Mark Royce (00:00):

Hi, John, how's it going?

John Baunach (00:02):

It's going great. Mark. Happy to be here.

Mark Royce (00:04):

Yeah. I'm glad to have you here. And I'm looking forward to our time together. I've been really impressed with your resume, kind of all the stuff you've been involved with. I mean, it's very impressive. You've been teaching for about 10 years or so now. And you're currently... Well, I'll tell you what, you just tell us a little bit about your history. 'Cause it's pretty interesting.

John Baunach (00:30):

It's a zigzag, right? Yeah. Yeah. Well, well, yeah, so this is my ninth year teaching in the classroom. Although I want to round up the 10, I'm ready to go. Born and raised in Louisville, Kentucky, which is where I am now for the holidays. I went to school in Nashville, Tennessee. I went to school at Vanderbilt and I got a bachelor's in physics. I got out of school right around the 2008 recession. And so kind of the job market that I thought I was going into, I didn't think I was going into education. It all kind of dried up right as I got out. So, reached out to an old high school teacher of mine who put me in touch with someone who needed an emergency hire in a public school. So I taught physics and astronomy at this school for about two years.

John Baunach (01:16):

And then I had the opportunity to go back and get a masters at Vanderbilt, in health physics, which is radiation protection. And so I worked in that for a couple of years. I actually got to volunteer at NASA to finish a master's thesis on space radiation protection. And that's a whole fun experience where I got to learn how to program in Fortran and all this other stuff that people get excited to talk to me about. And I'll say I was heading into that field thinking, okay, I did teaching. Maybe I'll stay in it, or maybe I'll go somewhere else. And then there was a short shutdown in 2013 that not many people remember, but NASA's budget got a little crunched. And I was basically told because I was in a terminal master's program, I wasn't going for a PhD, they couldn't hire me on. And so I kind of switched gears again. I looked back and said, well, I really liked teaching. And my now wife, she was finishing her PhD at Vanderbilt. So I started teaching at a parochial school nearby. And so I taught there for three years and I was introduced to modeling at that point.

Mark Royce (02:22):

What year was that when you were introduced to modeling?

John Baunach (02:26):

2014. I taught at a school just north of Nashville, Tennessee. It used to be called Pope John Paul, the second high school. Now it's Pope Prep, I think. And I was hired on as a ninth grade physics teacher. But the entire department was actually modeling teachers. So from physics to chemistry to biology, everybody had done it. And so the department chair, Jennifer Di. She basically insisted that I go to a modeling workshop before I stepped into the classroom and I'm so glad she said that. And I went North about an hour and I want you to Western Kentucky modeling workshop with Aaron Debbink and Ben

Buehler. And yeah, it was a fantastic time. It was a mechanics workshop, but it was geared towards 11th and 12th grade teachers. But that was the only one available at the time. So I came back and I started adapting that to ninth grade and I did that for three years and then my wife finished her PhD and got an awesome job in Philadelphia. And so we moved up here and I'm at my current job now, which is Doane Academy.

Mark Royce (03:31):

Ah, and that's in New Jersey, right?

John Baunach (03:35):

Yeah. So we lived in Philadelphia, but it was right across the river in Burlington, New Jersey. It's a small pre-K to 12 day school, about 250 kids total. So about 30 kids per grade level. And you know, it's a small school, you wear many hats. I was hired on as a STEM teacher, but also the director of technology. So kind of the head IT guy. And after a year I got a nice promotion to the science department chair, which I've been in ever since. So I consider myself a "physics and" teacher. I've always been that where I teach physics and some other things. But yeah, so I've been there for four years. It's been wonderful.

Mark Royce (04:18):

That's great. I know that at some point you got excited about the idea of a physics first curriculum flow for the schools. Talk to me about how you got introduced to physics first and then, you know, what it was like helping others get into that. Transitioning.

