

Mark Royce ([00:02](#)):

Hi, Brian.

Bryan Battaglia ([00:04](#)):

Hi, Mark. How are you?

Mark Royce ([00:06](#)):

I'm doing well. And you?

Bryan Battaglia ([00:07](#)):

Doing well. Yeah.

Mark Royce ([00:11](#)):

You guys got beautiful weather? It's 106 here in Fresno <laugh>

Bryan Battaglia ([00:18](#)):

Yeah, I don't, I don't miss that. We were in Arizona last summer for a workshop and I did not know what heat was until June in Arizona. Phoenix, Arizona. <Laugh>

Mark Royce ([00:29](#)):

It's 116 there today.

Bryan Battaglia ([00:32](#)):

Yeah. I'm not missing that at all.

Mark Royce ([00:34](#)):

Yeah. We kind of check in with Phoenix 'cuz Brenda has so many connections there and stuff,

Bryan Battaglia ([00:40](#)):

That's funny.

Mark Royce ([00:40](#)):

116 is ridiculous.

Mark Royce ([00:43](#)):

So, and they're just, they're just cruising above 110 right now for several days and

Bryan Battaglia ([00:50](#)):

And people choose to live there. I'm just, it shocks me. Yeah. <Laugh>

Mark Royce ([00:54](#)):

It's nice in the winter.

Bryan Battaglia ([00:55](#)):

I'm sure. I'm sure.

Mark Royce ([00:57](#)):

Yeah. So, tell our listeners where you are currently teaching and what courses you're teaching.

Bryan Battaglia ([01:06](#)):

I'm currently teaching in a suburb of Detroit, Michigan. Sterling Heights. Utica school district is the district that I'm in. And I teach freshman physics. We do a physics first at my school and my school is actually an IB school. It's a public IB school. It's part of the district. So it runs as a separate academy. So I have junior and senior level IB students. And then I have freshman that I teach as well. And all the freshmen that come into our program take physics first as their first science class.

Mark Royce ([01:40](#)):

Awesome. Yeah. My wife's a strong believer in physics first. You know, the term IB is something I'm just learning. It's international something? It's kind of like AP?

Bryan Battaglia ([01:52](#)):

International Baccalaureate is what it stands for. It's a worldwide curriculum. So Cardiff, Wales is like the home office of it and there's IB schools all over the globe that all kind of share similar criteria, curriculum guides, and things of that nature. So there's, there's IB testing that happens every May, much like AP testing. You know, in my school, all the students that are at my school are full diploma candidates, which means they are involved in all parts of it and take anywhere from 15 to 20 different exams over the month of May in order to get their IB diploma, which is an additional documentation separate from their high school diploma. If they do well enough and meet certain criteria, they can get an IB diploma on top of that.

Mark Royce ([02:46](#)):

Yeah, that's cool. So a student with an IB diploma is gonna have an easier chance of getting into a program overseas or, you know, somewhere else around the globe.

Bryan Battaglia ([03:01](#)):

Absolutely. There's some advantages to getting there and some kids worldwide, you know, it's even a criteria to get into a university or college. United States, that's not as big of a deal, but a lot of the kids, if they do well in their IB classes, especially there's two levels, there's a standard level. And then there's a higher level and a lot of colleges will give college credit for certain scores in higher level versions. So like I know physics, the score scale goes from one to seven. If you get a five a lot of universities will give up to like 10 credits of physics for getting a five on the IB exam.

Mark Royce ([03:42](#)):

Wow, cool. How do you see the difference in teaching IB versus just regular physics, if you will?

Bryan Battaglia ([03:51](#)):

It's a lot. The IB course itself is a two-year program. So it's more than just, you know, we cover pretty much the whole gamut of physics. So we'll go through mechanics and electricity, waves and things like

that. And then we even get into some of the non-Newtonian stuff in the quantum physics and nuclear physics type stuff towards the end. And then students get an option. There's four different options, although the curriculum is going to change next year. So we're eagerly anticipating what changes are gonna happen to the physics curriculum next year. Yeah, I think the difference between IB physics and your traditional physics class is just the depth. We go a lot deeper, cuz it's a two year course, so you're allowed to explore some topics a little bit more than you probably would have time in a single year course.

