Mark Royce (00:00):

Hi, David.

David Bates (00:01):

Good afternoon, Mark.

Mark Royce (00:04):

How are you?

David Bates (00:05):

I am terrific. And what a thrill. It is to have an opportunity to sit and chat with you a bit.

Mark Royce (00:11):

Yeah, I'm excited too. I've been told by some other folks that you have a lot to offer in the modeling world, and I'm looking forward to just picking your brain a bit here about what you've learned through your years. So, first of all, tell us about your journey into teaching, how you decided to become a teacher, kind of your path, and what has led you to where you are.

David Bates (00:40):

I went into teaching quite frankly, because I really couldn't decide what I wanted to be when I grew up. And I still haven't decided. I've been doing this thing for 34 years now or something and looking for something that's more challenging, more interesting or more engaging than teaching, I really haven't found anything. The opportunity to work with kids and shape how they think and try to use kids to build a future is just sort of nothing more interesting or engaging.

Mark Royce (01:14):

So I read that you've been teaching now for 34 years, is that correct?

David Bates (01:20):

Yeah. And across a number of different areas. I actually, my degree is in special education. I started teaching in special education with kids that were at the time older than I was, as I was teaching an adult group cognitively impaired and that led -- one challenge led to another. And then finally I ended up in middle school.

Mark Royce (01:45):

And how long have you been in middle school teaching?

David Bates (01:48):

Let's see. I think we're... 17 years now, maybe.

Mark Royce (01:53):

So you found your place then it sounds like.

David Bates (01:55):

I think so. I've enjoyed middle school teaching an awful lot. The kids are really engaging. They're... A lot of people say, well, I don't know how you teach middle school, but, the truth of the matter is for me anyway, that this is really the most interesting group of kids that you can possibly work with. You know, they're starting to discover that they're adults, they're starting and they're just driven to be independent, which is a wonderful canvas to work with in that, you know, you can get them interested in things. And yet, they require a certain amount of care and Finese in dealing with them in order for them to be comfortable, discovering about themselves.

Mark Royce (02:46):

What's it like in the classroom for you with middle school students? What's it like teaching them?

David Bates (02:51):

Wow. What an interesting question. That's a great direction to go in. For a day to day standpoint, the kids walk into your room, and they're all in, in a variety of different places. I have one lovely student that comes in every day and he's always the first person in the classroom. And he walks in with an air is excited to be there. And then at the exactly, if you say, well, how are you today? And he says, I just want go home and <laugh>, but at the same time, you know--and this is just so middle school --at the same time, as we get into the lesson, you can see him engaging. He's a good example of a kid that's been a real struggle for because he didn't really think of himself as having a lot of ability. But when you try and help kids begin to understand is that their greatest abilities lie in their own curiosity and that they all have the ability to think and take guesses and wonder aloud at how something works or why it happens. Then you know, they begin to realize that they really do have something to offer the world.

Mark Royce (04:08):

Yeah. It's an age where they're really burgeoning into their own. They're just finding themselves and that's cool. So how do your students -- first time modeling students, middle schoolers-- how do they react when you introduce 'em to this style of teaching, to modeling instruction?

David Bates (04:31):

You know, you get an awful lot of, you get a lot of pushback, from 'em and it takes a number of different forms. We get the, you know, "Hey, Mr. Um, you know, what's, the answer?" Is probably something that best exemplifies the difference between modeling and more classical approaches, I suppose you could describe them as. The kids are used to being able to ask questions and then have somebody answer their questions with a certain degree of authority. And, after they begin to realize that you're not answering their questions and you get "Mr, do you, do you know anything?" <Laugh> and answer is, well, I don't, I don't really know. And, you know, as middle schoolers, they're, they're both trying to push push boundaries. They're trying to find out where their place is.