John Baunach (04:42):

Well, thankfully I was pretty much brought into modeling as I was brought into physics first. So they've always been intricately linked in my mind. The school that I was hired at to teach physics first in 2014, that's when I went to my first modeling workshop and although the workshop itself wasn't geared towards ninth graders, my curriculum was so I had to spend some time adjusting to it, but I came from an education where I took physics in 11th and 12th grade. And I had taught previously at a school with 11 and 12th grade. So I always felt like I wanted the juniors and seniors. You know, I really wanted those kids that were ready to go and ready for physics. But what I realized when I switched over to ninth grade physics was with just a few tweaks and changing a few things about the math, it becomes so much more accessible to every student and it gears them up very well for a chemistry curriculum, and then gears them up well for what I would say is a 21st century biology curriculum. So in a way physics first sets the stage for what I would say is, you know, the queen of the sciences, biology, one that's become very important.

Mark Royce (05:57):

What was it like, convincing others in your department to make that switch and, you know, tell me about the process of transitioning.

John Baunach (06:10):

I have been so fortunate to work where I do. Like I said at my previous school, the transition was already done for me. But when I got to my current position and I was here for about a year and I got promoted to science department chair, one of the first things I wanted to do was take our traditional bio, chem, phys curriculum and invert it. And so put physics first and thankfully the previous department chair had wanted to do this for a long time. And I think he paved the way a little bit for that conversation with the

division head. What I found because we were such a small school, really my division head just said, you know, explain to me how this will support the students, explain to me what you need from me and how do I explain this to parents and our admissions team and our college counseling team. So I was thankful to have a lot of people on board and I think I used some AMTA and AAPT materials that focused on that transition and why it was so important. So I made a lot of different arguments for physics first, but I think I was speaking to an audience that was already ready to hear it.

Mark Royce (07:20):

I also know that you've been exposed and had some dealings with the approaches in computational modeling. Talk to us a little bit about what computational modeling is, how you got introduced to it and what you're finding as you're delving into it.

John Baunach (07:37):

Sure. Well, since 2014 I hadn't taken a workshop. In summer of 2019, I think it was on the AMJ listserv. There was an opening for an NSF funded grant that was integrating computational thinking into physics first. And I jumped on it immediately because when I thought about my experience in physics and I think I said at the beginning, I have two different degrees in physics, no one ever made me take a programming course. And what I realized when I got out into the job market. And then when I got into real research, when I was volunteering at NASA, programming is really one of the most important skills for any physicist or for any scientist. And so when we talk about ninth grade physics, preparing students to be scientists, something that's missing that I thought this fit perfectly in was this idea of computational thinking and showing them that programming is just another tool and another way of looking at the world and actually setting them up to be physicists or scientists or whatever they want to be, scientific thinkers, with programming.

John Baunach (08:46):

So I went to the workshop in 2019 and spent about three weeks down there and had a wonderful time, Melissa Girmscheid and Jesse Dykes were the workshop leaders there and they were fantastic. And I spent a lot of time in the office hours struggling through some things. I very vividly remember spending about two days working on building a flag in the coding language we were working with. And I guess, either I worked hard enough or it was good enough, I'm not sure which one, but they asked me to come and intern as a workshop leader in 2020 and 2021. So I've been on the leader side of computational modeling workshops two or three times since my initial workshop in 2019.

Mark Royce (09:33):

Can you explain what you've learned about computational modeling?

John Baunach (09:37):

Sure. So this grant focused on integrating computational modeling and really computational thinking and into ninth grade physics. And when I think about computational thinking, I think of the traditional markers, like abstraction, like algorithmic thinking, really a differential approach to a lot of physics problems as opposed to a parametric approach, which is kind of a high level way of saying it. But I think the most important thing is that it's just another representation. When we talk about models, we talk about building mental models. We have multiple representations that we ask students to create. So they create graphs, they create motion maps, they create energy bar graphs. A computational simulation is just one other representation of the world around them. So that was something that I think in my mind,

I had always separated programming as this big other thing. When in reality, the writing of the code and learning how to express physics logic in a computer programming language, that is actually just one more chance to show the mental model inside the student's head.