Mark Royce ([04:41](#)):

Cool. How do you find that using modeling instruction in your classroom integrates with your IB curriculum? You know, requirements?

Bryan Battaglia ([04:52](#)):

I think it works really well because IB kind of emphasizes understanding. It's a lot about conceptual understanding and things like that, that go along with that. And I think from what I understand, AP instruction used to be a lot more here is all the information that you need to do and kind of regurgitate it back and they changed the AP curriculum to be a lot more conceptual, kind of like the IB curriculum. So I think that there's been some comparisons with that, but I've found that my students do really well. You know, we spend a lot of time developing our kinematics and all of our models that we've used, energy models, momentum and things like that. And then my students are able to see how all of those are just applied in all the other areas because E and M is just applied kinematic models and energy models and momentum. And so once they understand those basics, I think it's a lot easier for them to see the same patterns in the different contexts that we explore.

Mark Royce ([05:57](#)):

Yeah. That's very cool. So tell me how you first got introduced to modeling instruction for your classroom.

Bryan Battaglia ([06:05](#)):

So yeah, I have an interesting thing cuz unlike most physics teachers I was not a physics teacher trained. I was a bio major. That's what I studied. I studied genetic biology at college at Purdue University and I had intended to go into maybe cellular biology, cancer research, something like that was what I was thinking. I also was thinking maybe marine biology, but I didn't really know where I was going. So after I graduated from undergraduate, I tried to kind of figure out where I was gonna go. So I took like a year off while I was deciding what I wanted to do with my life. And in that time I was working in a lab and realized I really didn't like working in a lab so much. And I had taught a class as an undergraduate. I was a TA for a bio lab and I really enjoyed that.

Bryan Battaglia ([06:51](#)):

And I was like, you know what, maybe teaching is where I should go. And so I went into that and then a long roundabout way, I was a bio teacher that was hired at a junior high that did not teach biology. It was the only one in the district that didn't have any bio classes cuz we didn't have ninth graders and that's what stopped. But I was like, Hey, it's a job. I'm doing it. So they rearranged the curriculum and had biology move to the 10th grade. So they needed bio teachers to go to the high school and I'm like, Hey, that's what I studied to do to become a biology teacher. So I went there and they're like, Hey, can

you teach physics? Sure. Why not? I've done physical science for 10 years. It'll be it easy. <Laugh> yeah, I made it, I made it two weeks into physics going, I don't know what I'm doing at all.

Bryan Battaglia ([07:35](#)):

So I actually had encountered a modeling workshop as a three week physics mechanics thing. So I didn't really know anything about modeling at the time, but I just knew that there was a three week workshop that I could take and maybe I would know some more physics content. So I said, sign me up. And it changed everything about the way I teach and everything I think about teaching. It was really cool. I had considered myself to be a constructivist style teacher, but I didn't actually know what that really meant until I took my modeling workshop and I'm like, oh, this is how you do that.

Bryan Battaglia ([08:12](#)):

So that was cool for me.

Mark Royce ([08:15](#)):

So it kind of opened up that innate thing that was in you, but you didn't have the training yet for it to fully be realized.

Bryan Battaglia ([08:25](#)):

Yeah, I thought it was kind of ironic that through my teacher preparation classes, they kept saying, you need to... They would lecture me on how to be a constructivist teacher and <laugh> it wasn't until my first modeling workshop that I was like, oh, this is what you mean. And this is how we have students actually build their knowledge and their understanding. Yeah. So that was in 2010 and you know, it's been, well, I would not say smooth sailing ever since. It was a struggle at first, but as I'm learning what I'm doing and figuring things out, but boy what a change in my instruction and in my students' understanding.

Mark Royce ([09:03](#)):

Yeah. That's awesome. So 12 years you've been at it in modeling instruction. And so at this time, at this point in your career, what do you think are your strengths as a modeling instructor? What are the things that you really bring to the table?