David Bates (05:29):

And, you know, it's a place of, I think in some respects, it's a place of wonder, but also at the same time, they're scared and worried. They're beginning to think of themselves as adults. They're beginning to think about their futures. They're thinking a little bit about high school. I happen to teach eighth grade. So they know that in just in a few months, they'll be heading off to the big high school arena. And some of them have older brothers and sisters and know a little bit what it's like, or have the ideas that are close, and then other students, this was their first time, you know, moving on and they're terrified, in some ways. So they're willing to listen to you, they're willing to try and do what you ask 'em to, but at

the same time, they just want be able to answer the questions, right. And, so, for them, I think there's quite a sea of emotions, I think probably going on within each one of them too. They want to be successful. They want to appear to be successful. They want to appear to be competent, and at the same time, what you try to do is confound them constantly, as a way to keep 'em engaged, keep 'em thinking, keep 'em asking questions.

Mark Royce (06:49):

Yeah, that's good. Do you have any tricks or methods that you've discovered in the middle school classroom that help you with your classroom management and especially keep them in the mindset of the modeling methodologies? Have you learned some things that you can share with our listeners?

David Bates (07:14):

You know, the thing that I had to learn right away, and I would love to tell you that I've figured it out, but I think for me, I've come to understand that it's really gonna be an ongoing journey, but that's, um, early on for a lot. So many of these students, as you begin to use a modeling approach with them, it really is turning the tables on what they're used to. Their elementary school years and many of their other educational experiences are sort of transactional where the teacher says, you do this and this and this, and then I'll do this and this and this. And then, and then I'll reward you with, the mark of that you've earned. But a real science classroom is really more of a learning community and students have to begin to look more to each other, to get clarification, to understand what's going on, to clarify their own thinking than to the teacher.

David Bates (08:20):

And so one of the things that I figured out early on is that I really had to take the time, to explain to them...and it's not just, you know, you can't do it at the beginning of the year and be done with it. You have to do it almost every day is to say, okay, this is this the way this works in this room. And, I know it's different than what you're used to, but let's work together on this. And I used to say, trust me, but, you know, middle school students don't trust any adult. They especially don't trust old adults with no hair and gray beards and stuff. So, you know, you just sort of have to continue to be open and willing and, and, you know, keep saying, let's work together on this, let's work together on this.

David Bates (09:09):

And you know, you still keep getting, um, "well, how many of points is this or is this gonna be graded?: And, there's a, you know, I think a common, maybe one of the things that seems to define education in general is this idea that everything is worth points or has to be graded. And that we, can't just sometimes try and figure things out for the fun of it, just to find out, what really happens if, you know, if I, if I push this this way, what will actually happen? And then, what does that teach us about how objects behave and move? So anyways, so going back to your question, sorry, I'm probably, bird feeding around there.

Mark Royce (09:53):

No, it's interesting.

David Bates (09:54):

The thing that I've learned over time is that you have to continuously negotiate with the kids for the classroom environment, and you have to promise 'em that, don't worry about... When you approach

this assignment, just do your best, put your own thinking down. I really, really wanna hear your thinking on this. They say, "well, that's fine, Mr. Just tell what's the right answer here. And I'll put that down for you." And that's a transactional approach. Here's the information, I'm gonna give it to you, then you give it back to me and then we'll move on and getting the kids to believe that their own thinking has value. And in order to do that, it really takes a lot of, every day, "I really want to hear what you're thinking." And sometimes you have to literally put grading aside, and say, you know, okay, let's tell you what, let's work through this. Um, and let's see where we can get with it. And then, you know, we'll come to some agreement later on.

David Bates (10:57):

One of the things that, I do do at the beginning of the year is I include the kids in the process of deciding how their work is gonna be evaluated. It's one of the things that, of course, all middle school students wanna know right up front. Right. You know, what's your grading scale? How many points are things worth? That's, again, that's back to that sort of transactional classroom environment, you know, what do I have to do to get an A, can you just put it down on paper here for me? And I can do it. But from the beginning I sit down with the kids and I say, okay, well, we're gonna look at this a little bit differently. All you have to do to get an A is demonstrate, your competence. You have to demonstrate, you understand the concept.

