

Mark Royce ([00:00](#)):

Hi, Phil. How's it going?

Phil Culcasi ([00:02](#)):

Great, Mark. How are you? It's, it's beautiful here in Chicago today, finally, <laugh>.

Mark Royce ([00:07](#)):

That's great. I'm glad to hear it. We're having a bit of a warm spell here on the West Coast Central Valley. It's like 97 or something today, so,

Phil Culcasi ([00:18](#)):

Oh, not that. It's 78 and sunny here in Chicago, so.

Mark Royce ([00:21](#)):

Oh, gosh. Lucky.

Phil Culcasi ([00:21](#)):

It's perfect, finally.

Mark Royce ([00:23](#)):

Very nice. It's been cold back there, huh? Yeah. Well, I'm very happy that you're joining me today and I'm anxious to talk to you about your modeling experiences. So tell me first, as we get going here, how did you originally get introduced to modeling and modeling instruction in the classroom? How did that first come to you?

Phil Culcasi ([00:49](#)):

Well, that's a great question, and the simple answer is it's by a guy that your listeners are probably familiar with. So, as luck would have it, in 2002, fall of 2002, I started at Wheaton Warrenville South High School in Wheaton, Illinois, which is about, oh, I don't know, about 25 miles due West of downtown Chicago. And, there was a guy teaching there by the name of Jim Stankovich. And, as luck would have it, Jim was my high school physics teacher at Marist High School on the south side of Chicago. And since I had seen him last, he had subsequently moved to Wheaton Warrenville South to teach there. And so, you know, about 10 years after I graduated high school, we ended up working together, which was a wonderful treat and amazing to see someone like that again.

Phil Culcasi ([01:47](#)):

And so I went into his physics classroom that first fall, and he was using modeling instruction, which he had not used when I had him in high school. And for that, he apologized profusely. And so I would go into his classroom that fall, and I was just dumbfounded, amazed, shocked by what I saw his students doing with whiteboards and with presentations and with discussions and with the questioning he was using. It was so radically different than the physics class that he taught to me and my brother while we were in high school. And in the 10 years that I hadn't seen him, he had changed schools, number one, and number two, came across this type of instruction called modeling instruction. And so, he had taken the modeling course over the summer, in I think '97 or '98, something like that. And he had the support of a fantastic principal at Wheaton Warrenville South. And he encouraged Jim to try new things in his

classroom. And that was sort of the beginning of the modeling movement at Wheaton Morville South a few years before I got there.

Mark Royce ([03:06](#)):

Wow. That's really cool. Yeah, Jim is a well-known modeler. Yeah, I think you're lucky to have been able to work with him.

Phil Culcasi ([03:16](#)):

Incredibly lucky, for sure.

Mark Royce ([03:17](#)):

Yeah. So tell me and our listeners, what surprises as a teacher you've discovered since you started using modeling. Can you kind of share with us kind of the big things that "ahas" or... You know, the surprises that have come to you?

Phil Culcasi ([03:38](#)):

Well, I think the number one thing, the biggest thing, even though a teenager will never admit it to you publicly or privately <laugh> is how much the kids like it and how much the kids enjoy that type of instruction. And don't get me wrong, there's days it's like pulling teeth at the dentist's office. But not a lot of their classes in high school are run this way. And if you think about, you know, if you put yourself in a 15 year old's shoes, their day is pretty miserable. You know, they have to get up early and they have seven classes that have seven different systems, and they have to ask permission to leave. And they, you know, they get a terrible lunch every day, if they even have time to eat it, and then they have stuff after school and, you know, it's a 12- to 14-hour day for some of these kids.

Phil Culcasi ([04:27](#)):

And sitting there in class and writing notes and listening to a lecture is obviously a lot easier. But what surprised me the most is how much we were able to get kids to buy into this type of instruction. And to the point where when I was first messing around with it in chemistry, when I would go back to some of my traditional material, kids would ask for the modeling stuff, Hey, uh, you know, Mr. C, when are we gonna do the whiteboards again? And that's what really convinced me in about 2011, 2012, that I needed to really commit to modeling for the entire year, rather than just a unit or two here and there. So the biggest surprise to me is, number one, how much the kids have bought in. And then number two, from a sort of an adult standpoint or from a teaching standpoint, is the amazing things that kids are capable of year-in and year-out, when you allow them to expose their thinking, when you allow them to make their thinking visible as some of the famous papers that you've quoted on here have talked about.