Bryan Battaglia ([09:23](#)):

So I think modeling instruction was difficult for me at first because I was a bit of a know-it-all when I came into this and that I think was the biggest change for me was to just stop talking and listen to my kids and figure out what they are doing. And, you know, I remember my first workshop that my instructors kept asking me, you know, do this as if your students were doing it; answer, these questions like your students would. And I was like, I have no idea what my students thought or how they would answer. That was really a struggle for me. So I think that has shaped me to make sure that I'm just really listening to my students and figuring out what they know. And so I think that's probably what I've gotten best at is just being quiet and listening to my students and asking them to really explain what they're thinking more deeply. So I think that that's probably my strength.

Mark Royce ([10:20](#)):

Cool. That that's a really important part of, I know, the modeling approach I in the classroom, so that's great. So is there a secret that you've learned that you wish you knew before modeling that you've come to realize that you can share a secret that you can share with others, especially those who might be starting out?

Bryan Battaglia ([10:47](#)):

Yeah. I think the thing that surprised me every year that I've been a modeler is that my kids are capable of more than I ever thought they were. And I think it's because I didn't really listen to them before. And so I didn't, you know, in every time I think, well, this challenge is too big. They're not gonna be able to handle it. And then they do. And they're like, and what's next? So I think that's for me, has been the best is that I've, I've just really appreciate how much my students are able to do and how much students really want to learn. Like, you know, you hear some teachers talk about, you know, all "these kids today" and stuff like that. And I've never experienced an, "oh these kids today" moment because my kids want to learn. I think all people want to know and they wanna know how the world works.

Bryan Battaglia ([11:35](#)):

And when you give them an opportunity to actually like do something important that they're figuring out that you haven't given them the answer, you know, you're, you're not telling them what they expect to see just, Hey, look at this, what can we find out? And they get so excited by just figuring out what seems to be a mundane thing, but because they discovered it, it's meaningful. Right? How awesome is it to like, oh yeah, you discovered this thing that Newton came up with a long time ago, but we didn't need him. We were able to figure it out without this guy.

Mark Royce ([12:11](#)):

Wow. So you're finding that even in your ninth grade students

Bryan Battaglia ([12:16](#)):

Oh, absolutely.

Mark Royce ([12:19](#)):

Cool. What is your favorite area of your curriculum that you love to teach, and maybe that you find the most impactful with your students? Is there something that during the year you go, this is the part where it's really awesome?

Bryan Battaglia ([12:37](#)):

You know, I think, for me, it's even the very beginning it's when I'm developing my classroom culture and I'm convincing kids that they are capable of way more than they ever thought. You know, I love when I get a student who tells me at the beginning of the year, they're not a science kid. And then they just discover amazing things and just make connections that they never thought possible. And even if they're, you know, they go down to the end, they're like, you know, physics is not my favorite class, but I really appreciated what you did. And, you know, and I feel like I've learned a lot. I think for me, that's better than any curriculum material that I use. Right? Like there's not a content that I'm like, man, if they get this, I'll consider myself successful for me, it's more, can you think critically, can you reason, can you argue using evidence? It's all those important things that if you ask a science teacher what they want their kids to learn, very rarely does anyone say they it's a content. Content is just the condiment that you put on a burger that makes it a little bit more enticing. The burger is scientific literacy. It's the

development of a critical thinker. And I think that's the important bit. And if I don't get through all of the physics curriculum in a year, I'm okay with that. You know, especially for my freshmen. For my, for my IB students, I find that because they were prepped as freshmen with this way of thinking. And you know, I'm lucky in the fact that I'm working with other modelers.

Bryan Battaglia ([14:14](#)):

So I have a chemistry teacher who does modeling with them in sophomore year and just continues the progress that I did. And by the time they come back as a junior, I find that they have very little drop off from freshman year and we just pick up right where we left off and we keep going. You know, and a lot of the curriculum is just applied, right? If we take classical mechanics, you take these models, energy model, momentum model, motion models, and you apply them to new situations. That's electricity and magnetism, that's waves. It's all just interactions that they've studied just in a new context. And so I find that my students are really successful at starting to see these patterns and being able to identify. And I think that's why modeling works so well with the IB because the IB exams, the assessments at the end, it's never like, here's an electricity question, answer all these questions.

