to a customer one of you got deathly ill? Well, the others would have to pick up the slack. You the kids would have to solve the problem. Because, you see, in this case, in Danny's school it's the kids' problem to solve. Not his. And all of that is facilitated by the fact that he's going with authentic assessment opportunities.

CURRICULUM ASSESSMENT AND INSTRUCTION

>> In the area of Assessment, there are some fundamental principles. There are some big ideas, and they do apply across grade levels and they apply across subjects. But increasingly I find in my work, I'm talking not just about assessment. One cannot talk just about Assessment, because one has to begin with the question, what are we going to assess, which of course takes us directly to curriculum, because the conference has got to be about thinking. A conference has to be about questioning. A conference has to be about self-reflection and reflection without colleagues, about what are we doing, what's it all about? And those questions are more important today in 2015 than at any point in my educational career. Why is that? Because of course, the pace at which change is occurring is nothing short of scary. And that must have huge implications for us as a educators, because presumably, despite the pace of change outside this building and indeed in this building, we are educating students to go forth into that constantly changing world, which means we have to be comfortable asking the really difficult questions about Curriculum, about Assessment, and about Instruction. If we're not comfortable asking those questions, and again I don't mince words, we're in the wrong profession. We don't run factories where our goal is to produce identical widgets and quality control is about how identical are those widgets falling off the production line. That's not what we do. In a factory, quality control is about sameness. Please tell me on our job, our role is not about producing sameness. Our role must be about
helping young people achieve their potential. Now, it's made difficult by the fact that of course there are critical things we have to teach. Of course we're bound by curriculum as we need to be. It shouldn't be a free for all. What would you like to learn about today? No, no, no. But we have to establish balance.

DESIGN WITH THE END IN MIND

>> I said to the team working on these textbooks, let's begin each chapter with a really authentic, exciting, engaging task, that kids are going to say, "Yeah! I want to do this!" So we begin at the end. And say by the end of this unit, you're going to do this. Now, there is a lot of grunt work to get there, so we'll plan backwards. But that is beginning with the end in mind. And of course one of the things that designers, the developers, the writers, I impressed upon them as hard as I could, make sure that that culminating task involves generalizing, applying, transferring, and doesn't simply replicate procedures that they've learnt along the way. It doesn't mean that you're setting them up for failure. It doesn't mean you're playing a "Ha-ha-ha-ha, I'll get you guys! I'm going to throw a surprise at you!" No, no, no, no. It means, just like I did to Chris at Mary Lou's, I presented him with an authentic challenge to apply his estimation knowledge and skills, and he failed it. Because one of the things we need to do in the formative tasks is prepare students to be able to make those jumps. To make those connections. To see in an unfamiliar context the familiarity with respect to knowledge and skills that they've acquired. So we have to set the kids up to be able to make those generalizations. And I, as you can tell, I know-I've got a big bias here. But I am hugely biased about the power of, in terms of BIAC Triangulation Model, the Ministry talks about products, conversations and observations-I talk about write-do-say. Written evidence, performance evidence, and oral evidence. And you can tell that I'm a great fan of performance evidence. Because I've seen too many examples of kids not actually being able to problem-solve outside of the classroom situation. Outside of school, kids have the power to do amazing things that even five years ago they couldn't do. By virtue of the technology, in their own rooms, they can make movies. They can make music. They can produce pictures, paintings-they can do incredible things in their classrooms. Do we invite them to do incredible things in the classroom? Because they're certainly doing it in their bedrooms. So we've got to make sure that we ask the question authenticity around a mathematics curriculum. We've got to make sure, and this is where we get into assessment, and this is critical, folks, we know from the research base that is ever-increasing, the assessment for learning base is proving to us over and over and over again that the assessment that leads to the greatest gains in learning for all kids, regardless of age, subject, gender or anything else, is formative, not summative. And yet in my experience, and please don't take offence, but in my experience travelling across this country and beyond, in mathematics, more than in any other subject, summative assessment dominates. And formative assessment seems to be catching on more slowly in mathematics than in other subjects. English language arts is sort of leading the way there, but in mathematics, I've had teachers say to me as recently as last year, having worked with me or chatted with me for a bit, they said, "Damien, I realize the problem. I've throughout my career gone teach-test-teach-test-teach-test." And of course each of those tests, in its own right, is summative. As
opposed to pre-assess. Diagnostic assessment. Differentiate teaching. Then, assess formatively, in a differentiated way, providing feedback. And then adjusting further. And only when you've got some evidence, or the kids tell you "I've got it," do we move to testing summatively. That kind of dynamic model which, yes, is messier, but ultimately is going to lead to learning for all kids, has to move into the mainstream as opposed to teach-test-teach-test-teach-test.