David Bates (11:40):

And so what does that really look like? And so we take a week and try and parse out. What does it look like when you really understand something? How are you able to share that? How do you convey that? Can you draw a picture of it? Can you write about it? Can you describe it? And, and what does it sound like? And we talk about, you know, when you really understand something, you're able to use the vocabulary that's associated with it comfortably. And you're able to describe it in different ways and you're able to draw pictures of it and describe it. And then we turn that into a evaluation rubric that then they use on everything that they do. A lot of times I'll have them evaluate themselves before they turn it into me. And I find that... Kids are amazingly honest, at least maybe middle school kids are amazingly honest, brutally honest, sometimes even about whether or not they really understand something or they don't. And that, as a teacher, that's your best feedback in terms of where you are in your own instruction, and what direction you need to go in next.

Mark Royce (12:51):

Yeah. So how did you discover and connect with the modeling instruction approach?

David Bates (13:01):

I was privileged to do a writing program actually, and met a person there who had become a modeler Nell Bielecki, who was still heavily involved in the modeling community and teaches courses. And she said, after we got talking for a while and I'll ...take one of the interesting things is I was at that time really, feeling like I was discouraged with teaching altogether and really thinking about it might be time to move on to do something else. And I ended up getting signed up to do a modeling course in the summer of 2016, with George Nelson and Scott Stokes. And, boy, when we first met, Scott Stokes told us a story, he said he'd been teaching for a long time. And once he took a modeling course, he realized he'd been doing it wrong for 20 years. And he felt like he owed the district another 20 years <laugh> and I really walked away with that sort of same impression, you know, you just, you realize, as they walked us through the modeling course, I walked in thinking I've got all these years of experience, you know, I

might pick up a tip or two, but, instead it just completely changed my instruction. It revolutionized my teaching. And really committed me to, you know, in Scott's words, another 20 years, of trying to, start out, maybe learning to do it better and, but doing it, doing it right. So that was sort of my own own journey to modeling. And then, after that time, and I just went into my classroom the first year, and this is, you know, maybe something for somebody who's starting out new.

David Bates (14:50):

Remember, you are taking a risk if you're, the first person in your building or even the first person in your district. And I was the first person in my building to learn about modeling and try teaching using modeling. And it's scary. And in some ways I was fortunate to feel like I had the trust of my administration. But you know, when you start doing it, the parents start calling immediately. And, you know, you get a note from the principal saying, you know, Mrs. Uh, called up and said, you won't answer any of her son's questions. <laugh>, you know, what kind of a science teacher are you aren't you aren't aren't you supposed to be answering these kids questions when they have 'em. And, so one of the next things I realized is that I needed to educate my principal about what I was doing in the classroom.

David Bates (15:43):

And then I realized I needed to start educating my parents as well. And, the principal over the years is, then began allowing to make presentations at his, PTA meetings, parent teacher association meetings. And, and that's been a terrific tool for building support in the building community for what we're trying to do. And actually one of the funniest things on that one. So there's an activity I learned in my first workshop, it's called the mystery tube. And it's neither here nor there, but it's essentially a piece of PVC tubing with some ropes that hang out of it. And, and it's kind of a fun, tricky thing. How, if you move one rope, the other ropes move and so forth. So I decided to do this with a parent group one afternoon and, and have them then, you know, draw a model of how they think it works.

David Bates (16:38):

And it was so interesting to watch the parents going through exactly the same process and experience that students had gone through at the beginning of the year, too, as they try and parse out, well, maybe this that works, or maybe this does that well, and then they get into this well, but if that does that, then it wouldn't do this. And, and you just hear, the parents suddenly are fully engaged in trying to figure out how this thing works. And, as we begin to get run near the end of our time, um, you know, I had a parent, okay, so, can you just tell us how this works? And, and the answer is, well, you know, how do you think it works? Well, this is how we think it works, but just tell us how it works. I'll say, well, you know, does the evidence support your conclusion about how you think this works?

David Bates (17:29):

And a parent got really frustrated and just said, this is dumb. You know, why won't you just tell us how it works? You obviously know how it works. Can you just tell us the answer. And I had a gentleman who'd been very quiet down the end of the table. And he put up his hand. And he said, you know, he said, let me, let me offer you something here. He said, I am an engineer over at Ford motor company, and this is exactly the way we work at Ford motor company. And we also have to realize as we're solving problems, that we may not ever know the answer. And it's important for us to understand that what we have to do is collect as much evidence as we can, come to the best conclusion that we can. And then we have to go to production with something that we're pretty sure is gonna work, but there are no guarantees in life. And, and the parents just sort of all looked at him and immediately you could just see everybody kind of

got it. They understood what we're trying to accomplish in the classroom, and how we're trying to engage kids and lead them, and prepare them for the future.