Bryan Battaglia ([15:11](#)):

It's always about, you know, it starts as an electricity question and then goes to momentum and then goes to all these different other aspects of it. And it's very rare that a question on an IB exam is like in one content lane or one topic. It branches 3, 4, 5 different topics. And so my students have to be able to like, identify what's important, what models are actually being used in this question so that they can answer them effectively. And I think that's where my students thrive. Is that ability to see those connections and how to look at things in different with the different model.

Mark Royce ([15:52](#)):

What you were just sharing is very interesting to me, because one of the quotes that I read from you, that I wanted to pursue, and you started it right there, but you said, I think teachers, I think we teachers get so caught up in the content that we forget. It's only one third of what we're actually supposed to teach. So I'm curious when you say it's one third, what's the other two thirds.

Bryan Battaglia ([16:17](#)):

So when I first started teaching in Michigan, we used the Mago see frameworks, and it was it was a list of three different things. There was constructing knowledge, reflecting on knowledge, and then the content knowledge, those were the three aspects and you looked through the constructing and reflecting, and it was like developing a lab or thinking scientifically or things like that. And as a new teacher, I remember looking at that and going, yeah, I do that. Yeah, I do that. Yeah, I do that. And then just focusing on the content and like all the rest of the stuff is gonna be there. And that was like the content was the burger and all the constructing reflecting was like the condiments. And then I realized, I think mostly after modeling instruction training that I had it all backwards, that the content is right.

Bryan Battaglia ([17:06](#)):

Like, I mean, anything that I want to know, I can go to the computer, I can do a Google search and I can figure out anything. Like information is easy to obtain, but is that information accurate? Do these things make sense? How do I get that? And that's the part that I think as science educators we need to focus on is that the problem is, is that, you know, if you look at most standardized tests and things like that, they tend to focus on the content area as a way to know if your students have learned things or not. And

that's unfortunate, right? Those are easy questions to write. They're easy questions to grade, but the important questions, the stuff that like, how do we actually think scientifically and how do we actually process information and, and accept the validity of our observations?

Bryan Battaglia ([17:58](#)):

That's the important stuff. That's what we really need to focus on. Yeah. And so, you know, you look at like NGSS now where you have you, even that has three different strands. There's the core content, but then there's also your engineering and science and engineering practices, your crosscutting concepts. And those are the big ideas that overarch all science. So like energy, developing an energy model, is not just useful for physics. It's useful for every science discipline, because energy is like one of the core ideas for anything. So, being able to think about energy and develop some sort of useful model for energy that we can use in all contexts is way more important to me than Newton's second law.

Mark Royce ([18:44](#)):

So talk to me a little bit about what you have learned or what your perspective is on the process of learning. Student learning. This is kind of extends that idea of content is the least of what you need to teach. So I know you've given some thought to how people learn and especially your students. Talk to us about what you've learned over the years.

Bryan Battaglia ([19:13](#)):

I think the most important lesson that I've learned is that thing that I've discovered I think is that learning is collaborative. That's free for them to share their ideas, even if they're not the, the idea that everyone else has. And to be able to explore these ideas and really challenge those things. You know, no learning happens if you're afraid to have your ideas or your thoughts evaluated by somebody else. If you're working in a vacuum, you're not going to get pushback on your own ideas, and there's no reason to ever change those ideas. So I think, one of the things that I strive to do in class is develop that culture where kids feel safe to bring up ideas. We celebrate incorrect answers as much as we celebrate correct answers because it's through disproving ideas that we have more confidence in what we eventually deem to be the correct answer.

Bryan Battaglia ([20:15](#)):

And I think giving time for students to be able to explore that and develop those ideas, you can't do that if you're teaching a class where I have these 180 content standards and I have to hit every single one before the end of the year or this exam. I don't know how long it's gonna take my kids to learn. And it was funny, you know, I'm leading a workshop right now and we were, it just came up you know, an hour ago we were talking about the idea of pacing. How do you do modeling and, and keep to the district pacing that's going on? And you know, that's a huge conversation that has to happen about why is there a pacing guide when your students should be the important thing? You should go at the pace that they are understanding, and they can develop their knowledge.