ESSENTIAL QUESTIONS ABOUT ASSESSMENT

>> The Wiggins question is so powerful! 'What evidence would show beyond a reasonable doubt, legalistic terminology that students have achieved the desired understandings and skills?' That's a much more powerful question than you know, 'have the kid got 50%?' So, let's just examine through a framework that I'm playing around with right now. When we think about assessment, why do we assess and communicate that? And it's not one reason. Second question, with whom are we communicating through our assessment information? It's not one audience, it's multiple. What should we be communicating through our assessments? Scores? Other things? And number four, how do we communicate? How do we assess? Now those were not questions that I was invited to consider when I was in teacher's college. Or even the first third of my career. These are the kinds of questions that Grant Wiggins and Jay McTighe and others are saying we must raise. Because here's what happens; the issue of why we assess has got to be met with deep thought in terms of there's more than one purpose. There's the pre-assessment to help me decide on instructional direction, resources grouping. There's the on-going formative assessment where I expect kids to make mistakes and I don't penalize them for that. And there's a comfortable environment in which to do that. And then there's the summative where my goal is to certify at the end of a period of instruction whether the kids have got it! Whether they're proficient! Three quite distinct purposes. And so these days were talking about assessments for-and- as-learning; occurring as to promote learning and the "for" is the teacher doing it and the "as" as the student doing it. Which will always be more powerful because if kids have to reflect the goal of assessment as learning, is to have kids become independent monitors and adjusters of their own learning. Our assessment purpose actually, overall is to put SL's out of a job. Because as long as the kids are dependant on us to know whether they are proficient or not, they haven't learn the most important lesson in assessment; which is to know themselves, whether they are proficient. So that's why self appearance is so important.