Phil Culcasi ([05:39](#)):

And, and when you hear what's going on, thinking-wise for them, it never ceases to amaze us year-in and year-out, because there's always new angles of looking at a problem that we would never get if we just told the kids how to do the problems. So I think those two things are the biggest surprises.

Mark Royce ([05:56](#)):

Yeah. Wow. That's very insightful. Thanks for sharing that. I appreciate it. I know that one of the things that most modelers and you are really interested in is developing your ability to ask good questions of

your students. So, what tips would you give, because I know you're good at this, what tips would you give for developing the techniques for that kind of Socratic dialogue in your classroom?

Phil Culcasi ([06:27](#)):

Well, I think the first thing is go to a workshop in the summer, and put yourself in a room with like-minded people and put yourself in a room with people who've done modeling or are experimenting with modeling. And we've done that a lot at Wheaton Warrentville South over the last 10 or 12 years. And one year during a workshop, I actually had a teacher write down every question that I asked of the teachers who were pretending to be students in the workshop. And it ran like three or four pages of questions. And so we've shared that year-in and year-out in the summer. And, and that sort of serves as a baseline to start with asking questions. I had a young teacher tell me once, cuz I'm a department chair now, and so I work with a lot of younger teachers and the teacher had student taught in a more traditional setting, lecture type setting.

Phil Culcasi ([07:30](#)):

And now she comes to our school where we work with modeling. And she told me something that's really simple to remember. She said, you know, when I was student teaching, I used to write down what I had to tell the kids every day. And now I write down what I'm gonna ask the kids every day. And I thought that was an interesting sort of mind switch, the way to prepare for class. So we think about, I go through worksheets and labs and I think about what I'm gonna ask the kids, which is really insightful on her point. And the other thing I would recommend is that it's an art and it takes time and it takes patience and it takes practice and it could take three years to, to really feel comfortable asking questions.

Phil Culcasi ([08:17](#)):

I mean, the best thing I ever did as a younger teacher and then as a department chair was go and sit in Jim's classroom and listen to him ask questions. Or I would go listen to Frank Novakowski ask questions, when I had to do observations as a department chair, but I was really just cheating and stealing all their questions. And you know, that's my advice is you write down what you want to ask the kids, you go watch other teachers ask questions. And then the third thing, which nobody ever wants to do is to videotape yourself asking questions of kids. And I think those are the ways to get better as a teacher and to get better at modeling is to watch other teachers, to record yourself and watch yourself, and then think about what you're gonna ask the kids, because it does take time and practice.

Mark Royce ([09:07](#)):

That's really good advice. It's not cheating when you copy others, if they're good at it and you're gleaned from what they're doing. Absolutely.

Phil Culcasi ([09:19](#)):

Well, I was supposed to be in there doing their formal observation as their department chair, but I was really just looking for tips about modeling.

Mark Royce ([09:28](#)):

That's awesome. I read that you've eliminated points-based grading in your

Phil Culcasi ([09:37](#)):

I've tried and I'm still trying. That's our joke. The chemistry is pointless. And, you know, we wanna put that on t-shirts 'cuz people won't understand except for the kids in the room with us. This has been a long-term project and grading is really the third rail of teaching high school. It's something to be avoided because it's a Pandora's box. But I've really felt all along that if we're going to change the way that we're teaching, we need to change the way that we're grading, too. And that's really, really hard because it's sort of an entrenched system of do this and we'll give you points or do this and you get a nine out of 10, or this is your score on the midterm or the unit test and you got an 87 out of 100 and then we're gonna average up all your scores and that's gonna be your grade.