Mark Royce (18:34):

Yeah, boy, that's great. So for those who are listening, you know, that are modelers, a lot of our listeners are already modelers. Give us some tips on how you worked with your administrative to help garner their support. And, you were saying that when you first introduced it, you were the only one doing it in the school. And I know you had to have to do some convincing to be able to get the support from the administration. Give us some tips. How did you do that?

David Bates (19:09):

So, I want to emphasize, there's a wealth of really good resources, at the AMTA website. That was one of the first places I landed. One of the tools that's there is some information that's specifically designed for administrators. And so I printed off some of those things, and I went and met with my principal and sort of, here's the reason that you ought to support me trying to do this because the evidence shows that teachers that do modeling really well get really high achievement out of students. And I had to say, so I'm taking a risk and I need you to take a risk with me.

David Bates (19:57):

And then, they still sort of have a lot of questions about it because for them, they haven't had the benefit of the training. And, and they're just seeing this enthusiastic new teacher come in with some new thing that they haven't heard of and try and say that this is the best, new gizmo that there is. One of the things that I found most useful is to invite the principals down, assistant principal and the principal, and have 'em come into my room whenever they wanted to and try and observe what was going on. And, you know, some of the things that we do in modeling are, are applicable in other areas, for instance, what we refer to as a board meeting, where we have the kids defend their thinking and that they've recorded on their whiteboards and, and ask questions of each other, in other areas it's just called a Socratic circle. So if you can help them connect to other things that they're already kind of familiar with, and they understand the value of those things, but if you can get 'em into the classroom and help, 'em see the thinking that the kids are engaging in. That's when they really begin to get the value of modeling and why this is something they ought to be encouraging all the science teachers in the building to pursue. That was very fortunate to have that support. Yeah.

Mark Royce (21:23):

So you started modeling in 2016, you said, was when you took your training. So, and then when you came to the school, you were the only one practicing modeling instruction. Do you now have other teachers in your school who are modelers?

David Bates (21:42):

Yep. Three out of the, let's see, 1, 2, 3, 4, 4 of us four out of five of the science teachers in my building, myself included. We have five science teachers, four of us have been modeling, trained and are using well, all of us are really using modeling instruction. The fifth teacher has not had the opportunity to attend a training, but, you know, when four out of five of us are doing it, you know, you're gonna come along.

Mark Royce (22:10):

Gonna be some peer pressure.

David Bates (22:12):

Yeah. It's funny, we say to kids, don't get caught in peer pressure, but I mean, don't, we do it to each other in the classroom too? Um, but anyways, yeah. And so, four of five of us have been trained. Two of us are now the district leaders, co-chairs of the district, middle school science committee. And so, we're out driving the benefits to the rest of the district as well, and that has made a huge difference because the first year that I taught modeling, the kids didn't have the benefit of having had the experience with recording their thinking on whiteboards or the board meeting, you know, Socratic circles that we do and defending their thinking and exchanging. And it was really, really hard, even the first weeks I would sometimes have class periods, and this may be horrifying for some people, and I'm just glad my administrator didn't show up, but I would have class periods when the kids would just sit in these circles and nobody was gonna say anything, for nearly the whole, the whole class period. Oh my. And you just, you have to really stick to it. Once you get it rolling though. But, now we're doing it in all the classrooms. And so from the very beginning of the year, you can tell the difference and the kids are very... They understand how to play this game better. And they're very quick to get involved and get engaged in the discussions and, challenge each other and talk about, you know, what they observed and what they think it means. And ask the right questions.

Mark Royce (24:00):

My wife is a high school science teacher, and she has often lamented to me that the kids come in to their school and have not been exposed to the modeling approach. And so the first year, which happens to be at this school physics, it's a physics first school. The first part of the year, the teacher is helping them understand how the modeling environment works, you know, how the classroom's gonna work, it's different. And she has often lamented that I wish there were more middle schools in our area that were feeding our school that would practice modeling. So the kids would come in already prepared and ready you to go. And so my question to you is do you feed high schools that are practicing modeling also?