FEEDBACK AND MINDSET

>> Feedback and mindset are critically connected. For the kids in your classroom who suffer from a-- hands up who's read some of Carol Dweck's work on Mindset?-- so I guess because, seen at the conference so it's getting a lot of attention. And so Dweck talks about fixed mindset, growth mindset; not only with respect to kids of course but with respect to teachers. But thinking about the kids, Dylan William whose work in assessments, I just think is absolutely superb. This book in particular, is a must read,
but he talks about how for the child who has a fixed negative mindset, the feedback you deliver to them is absolutely critical. The fixed mindset is characterized by the kid who says, "I'm dumb in math and there's nothing I can do about it cause it's not my fault", "it's my parents because of that gene pool", "it's my teachers", "it's my friends who make me feel stupid in class"; it's all, in other words, this is a fixed state, "me-bad-at-math". And so feedback can, if we're purposeful about this and we understand it, it can begin that child to realize instead of this being a fixed state, with the causes of it being external to me and unchangeable. They begin to realize actually, this is a temporary state and I can do something about it. But it does require me to do some things differently. And so for the child who is going to make that change, part of it may simply be that we, for the kid who say, "I don't understand any of this!" and Dylan says so for that child you may simply have to say, "Look, we don't ever do anything that's completely new in here, so let's look at the parts of this problem that is similar to what we did last week, that you did quite well on" and then here's the only thing that's new. So once we pointed out that kind of familiar and new, so have a think about that, try some things and I'll be back in a couple of minutes. So that kind of scaffolding, delivered as conversational feedback can help a child like that. Or if we say to a child, "Where do you think you went wrong?" The child has to go into inquiry mode; has to go into reflective mode. So questions, reflective questions rather than statements are going to be powerful. Now the purpose is to improve, an expectation that the feedback will be used and implemented to change what the child did, is why some people call it feed forward. But as an ex-English teacher I can't really say, bring myself to say, feed forward, but. One other example about this, I got invited about a month ago, this is a project, I'm now in year four with this school district working with secondary teachers. I got invited on a Friday afternoon to spend the afternoon with a high school math department to talk about feedback. I thought I'd died and gone to heaven. And I don't mean to be flippant about this; I mean it's the first time ever I have been invited by mathematics teachers to talk about feedback. When I got into their department office, they talked to me about their plan this year and they have had an exhaustive focus on feedback, because they had read John Hattie, Visible Learning. And they said as a department, we need to learn more about this. So I was Phase 3 in their plan. Phase 1 was to do some research, do some reading. Phase 2 was to implement some of their findings in terms of classroom practice. And here's what they done, they had decided that they would implement the following strategy in every single grade, in every single course, for every single lesson they would have the kids complete an exit, a slip out the door, an exit slip. And that exit slip question was going to be based on the learning goal for the day. And then they collected in all these exit slips and took them home. And this is where the feedback began. So when I said, so when you take them home, what do you do with them? And they kind of wondered if it was a trick question. I said like, yeah, what do you do? I thought do they organize it into groups in terms of differentiated expect? They were marking the exit slips in terms of mistakes and they were correcting the mistakes and returning them to the kids. Now they did show me some data about the success they were having because they were holding kids more accountable and their exit slip were directly related to the learning goal. But when I questioned this business of written marking in a traditional way, they were a bit puzzled by that. And at the risk of offending them but I sort of felt that we got a bit of a trust happening, I said, "any of you parents", hands went up. Okay this practice would be a
little bit like maybe your young child is trying to learn to ride a two wheel bicycle and of course, they keep doing it wrong and falling off or putting their feet down, so finally you just say look, "I'll do it!" and you take the bicycle away and you ride it. And we had a laugh about it but then I just didn't say anything and I let them think and of course they went, of course. So this is a, "what do we do?" And I said, well the critical thing is, even if you find the errors, maybe highlight errors, but don't write anything. And maybe color code; you can use highlighter pens in terms of the kinds of errors. And if kids have got some kind of rubric, there's a bunch of ways you ought to draw the kids attention to the errors but you don't want to correct them. I said the other thing is, use the data because they also said that, as they returned the slips they were trying to spend time one-on-one with each kid to talk about their marking. And I said well aren't the patterns in the errors made? And he said, of course. So you can simply group the exit slips and group the kids the next day to do mini lessons in terms of what are the common kinds of errors that were revealed on those exits slips and you just highlighted them; so then you're sort of addressing the problem, the procedural problem, the misconception whatever you can address with the group in a mini lesson.

FEEDBACK

>> How do I triangulate my data, it's the number one question and it's coming more from mathematics teachers than any other subject area. So I get that, I get that this is difficult. Again there is no one right way to do this. But we begin by thinking about that example in saying, simply having evidence of the multiple choice online test is not sufficient for me to certify the kids in mathematics. So then we go to this, so we've talked a little bit about performance task but this area is absolutely huge. I'm finding among folks working in prorated [assumed spelling] departments in the math area, that they are really getting more and more focussed on the conversations part of the triangulation, the "say" part. Because of course, hearing what children say is so important in terms of revealing misconceptions or indeed; conceptions. In terms of feedback which is what's going to occur when you are in conversation with a kid. Back to John Hattie, 'Visible Learning', you get a bigger bang for your buck for providing feedback to kids in almost anything else you can do in the classroom from Learning, feedback works, so we got to do it. And if we don't know how to do it, we have to learn about it. More on that in just a sec. If we want kids to pay attention to feedback, we do not mix feedback with scores. That's my number one rule. Because we've taught kids the reason you do work in school is to rack up maximum points with minimum effort. Okay. And so it's been all about the score. I was working with primary teachers last week in Upper Canada and we talked about; I said to the JK teachers in the room, "before children start to work in your room, do you ever hear, does this count?" Of course they laughed at me. So then I went to the K teachers, do you hear, "does this count"? I went to the Grade 3 teachers, I jumped, "do you hear does this count"? Oh you bet in Grade 3, oh yeah! I went to the Grade 2 teachers, what do you think they said? Oh yeah. I went to the Grade 1 teachers, oh yeah. It's beginning in Grade 1, the notion that we're training kids to do work to get extrinsic recognition and rewards. If it's a learnt behaviour, it can be unlearned. But we got a lot of hard work to do here. So this is where feedback is critical. And so the first thing is, to, that conversation I had
around sports, soccer, different purposes for assessment, I have that with children, I have it with adolescence, I have it with teachers, I have it with parents; because I want them to get it. And they do.