Phil Culcasi ([10:45](#)):

And if you get a 89.5, maybe your grade will be rounded and maybe it won't and depends on the policy and things like that. And I've struggled with that for a long time. In conversations with kids, we do a lot of interviewing of kids, which has really helped at our summer workshops. And you know, if a kid gets a 65 on their first test of the semester, they're very honest and they'll say, I have no chance of getting an A, so why should I do this homework? And I can very easily get a B. Cuz I know you're just gonna average the 65 in my grade. And so what we've tried to come up with is a way to give kids hope and give kids a reason to keep going and give kids a reason to learn that's sort of separate from just trying to accumulate points. And you know, sometimes we as teachers, we have these discussions of, why won't kids do this if it's not worth points? And, you know, it's a whole, we could do an entire hour-long podcast on grading, which I don't wanna do cuz no one would listen to. But, eventually I decided, you know what, I have my group of little sophomores and we're gonna try and make the homework pointless, make the quizzes pointless, make the tests pointless. And we're gonna keep track of the the chemistry skills that I want them to learn. And we're gonna have them show improvement and we're gonna offer them chances to try again on some of these objectives. With the ultimate idea that by the end of the semester you need to learn this stuff.

Phil Culcasi ([12:33](#)):

And the amount of stuff that you have proven that you're capable of doing will lead us to give you an A or a B or a C for the semester. And, at our school, and I think a lot of schools, on the kids' transcript, they don't get an 89.5 or a 93 or a 74, they get a letter A, B, C, D. And so we just started giving letters for everything and tried to cut out the points. So it's been something we've been working on for about seven, eight years, that I tried by myself, all those years ago. An, it's kind of caught on in our department and a lot of the teachers in biology and physics are trying out their own variations of this. I think it goes back to what I saw in Jim's classroom, 20, 21 years ago at this point is kids are capable of more than we think they are.

Phil Culcasi ([13:27](#)):

And kids, if you create the right environment, kids will do homework even though it's not worth points 'cuz it's now extra practice rather than do this to accumulate your 10 points or whatever. So, we have been able to get kids to do homework or extra practice without grading it or without collecting it for points. And so we were making a lot of progress with that. And then of course the pandemic hit and everything got flip turned upside down and so we're trying to build momentum again there. But I do think there is a way to grade without points and we've done it for the last seven or eight years. It's not perfect and it's not always easy to explain as you can tell, but I think there is a way forward.

Mark Royce ([14:17](#)):

That's fascinating. I really think your thoughts on grading are interesting. You said you could talk for an hour on it and I don't know that it would be that boring. So my question to you regarding this is how do you, what's the process you guys use when you're determining the grade then for the kids? If you're not using a point system, what's the process?

Phil Culcasi ([14:43](#)):

That's a great question. So I'll give you an example and, of course the devil is in the details and there's a lot more under the hood on this as far as collecting data and spreadsheets and Google forms and programs that we've used for grading and keeping track of all the data cuz it does generate more data. But the bottom line is like, let's say this semester in chemistry, there's 25 objective skills, learning targets, whatever the heck you wanna call them. There's 25 things in the second semester of modeling chemistry that I want kids to be able to do. And if they've demonstrated over and over again that they could do, say 22 of those 25, they get an A for the semester and then we go down from there. So, it's a little more complicated than that, but let's say that you've demonstrated you could do 20 of them really super well high, like a stoplight green and then, maybe 18 and then seven of them are yellow, so that's a B or maybe you have, you know, 15 are green and 10 are yellow, that's maybe a B-minus or something like that.

Phil Culcasi ([15:56](#)):

But the kids know all that ahead of time and they know what they need to prove to us on the final before they go home for the summer. So that's kind of what we do. There still are lines that you have to draw, for an A or a B or a C or whatever. But generally speaking, if a high majority of the skills we want you to know in that chemistry modeling curriculum, you've mastered them and shown them over and over again to us, then that's an A.

Mark Royce ([16:27](#)):

So it sounds to me like it requires a little more thinking from the teacher's perspective as you're evaluating the student's work rather than just adding up points on a test, you're really looking at what they did and how deep their understanding is on each problem.

Phil Culcasi ([16:49](#)):

Yeah. And you know, it is more work and more time. And I'm the first to admit, I only teach two classes a day now as department chair and other teachers have-- so I have 50 kids and almost everybody else in the department has 125 kids. And so there's an economy of scale there for sure. We have eliminated a lot of multiple choice exams, which of course are less time consuming to grade, but they don't really give you as much of a picture of what kids are thinking. We do sometimes include multiple choice questions, but then there would be a space underneath. You pick choice C. Explain to us why you pick choice C. I think what's really helped me is before I started thinking about grading this way I certainly wasn't the only one to do this.