David Bates (24:54):

We do. And one of the interesting things is not every middle school in our district is doing modeling. And when I am able to talk with the high school teachers that are doing modeling, they say, it's very clear at the beginning of the year, which school the students have come from. They can tell the students that came from one of the middle schools where they're actually doing modeling and the ones that did not. I think that that's an important discussion or consideration to have because, in some places there's very little elementary science education going on. Now, I'm speaking through the lens of the state of Michigan, and I know you're out in California. And I think that there's a lot of variation from state to state, but with the national leadership, driving the stuff, the last, I don't know how many years, you know, the emphasis everywhere is on math and language arts and not, not to diminish those. Uh, but the argument that if the kids can learn to read, then they'll figure out the science on their own, I think is a really, really unfortunate perspective because I think it belies the fact that science requires a different way of thinking. You know, science is almost a language of its own in some ways, in terms of how we observe things and wonder about them and then try and bring understanding to what's actually taking in place. I guess, one of the things I think about sometimes is, maybe it's like painting, you know, you can't send a person to art classes and have 'em read books about art and then have them walk out and become a first rate painter. It just doesn't work that way.

David Bates (26:50):

And the same is true in science, you know, you can read textbooks and get introduced to science concepts. And maybe you can even memorize some of the ideas behind 'em, but it's not the same thing as really grasping the concept at the root of what's actually happening. And the only way you can really begin to do that is to construct it for yourself. And that's where modeling is so different. So, in an awful lot of cases in our schools and in this country, elementary teachers are specialized in giving more support in language arts and math. They spend most of their time doing language arts and math. And I think in some cases we get kids in middle school that have no science education experience at all. Middle school is their first time of having any kind of formal science instruction at all.

David Bates (27:45):

I'm sure for the high school, it's even even more challenging because there's so much more ground to make up. If you're a high school, getting the kids just to kind of trust you, because they come into the classroom with a certain, an idea about... And maybe it's, cuz they've, seen it on television shows or something else, but, they think they're gonna come in be given a super thick textbook. They're gonna have to outline the chapters and answer the questions at the end of each chapter and memorize the key formulas and they'll be off and running.

Mark Royce (28:26):

I'm curious if you've had any interaction with teachers who are not modelers in high school -- high school teachers. And have they talked to you a little bit about your students coming into their classes? Have you had that interaction?

David Bates (28:42):

That's a great one. I've had a few conversations with high school teachers and the answer is that they seem mystified by the kinds of questions that the kids try to ask and they want to migrate to, well, don't worry about that. Just read what's in the textbook and do the questions at the end and you'll be fine. And just think about what's embodied in that kind of an exchange with a student, that's basically saying I don't value your curiosity. I don't value your thinking. The textbook here is the expert and you're only objective ought to be to get an A, and here's how you get an A: read the chapter, do the questions at the end of it and memorize them and you'll be fine. And, you know, if we're trying to develop kids that are gonna walk out into a future where they're in a position to solve problems, we need to help kids develop the skill sets of really thinking deeply about something, making good observations. Constructing ideas about how things work and then having the skills to be able to test out those presumptions and see whether or not they hold up or not.

Mark Royce (30:05):

Describe the environment that you're trying to create in your classroom. And talk to me a little bit about how you approach creating that learning environment for your students.

David Bates (30:22):

So the environment that that I'm trying to create is an environment where students walk in and bring their curiosity with them, value their own thinking, value their questions and are not afraid to share their thinking and share their questions with the other students, because they know that other students also are bringing their own questions and thinking in, and they're gonna value other students' questions and thinking. And so they can reasonably expect other students to value their questions and their

thinking, and that's a really different environment for a lot of kids when you think about it, because mostly, we treat education as a race, of types. And we don't really value the sort of coordinated working together to try and solve a problem. In most cases it's who can do the best job is gonna be at the top and everybody else is gonna get ranked somehow underneath them.