Bryan Battaglia ([21:06](#)):

And if you push kids to move on before they're ready to understand, that's really gonna come back and hurt you later on because they haven't developed a foundation and you're now building a building that is gonna just crumble because they haven't figured things out. So that's a large criticism sometimes that I hear of modeling is like, well, it's so slow at the beginning. And it is. But at the same time, if I look at my IB students, when it comes to May of their exam year, they're able to think very deeply about things and

identify the important. What models apply, what ways can I think about this? How can I think about things differently and creatively in order to solve a solution? And I mean, that's the kind of kids I want being the leaders of our country in the future is these kids who can think deeply about stuff and know that they have the mental capacity to back up their ideas with evidence and critically think through problems. So for me, that's what I say is learning. Developing the ability to communicate with others, share your ideas, evaluate whether ideas are good, or if we need to like revise our ideas to be fitting with the observations that we're making. Right.

Mark Royce ([22:30](#)):

That's awesome. I I've talked with a lot of modelers and I think many would agree with you that that is the critical point in the classroom. Can you tell us a little bit about some of the tools that you use to accomplish that in your classroom, that collaborative learning? I don't know if you use like whiteboards or some of the tools that you use.

Bryan Battaglia ([22:58](#)):

Sure. Yeah. Whiteboarding is obviously as most modelers do, is a critical component. I like using a whiteboard to have groups communicate their ideas or develop ways of understanding. And it's a really good way to be able to make your thinking visible and compare ideas in a quick way. You know, there's lots of different whiteboarding techniques that get used that are not the same. You could have some jigsawing, where everyone like, kind of completes a bit of the board as they move around. You know, gallery walk. People look at, create a board and they walk around and make comments and try to figure out some questions that they have as well as, you know, more presentation style, where kids are looking at that. But that's definitely a thing that we use a lot.

Bryan Battaglia ([23:46](#)):

I do blogs with my students. So with my freshman, I have a, a reflective blog that they do once a week. And they just think about things that sometimes might be content-related, sometimes might be more about them as a learner or different things like that. And I usually get to the point where I have them share each other's blogs, and so they can actually take the conversation deeper outside of my classroom, which is kind of cool. It doesn't work for every kid, but there's a lot of kids that really have enjoyed it and like that reflective piece. So I think that's an important aspect of it as well, and then, like I said learning is not a solo thing. So it's, it's group work pretty much all the time in my class, we're doing lots of small group discussions, or even, you know, in the middle of a discussion if I get a lull, it's like, Hey, check your neighbor, let's see what's going on. And then see how we can move the conversation further. So it's very collaborative. That, I think, is probably the most important aspect of my class. Very seldom will you come into my classroom and see that the kids are working independently on something,

Mark Royce ([24:58](#)):

If you were talking to someone who's considering going to a modeling workshop, what would you say to encourage them to follow that path?

Bryan Battaglia ([25:10](#)):

It's the best professional development you'll ever take. I think the biggest problem that I think most people have about coming to a modeling workshop is that most modeling workshops are about three weeks long, and that's a huge investment in time to go to it. But, you know, for me, it was invaluable. Like, I don't know of anything that I've done that has changed my teaching more than taking a modeling



workshop and developing this community of educators that all think passionately about student learning and student achievement, and want the best for our kids and want our kids to be scientific thinkers. You know, it's an unbelievable experience. And it's a bit humbling. It's a bit frustrating, cuz I know after I took my first workshop, I was like, what the heck? where has this been hiding?

Bryan Battaglia ([26:10](#)):

How have I not known about this? And why did it take me this long to go through it? There's an interesting dynamic in modeling workshops that happens around day eight or nine where spontaneously, it almost becomes a science teachers anonymous, you know, I've been teaching for 10 years and I can't believe what I did you know, so that's a fun part of it, but you know, it's such a rewarding group and community to be associated with and to challenge your ideas of teaching and being able to have a group of teachers that you can just sit and talk about pedagogy and how students learn and how best to do that. It's just an unbelievable feeling.

Mark Royce ([26:58](#)):

So are you a member of AMTA?

Bryan Battaglia ([27:03](#)):

I am, yep. I'm a life member from a few years ago and yeah, I enjoy what they've done and I appreciate the AMTA for keeping modeling on the forefront and trying to, you know, keep growing this community of teachers and getting things going that way.