Phil Culcasi ([17:46](#)):

I made sure I was a year behind Ryan Burwick and, and Erica Posthuma in Indiana, and I stole a lot of their ideas on this as well. And they helped me come up with some new ideas for this. But I think the biggest thing for me is I had 15 years of experience teaching chemistry. I know what A work looks like in chemistry. I know what B work looks like, I know what C works like when I was grading with points. And so it wasn't that tough for me to transition to grading this free response problem and say, Hey, this is A

work right here, or this needs a little improvement right here, or this is, you just have no idea what you're doing here and we need to talk about this and you need to show me again that you can do it, or show some improvement. And so that really helped me come up with this system that's a little bit more convoluted as I mentioned before, of being able to say, this is A work right here. We don't need points to prove to me that this is a nine out of 10 or a 93 out of a hundred or, or things like that. You, you really know what's going on here.

Mark Royce ([18:54](#)):

Let's talk about your approach to whiteboarding sessions. Let's talk about how what you've learned in helping whiteboarding become effective with your kids. I know that's something you've been practicing for a while.

Phil Culcasi ([19:17](#)):

The hardest part about that is-- it's not the buy-in of the kids. You can get the kids to buy in to what you're doing, from the beginning of the year. You create this space that kids look forward to coming to as much as a kid can look forward to coming to science class. And you create this room where kids feel safe and they feel comfortable and they feel okay sharing. And I think part of that is eliminating the points because a kid's not gonna lose anything or gain anything by throwing out an idea or by speaking. And so when you remove that construct, you can throw an idea that says, Hey, you're supposed to divide that by two and maybe that's not the right way of approaching that problem, but it's not like they got minus three for the discussion or something like that.

Phil Culcasi ([20:11](#)):

So they're willing to share. The most difficult part, especially in the new world that we're living in, is getting kids to try the problems before we have the discussion. Because if only 10 of your 25 kids or 30 kids have tried the problem, the discussion is now between me and 10 kids and the other 20 kids have no buy-in. And especially within the last three years, trying to get kids to come prepared with, I've tried this problem, I struggled with this problem, here's where I ran into trouble. Okay, let's stop and talk about it. And we were getting there. We really were getting there. And now, within the last three years, there's such a deep anxiety with kids about everything. They want the problems to be right. Is it Mr. C is this right? Is this right? Did I do this right? Did I do this right? And they don't want to come start their whiteboard until they know their problem is a hundred percent correct. And if, if the problem is a hundred percent correct, the whiteboard discussion is super boring.

Mark Royce ([21:26](#)):

And pointless.

Phil Culcasi ([21:27](#)):

Exactly. And pointless. In two different meanings of the word pointless. Because the learning comes from the struggle and if the struggle is already done because you're so worried about presenting a correct answer-- cuz the whiteboards aren't for me. And that's what I've told kids since I started the whiteboards are for them, to learn and to think and to talk it through. And so, that's what's been really hard lately, because if we spend class time going through these problems so that we can subsequently whiteboard, well now we've used two days of class and while the kids are doing the problems in groups, they're asking, Hey, Mr. C is this right? Is this right? Is this right? Is this right? And so it's a continual

struggle. And you know, it's a good thing. I tell young teachers it's a good thing we have 180 days of school cause we get 180 shots at getting it right. Cuz some days don't go so great.

Mark Royce ([22:35](#)):

Yeah. Wow. Shift gears just a little bit. In your bio, I saw that last year you were awarded the Golden Apple Award. This is not something I was familiar with, an award that I've heard of before. Can you tell me the background on it and, tell me a little bit about the golden apple.

Phil Culcasi ([22:56](#)):

So a guy that I know very well, he won the golden apple in, I believe it was the late nineties. And so the Golden Apple Foundation was started by a husband and wife in the city of Chicago to promote excellent teaching in the city, number one and number two, encourage young people to become teachers. And number three, encourage people to become teachers and then subsequently work as teachers in schools of need throughout the Chicagoland area. So it's a foundation that probably goes back 40 years at this point. And so every year teachers are nominated and then folks from the Golden Apple Foundation, they go out and they observe the teachers who are the finalists and then their committee picks 10 teachers, originally from Chicago. And then it expanded to Chicago and the suburbs, and now it's Chicago, the suburbs, and the entire state of Illinois.