INDIVIDUAL ACCOUNTABILITY

>> When kids work with a partner, how do I know whose work is whose? How do I know if the data I'm gathering is reliable for Mary Lou? Maybe she was just along for the ride. Or if I were working with Mary Lou, I'd like to be along for the ride and she'd be doing all the Math. So how do we check that Damian understands this stuff? Well of course we have to make sure that when were designing performance tasks, we include all of these things. But if the task involves cooperation, there is individual accountability built in. Whether that's written material students submit. One of my favourite ways to check for this, I used to judge science fair, right. And so, I would never just look at the project and make a few notes on my evaluation scheme and smile and walk away; I would speak to each of the kids about their science project and I would ask pointed questions of understanding. Why did you do this? What would happen if I did this? And of course in many cases because mommy and daddy weren't there. The kids couldn't answer the question. So these are individual checks for understanding, using key questions, engaging the brief conversation with the student, which is critical in the case of Danny Carmoly's [assumed spelling] where kids are building sheds or poglers or whatever. He does have a responsibility as a teacher to check each individual student for understanding. Very important issue.

RELIABILITY AND VALIDITY

>> What we have to make sure of here, is that yes that we've been talking validity, we've been talking about how do we come up with authentic tasks that will actually give evidence that kids could take their learning and transfer it in a kind of real life situation; but maybe doing that, we sacrifice reliability. So now we are talking about reliability. What I don't want to happen, in order to raise reliability scores here is to say well, I won't use any of that group stuff and I'll put all these limits around and I'll time everybody and I'll use multiple choice because that really enables me to ramp up my reliability. The problem with a lot of those steps is, we reduce the validity of the task. And we disengage the kids. So we've got to, so we need to in our assessment plans, we need to balance the one with the other. It's not an either, or. We need to be aware of, and of course, the reliability issue is much more of an issue when we're talking summative data for grading reporting. When we're talking formative, don't worry a whole lot about reliability, in fact, your assessments won't be reliable formatively because you're having different kids do different things; and you're responding to them. So don't worry about that. The key thing actually, when we're working formatively, is to be responsive and saying different things to different kids. Which of course is one of the ways we undermine reliability; it's why teachers with a standardized test have to follow a script. They do the exact opposite of what we need to do when we're coaching kids. So we've got to realize these are assessment theories which we have to think about deeply.
because reliability is therefore; critical in some situations, summative; not critical, in fact, maybe counter productive in other assessment situations. The validity question, I-- Nancy and I own a cottage on Georgian Bay and I --when we bought it six seven years ago it came with a little power boat, 15-horse motor on the back but I wasn't allowed to drive it of course because I didn't have my BOATsmart license. Ha, that problem is easy to solve! I just went online, memorize the guide, did the test, failed it the first time, did it again, passed it and I'm now certified for life. So these reliability and validity are very important concepts but we have to talk deep with our colleagues about them as they apply to our mathematics assessment.