David Bates (31:39):

And so one of the things that we talk about in the classroom is our goal really needs to be not to find out who the smartest kid is in the classroom. But our goal really needs to help everybody in the classroom be the smartest kid in the classroom, by sharing our thinking, sharing our questions, encouraging each other, and supporting each other. And that requires building up a very, very high trust environment. You know, middle schoolers by nature and developmentally are going through so many changes. And they're very, very, vigilant -- I'm not sure that's the best word for it-- about how they're viewed by the other kids in the classroom. And they're terrified of doing anything that might cause other people to think of them as being less smart or less capable or less anything. And so they tend to approach that with different approaches. Some students deflect and try to monopolize and move in a different direction just to distract and other students just kind of ball up in a corner and sit quietly and don't say anything.

David Bates (32:53):

And neither one is helpful to the learning environment. So the trick becomes in getting kids to encourage each other, trust each other, and know that they can say something. And even if we all may agree that it isn't helpful to solving the problem, that everybody will respect the fact that they shared their thinking and value the fact that anybody's and everybody's thinking contributes to the journey that we're gonna take to trying to solve whatever problem that we happen to be working on.

Mark Royce (33:26):

That's awesome. So, can you share some of your, the ways that you bring that out in your students, do you create trust in the classroom? How do you do that?

David Bates (33:39):

So, you know, part of it is the, I don't know the pedantic angle of it where you have to surface that information almost daily. Okay. We're gonna have our board meeting now. And it's important that we all remember that this is a time when we have to support each other. Our goal has to be to help everybody be successful and we have to value each other's thinking and questioning, and we can disagree, but at no time is it acceptable in any way to make fun of somebody or to laugh at somebody for what they happen to share. And then you have to stick to that because middle schoolers will be middle schoolers and you're gonna have those moments. And they don't necessarily-- I mean, they're not bad kids per se, when they laugh at somebody else, but their, maybe their own personal concerns are driving that, but you just have to then stop and say, you know, Hey, this is not something we agreed on. We agree that we're gonna all be better off if we support each other. And so you have to be willing to stop and have those conversations in the classroom and do it in a way that is also supportive of a kid. One of the interesting things is students will say, you know, well, aren't you gonna punish 'em? And it's like, well, that's, that's not really gonna help them be successful, I don't think, is it? I mean, if we send them out of the room, aren't they gonna miss the conversation in the discussion? And it's like, oh, oh, he really does mean it. You know, means that we're gonna value everybody. We're just gonna keep reminding each other that we gotta be respectful. And supporting that. And so also, you know, when you see students

behaving in that way, it's important to acknowledge that and say, you know, that's what we're talking about, way to go. That's the kind of behavior that's helping us all be successful.

Mark Royce (35:53):

Gosh, It sounds like you've be a great teacher to learn under.

David Bates (35:58):

Thanks.

Mark Royce (35:59):

I wanna ask you to share your greatest tip to like, if someone's listening to this and they're considering modeling or they're new to it, and they want to dig in and do the best they can. What's your greatest tip that you would share with another modeler?

David Bates (36:17):

A lot of teachers come into education and I'm not sure whether it's different at different levels, but, you know, I think elementary teachers innately tend to get the relationship aspect of, teaching more so. And I think, and your wife could probably correct me on this, but I think somewhat at the high school, teachers are more driven by their enthusiasm for their content. But one of the things that anybody who's gonna be approaching modeling needs to stop and really ask themselves is, what do I think about the importance of relationships in teaching? Because, when you have a textbook to rely on, you can just put the textbooks out and say, okay, read this chapter and outline it and answer the at the end.

David Bates (37:20):

But when you're teaching using modeling, your own personal relationship with a student is where the trust derives from that allows the student to take the risks necessary to learn in that mode. The students have to be willing to say, okay, Mr. Bates has got my back on this one and I'll just take a chance and try this out and see if it works or not. And once you've got that, then the kids can really catapult forward on understanding the concepts and grasping things. So in short, the answer is that we all all do and have talked about the value of relationships in education. But to me, that's the very first thing that if you're gonna go about modeling, realize that that your success is really gonna derive from the personal relationship you have with your students. Because they've got to trust you. And in order to trust each other, they have to be able to trust you. And that's a pretty awesome responsibility, when you stop and think about it. But, on the other hand, it may also be one of the reasons that modeling is so much more productive and so much more rewarding, because I don't think you can teach modeling without having that level of relationship with students.