Phil Culcasi ([24:10](#)):

And also moving to the state of New Mexico now too, where a lot of the Golden Apple folks are from. And so, Jim won the golden apple and what you get for winning the golden apple is you get a surprise visit to your school and you get a little financial reward. And then you get a free semester or quarter, cuz they're on the quarter system, sabbatical at Northwestern University. Which is pretty cool. Yeah. So Jim, who I learned about modeling from, he won the Golden Apple. And then I'm pretty sure I've never confirmed this, but I'm pretty sure, last year he was the one who nominated me. And so in March of last year, the Golden Apple folks came to our school and they interviewed students and parents and teachers and administrators.

Phil Culcasi ([25:06](#)):

And I was lucky enough to be selected as one of the 10. And I'm Northwestern right now for their 10 week quarter. I actually have class tonight, and as soon as we're done, I'm gonna be doing some homework for that class. It's a surreal experience to be an undergrad again, 30 years removed from that. But I will tell you and I will add, not as self-promotion, but promotion of the Golden Apple program. So now that I'm in this part of this program, what I was asked to do last summer, and again this summer is, I'm gonna be part of the Golden Apple Scholars Program. And what that is, is, is the program that the Golden Apple has used significant funding for, is to again, draw students into the profession.

Phil Culcasi ([25:54](#)):

So this summer I will be at North Central College for three weeks working with some rising college sophomores who are attending college in the state of Illinois. And they all would like to be teachers. And they live at North Central for three weeks and they go observe summer school classes and they take workshops, and then in the afternoon after their classes, they come back to the college. And then I'm with a group of 10 of those kids and we talk about what they saw. And so I'm a reflective seminar leader is what they call it. And last summer, it was an amazing experience. It's one of the best things I've ever done in education working with these 10 kids who are really, really excited about being teachers. And it

was not just science and not just modelers. But, you know, I had a kindergarten teacher in my group. I had a social studies teacher in my group. I had a middle school teacher in my group. And you know, we used whiteboards and, and we had discussions and it was really great. It was wonderful to meet them and it really made me excited about starting the next school year knowing that kids like that were out there studying at colleges in the state of Illinois and and hoping to become us in 10 years.

Mark Royce ([27:10](#)):

Wow. That is really neat and exciting. Congratulations for

Phil Culcasi ([27:17](#)):

Thank you. I appreciate it.

Mark Royce ([27:18](#)):

for that award. That's wonderful.

Phil Culcasi ([27:20](#)):

And I'm gonna find out for sure if Jim did that or not. I'm pretty sure he did.

Mark Royce ([27:25](#)):

I interviewed Jim. Give me just a second here. I'm gonna look up something real quick

Phil Culcasi ([27:31](#)):

While you're looking that up, I will tell you one thing, he'll probably be mad that I told you this, but the thing about Jim Stankovich, and and I say this to teachers at workshops who I'm teaching about modeling. So, the magic about Jim and his classroom was he had this way about him that he never, ever, ever made a kid feel bad about asking a question. He's so kind and so patient And his way about him. And it was the same thing for teachers who asked him a question, adults as well. But a kid never felt bad about asking a question in Jim's room. And that kindness allowed him to have some amazing discussions and get amazing things out of his students. And that's what I really try to impress on younger teachers is that way, that kindness, really allows you to, to build a classroom where kids are comfortable talking and that that was his magic. And that that's the number one thing that I learned from Jim.

Mark Royce ([28:37](#)):

Yeah, that's awesome. That was about a year ago or so that I interviewed him, but it was episode 36, if any of our listeners wants to go check that out.

Phil Culcasi ([28:48](#)):

I'll be listening to that later as well.

Mark Royce ([28:50](#)):

Cool. So, when my wife kind of got started, 25 or I don't know how many years ago with modeling

Phil Culcasi ([29:00](#)):

Yep. Her name's on the chemistry binder that I use every day.



Mark Royce ([29:05](#)):

The focus of modeling early on was primarily toward physics education. And over time it's evolved and there's been a lot of work. My wife's been involved with Larry Dukerich and others about bringing it into the chemistry world, that's evolved into pretty a substantial thing now. And then also biology is coming in and all these other areas where modeling is being used, techniques are being used in the classroom. And one of the more recent ones is in the math world. I know that you're moving toward a math position next year or something. Is that correct?