Mark Royce ([27:24](#)):

Yeah. Other than the modeling workshops, which they are heavily involved with promoting and equipping, have you found other benefit from your membership there?

Bryan Battaglia ([27:37](#)):

You know, yeah. The people that I've worked with and the modeling workshop in 2017, I connected with a bunch of people. We started writing a new curriculum using the computational modeling for physics first with bootstrap. And that's actually what I'm working on this week with a workshop for that. It's great to develop this new way of, new representation, I guess, of adding that computational piece into the freshman physics. And you know, it's something that I use with my students now and I'm really enjoying the connection and the way to move something that I think is fundamentally important to our society. Like, you know, before I started the computational modeling piece in my freshman physics, you know, there really wasn't any computational computer science program in my school at all, as the IB school.

Bryan Battaglia ([28:36](#)):

There just wasn't anything there. And due to developing this, you know, I've used it for three or four years now, and now we have a robust computer science program in my school. And I think a lot of that was from students saying, Hey, we started this in freshman year. I wanna learn more about coding and how to do this. And I think that's exciting to give kids this opportunity that even if they don't go into computer science, the computational pieces that they get, they can start to understand some of the logic of coding and being able to move that into something that, you know, maybe they can make an app for their phone, or maybe they can figure some things out that... At least it opens the, the door to

explore there. So, you know, opportunities like that and developing some new ideas has been great, that AMTA has been there and available to do that. To help us with those things.

Mark Royce ([29:32](#)):

That's great. So I would love for you to share with our listeners like your best teaching tip or your best modeling tip, what you would just share with other teachers say, Hey, this is the big thing that I've discovered.

Bryan Battaglia ([29:52](#)):

I have found that every time that I'm leading a discussion with my class and things aren't going well, I figured out that the problem was me.

Mark Royce ([30:05](#)):

<Laugh>

Bryan Battaglia ([30:06](#)):

I'm always the problem. If my kids aren't talking, it's because I'm doing too much, or I'm saying too much, or I'm not, you know, I'm not allowing them to really explore and talk to each other. And I found that the best solution to this is to walk away. I go and find something to clean in my room, or I sit at my desk and pretend I'm ignoring them. And I just leave the circle altogether. And all of a sudden magic happens pretty much without fail every time that I think, oh, this conversation could not get any worse. I take myself out of it and it gets better. So I would say if you're struggling with anything, you're doing too much and your kids need to be able to make it through without you.

Mark Royce ([30:56](#)):

Wow. That's really cool, Brian. I gotta

Bryan Battaglia ([31:01](#)):

That's my biggest takeaway.

Mark Royce ([31:02](#)):

That that's awesome. I think you told me those are bowling balls in the hallway.

Bryan Battaglia ([31:09](#)):

There are bowling balls. Yeah. We're doing bowling. <Laugh>, we're bowling in the hallway right now. So I apologize. I'm trying to be in a quiet room and, you know,

Mark Royce ([31:19](#)):

No, it's great. It's been very clear, but, but it kind of sounds like thunder or something rolling in the background.

Bryan Battaglia ([31:25](#)):

<Laugh> It does. Yeah. We're playing broomball right now. We just started our forces unit. So they're out there. We've got teachers running around with bowling balls and brooms around the hallways of the university building right now. It's great fun.

Mark Royce ([31:35](#)):

That's awesome. That's awesome. Hey man, it has been really great talking with you. I have enjoyed it very much and I think it's been very informative, insightful, and I really appreciate you taking the time to spend with us today on this podcast. Thanks.

Bryan Battaglia ([31:54](#)):

Awesome. Thanks. Yeah. It's been a pleasure talking to you and I appreciate everything that you're doing. I love the podcast and thanks for doing what you do.

Mark Royce ([32:01](#)):

Ah, thank you, Brian. And for doing what you're doing with our kids. It's wonderful. Appreciate it so very much. Thank you. And hopefully we'll talk to each other sometime. <Laugh> and there goes a ball. Sounds good. The bowling ball in the background <laugh>

Bryan Battaglia ([32:16](#)):

It's getting, it's getting festive out there. Absolutely.

Mark Royce ([32:19](#)):

Yeah. You, you take care.

Bryan Battaglia ([32:21](#)):

All right.