Mark Royce (38:55):

Yeah. That's so awesome.

David Bates (38:58):

And in full disclosure, I don't mind telling you, that was an area of weakness for me. And I had to talk with some people and then really, evaluate why I was in education and say to myself, okay, I've done a pretty good job of having cursory relationships with these kids over the years, but that's not the same thing as really getting to know 'em and getting to appreciate them individually and helping them

understand that you got their back. One of the stories that I wanted to share, letting the kids drive the instruction, because if they're not driving instruction, then they're not really learning. I had a group of kids, many years back now, that was working on an astronomy problem.

David Bates (39:48):

And they were in the process of having a discussion about what causes day and night. It's amazing, actually, how much misconception there is around that topic. But, I had some sort of overbearing young men that really drove the conversation and somehow managed to convince every other person in the class that day and night happened because the Earth went around the sun and on one side of the sun, it was nighttime. And on the other side of the sun, it was daytime, which all of us, listening to this one, I imagine, understand is not the case. But I sort of couldn't believe that nobody was willing to challenge them on that. And this is after having done our investigation with the models.

David Bates (40:42):

And I said, okay, we're gonna stop there for today. Time's up, but we'll have to pick this conversation up tomorrow. And the next day we picked it up, and I just sort of kept asking questions. And finally, I had one young lady that literally jumped out of her seat and said, wait a minute. I was right. You guys convinced me I was wrong, but I was right. And she proceeded then to draw a new model and, the rest of the class looked at it. But for me, one of the things that it emphasized and we've heard about the role that gender has played in the classroom. And each of us is in different places, different parts of the country. And I'm sure it makes a difference where you are geographically and the population of students.

David Bates (41:31):

But I happen to work with a population of students where women women's role in science is often undervalued. And, one of the things that I find with modeling that I think is particularly terrific is the equalizing factor it has. So, young ladies can find out that they really have as much to contribute as the young men in the classroom. And a lot of kids that have not had success in other academic areas, in their experience. It's often for reasons that are obstacles to them being able to share their understanding. So for instance, maybe, they've had to do a lot of writing in order to be successful, and they haven't had a lot of success there, but given the opportunity to draw a picture on a whiteboard or illustrate something, and then be able to explain it out loud, now they find their voice and they find they have a lot to contribute. And so I think one of the real valuable aspects of modeling that doesn't get emphasized as much as I would like to see it is the fact that it creates equality in the classroom. And in terms of the value that each person has to bring to the conversation and the thinking that each person brings, no matter what their experience in the past is, or their background or their gender or their race, or their orientation or anything else.

Mark Royce (43:05):

That's awesome. Thanks for sharing that. That's a really good anecdote. Well, I've thoroughly enjoyed our conversation and I hope it's been a good time for you. I really appreciate you taking the time to share your experience and your thoughts with our listeners. It's really a pleasure to meet you. And I wish you the very, very best and I know -- you're a skier?

David Bates (43:40):

Yeah. Yeah.

Mark Royce (43:41):

And are you doing anything during the school break to do any skiing or anything?

David Bates (43:47):

Well, I hope very much. I know you're out in the west coast, but, yeah, even though I'm over here in the Midwest, I'm hoping to go West, to go skiing. So hopefully, we'll get out towards the Salt Lake City area and hit the slopes.

Mark Royce (44:02):

Cool. And when do you hit the classroom?

David Bates (44:06):

January 3rd. We'll be back in there and looking forward. And I know my students have been emailing me over the break and I'm looking forward to getting back in and starting up work with them. And it's been great fun, getting to meet you, Mark, this is, a thrill and I can't tell you how much I appreciate the way you you're contributing to the modeling world.

Mark Royce (44:30):

I'm just bringing out some stories. That's all. So you guys are doing the amazing work. I really appreciate it, David. Thank you so much for taking the time to do this with me.

David Bates (44:41):

Cheers. You bet. It's been a great pleasure. Really.

Mark Royce (44:44):

Take care.

David Bates (44:45):

Cheers. Bye-bye.