TEACH AND ASSESS FOR TRANSFER

>> We are in danger of our kids being like my son Chris. And Mary Lou knows Chris well and she's watched him grow up. And her first question was, "How is Chris?" And he's now 28. But I remember years and years ago when we were Mary Lou's grocery store in Burlington, and this was pre internet, this was pre debit card, and I was walking towards the cash of Mary Lou's with a basket with a few items for dinner, and I said to Chris, "Oh, I've only got 20 bucks in my pocket. I don't know if it'll be enough for these groceries. Do a quick estimate would you." So Chris looked in the basket and he looked at me. And he said, "I don't know how to do that." I said, "But Chris, you do estimation in class every day." He said, "I know, but it doesn't look like this." In a nutshell folks, maybe that's part of the problem. I used a performance assessment with Chris in Mary Lou's, and he failed it miserably. Because the performance assessment I presented him with did not look like the questions in the classroom. If we don't teach and assess for transfer, we're wasting our time. Kids simply being able to follow the procedure is the equivalent of the soccer player who learns to dribble the ball between those bright orange cones that are about this high. They're very friendly, they don't attack the other player, and they're evenly spaced. But the player who can dribble that ball between the cones may not be able to dribble to save her life in the game, because the game looks messy. So these are very important messages for us as we ask the big questions around curriculum assessment and instruction. Design our summative making sure that they do require kids to take their learning and apply it in a new or unfamiliar situation. Also make sure that we get a big bang for the buck, which means that your culminating performances at whatever grade level should be addressing multiple overall expectations. You want to get as much evidence as you can out of these things, especially if kids are spending time on them. And in order to decide what kind of a task, very often the expectations will provide hints as to whether the task can be write, do or say, but typically a rich performance task involves the kids writing stuff, doing stuff and saying stuff. That's the nature of a rich task. What am I talking about? Well, maybe something like this. A little chunk of stage one from Wiggs and McTighe. A little chunk of critical learning, overall expectations in grade ten academic mathematics. By the end of the course students will do those things. A performance task to provide evidence of those and other things. Design a rollercoaster. And this doesn't just mean pretend this, pretend that, pretend you're, no, no, no, no, we don't do any pretend in my classroom. We do it for real. We take on the roles. You are a project engineer, you are leading a team. Because if we do those kinds of things, that's going to be more engaging for the
kids. Have them dress up with a silly tie like I've got on today. Pretend they're engineers. And of course, so what we can do is actually we can do a lot of cross-curricular stuff here too. Because they also have to be able to speak really well when they present their findings. This can be really, really rich and engaging for kids. And there is no one perfect design for the rollercoaster. What we do know is it must scare the living daylights out of people who ride it, but it must be safe. There are success criteria associated with this. Some of which are mathematical, and some delve off into other subject areas. So there's an example of a big, whopping, culminating task that provides multiple evidence of yes critical mathematics but also other subject areas.

WHAT'S WRONG WITH MATHEMATICS

>> How many of you have read this document? Read it. I guarantee it will unsettle you, but I guarantee it will give you pause for thinking. And I, you know, he's looking back on his career, he saying what's wrong with mathematics curriculum; what's wrong with mathematics teaching; what's wrong with mathematics assessment? I agree with some of what he says, but not all, but mathematicians would probably bring much greater insight. What I love about it is it causes us to ask the big questions. For example, where of all the problems gone? And he's talking about the fact that the problems actually have all been solved, and the kids simply replicate the problem-solving strategies that are already out there for the most part. He says we need, as lovers of mathematics, people who appreciate that mathematics is joy and play, we need to throw out questions to kids before we teach them. And that will engage them like the preschooler, for example, he says throw out the question to the children in your classroom, how much of the rectangle do you think the triangle takes up? And have them brainstorm individually and then with a peer, then have some fun talking about it, and you'll have a whole bunch of different possibilities. Maybe two-thirds? So, and then he says 'okay, so you've thrown out some possible hypotheses around this - test them. Figure it out'. And some kids in the class very young kids will realize well if we just do that, then it becomes much easier to answer the question how much of the triangle-- how much of the rectangle is taken up by the triangle. Because of course now we can see, all right? So the moment-- and kids in your class I guarantee will do that. There'll be some who will drop that line down. And then they'll get really excited because some kids when they first answer the question how much area of the area of the rectangle do you think takes up, some of them will have said half of it. What do we do in school? Teach them the formula and then they apply it, and apply, and apply it.

WHITE SPACES IN THE CURRICULUM

>> Andy Hargreaves, who's an educator who I admire tremendously. If you don't know Andy's work then Google Andy, and in particular, his latest little piece, his latest Ted Talk, well, he's probably done more since, but the last one I saw. Andy Hargreaves and the topic is uplift. In which he's using an aeronautical metaphor in this Ted Talk. The notion being that in order for a plane to take off, it actually has to fly into the wind, against resistance. And it's a powerful, powerful metaphor. My favourite comment by
Andy in this Ted Talk is, he implores us as educators to find the white spaces in our curriculum, he implores us to find the white spaces in the curriculum. What does he mean by that? Well, of course, he means that while we must follow the curriculum, we're bound by it, on the other hand, the ministry here in Ontario states categorically that the focus for evaluation, grading, and reporting are the overall expectations not the specifics. That's very freeing. It needs to be very freeing. Because our role as educators is not to cover the curriculum in the same way for all kids. If we see that as our goal, we're going to probably meet with an early death, certainly we're going to get stressed out, because simply put, there's too much to cover. And of course, as Grant Wiggins has been saying for 20 years, us covering doesn't mean they've learnt. Which is my favourite statement from Wiggins from 25 years ago or thereabouts is our role as educators is to help children uncover learning.