Phil Culcasi ([29:55](#)):

That's correct. Full disclosure, I was gonna bring that up. I'm gonna be teaching pre-calculus next year instead of chemistry. Going back to my first workshop in the summer of 2003 when I took Jim's workshop for the first time. You know, it was incredible. And I learned so much and I learned more about being a teacher from Jim's workshop than I had in all my grad school courses. But I was young and I was like, this'll never work in chemistry. This is amazing in physics and this'll never work in chemistry. And I wandered around in the wilderness for about a decade trying to fit it into chemistry. And finally, the binder that Larry and Brenda wrote, the modeling curriculum, finally in 2010, 2011, somewhere in there, Jim had convinced me, he's like, you need to throw out all your old stuff and you need to try this.

Phil Culcasi ([30:54](#)):

And so I did. And you know, I had met Gary Abud who I know that you might have talked to at some point down the road. And so I tried it and it was amazing. And I was kicking myself for not trying it sooner. That was my own fault. And then, through Frank at our school, we brought modeling into biology. Biology teachers thought it would never work, never work. And one of the things that Jim and Raj Bonner and, and, and Frank and I had always talked about, and including our math chair, Cindy Budkowski is amazing. We wondered if this type of instruction would work in math. An opportunity came up for me in the town that I live in, the high school is a stone's throw from here.

Phil Culcasi ([31:44](#)):

I could walk to it in 10 minutes. An opportunity came up for me to work at that school and teach pre-calculus next year. And this book that I don't know if any of your, I'm sure some of your listeners are familiar with, I don't know if you're familiar with it, it's called Building Thinking Classrooms in Mathematics, that just came out that lots and lots of teachers know about. And there's tons of modeling curriculum parallels in this book. That's gonna be my summer book project, to go through that book with a fine tooth comb. And Jim and I wondered if you could teach math with whiteboards and I'd really love to try, love to get a discussion-based, pre-calc class going and I only have one section of math next year cuz I'm gonna be the department chair as well, and I'm gonna treat it as a little laboratory. Jim always encourages, always, always, always. He said, if you're teaching science, you should be a science in your teaching. And, and that means experiment and try new things. And if it doesn't work, you collect your data and you go back to the drawing board, just like the scientific method. And so, we're gonna try and, and see, see if we could have a discussion based precalculus class next fall.

Mark Royce ([33:07](#)):

That's really cool. Well, you'll need to, as you develop insights, you'll need to share those with others through the AMTA site.

Phil Culcasi ([33:17](#)):

Absolutely.

Mark Royce ([33:18](#)):

You know, that would be, I think, really valuable. Well, Jim, it's been a real joy talking with you and your insights are outstanding. I think our listeners are gonna gain a lot from listening to what you've shared with us today. And I just wanted to say thank you for taking the time and for being willing to share so much of your experience. It's really great, really great.

Phil Culcasi ([33:48](#)):

Well, it's been my pleasure. And I appreciate you getting the word out about modeling. I mean, it's changed my life. Meeting Jim and learning about modeling and then, workshops in the summer that I took, and then workshops that we put on in Wheaton for the many, many years. I'll be at a high school in Payless, Illinois this summer, end of June. We're doing a little four-day workshop in physics and chemistry at Stag High School, and plenty of good spots still available if you're interested in that. So we're gonna talk,

Mark Royce ([34:26](#)):

How would somebody connect with that if they wanted to attend?

Phil Culcasi ([34:31](#)):

I believe the workshops are listed on the AMTA website, modeling.instruction.org. You could always Google my last name and reach out and email me. You can contact Matt Long at Stag High School in Payless. We're looking forward to talking chemistry and physics and maybe a little grading and maybe a little math this summer. It's always a highlight and it really truly does make you look forward to starting the next school year.

Mark Royce ([35:04](#)):

Yeah. That's awesome. Well, Phil, thank you again. Thank you so much.

Phil Culcasi ([35:09](#)):

Thanks Mark. I enjoyed it so much. I hope the 95 degree day turns out pretty nice out there in California.

Mark Royce ([35:18](#)):

We have air conditioning, so <laugh>.

Phil Culcasi ([35:20](#)):

All right, great. I'll see you. All right. Take care.