John Baunach (10:54):

So the curriculum that we use or the curriculum that we developed through this NSF grant, it has five units and it's geared towards ninth grade physics. And so roughly the five units are the first unit being energy storage and transfer. And then you have constant motion, changing motion, which is constant velocity and acceleration. And then you have balanced forces and I guess more about forces, so balanced and unbalanced forces. So you have one unit on energy, two units on motion, two units on forces. And we're working on building a sixth unit on momentum. But we're not there yet, but we're trying to encompass all of Newtonian mechanics. And we use a programming language called Pyret, which is developed by an organization called Bootstrap out of Brown University. And we use it because it's developed for ninth grade students, or I would say algebra one students who haven't done programming before, and it helps them link the idea of programming functions with functions in algebra.

John Baunach (12:00):

So they use it to link coding and math, and we use it to link coding and physics together. And so that that's been the very specific use that we've had in our grant and in the resources we've developed. And we do still use a lot of the ninth grade modeling materials. We have just modified them and added a few things and taken other things out to make space for this new representation of a computational simulation. So for instance, we do a buggy lab in unit two, which is familiar to anybody who's ever used the physics resources through AMTA where you have one buggy on the left and one buggy on the right. And then you say go and they collide. And you have to try to predict where on the ground they're going to collide. Well, we have the students just recreate that in Pyret in the simulation.

John Baunach (12:51):

So we have them do that sometimes before, sometimes after, when they do it in the physical world. And sometimes as a replacement. Last year, remote, we didn't have a chance to do it in person. So we did that as a remote substitute. And so, that's what I've seen computational modeling as a nitty gritty curricular material. But stepping back, what I find is most important is that it changes how students see math and its relationship to physics. Because oftentimes we go from motion maps to graphs and then jump from graphs and kind of derive the equations of motion from a graph. And I find coding is another nice half step between that point. And it is a different way. So instead of saying, you know, displacement is velocity times the change in time, we look at it as a differential of the next position is equal to my current position, plus the change of position.

John Baunach (13:54):

And then we just do that a bunch of times, and it's a different equation than X equals VT. It's X next equals X now, plus Delta X. I know that equations are great for podcasting, but it's something that helps to just create one more representation. That's useful. That's very different. And I think expands their way of looking at things because when you get to, say uniform acceleration, you can't use X equals VT anymore because V is constantly changing. You could still use X next equals X now, plus Delta X. So there's an equation that works for all of motion in computational stuff that we never really touch in

traditional modeling. And so, that to me is one of the, of computational thinking and computational modeling is that it lets us look at the world in one more different way and one more useful way.

Mark Royce (14:59):

Oh, that's fascinating. Thanks for helping me understand it at least. So if one of our listeners, a teacher, wanted to learn more about computational modeling, what resources are there for them to investigate.

John Baunach (15:16):

So the most recent resources that we finished this summer during, and after the workshop, those should be on AMTA's website. So any AMTA members can go there. I'm also on the AMTA discord. I know that you can ask some questions, especially in the physics first around anything with computational modeling and some someone will answer. I know Melissa Girmscheid will probably answer before anyone else. She's very good at that. And so I would say the Discord and the AMTA resources are the best places to go.

Mark Royce (15:47):

When modeling instruction was first brought in over 20 years ago with David Hestenes, and, you know, all his wonderful work. It was focused pretty much on physics. And over the years, modeling methodologies have been applied in chemistry and biology. And one of the more recent ones is in astronomy. I know you've had some exposure to astronomy modeling, and I just am curious about what you've learned in that little endeavor on your part.

John Baunach (16:21):

Sure. That's a big question. Like anything in astronomy, it is a wide ranging question, I'll say. I went to the inaugural modeling workshop in Louisville in 2019, actually right after my computational modeling workshop in Phoenix. So, that summer was a busy one for me. So I went to the modeling workshop and I would say the materials there are in a good beta version. They are being implemented now. I haven't had the chance to implement them, but what I found going there was like any astronomy curriculum, there are so many paths you could take. And I think that's where the conversation around astronomy is right now. You could have some teachers who really want to focus on what I would call solar system astronomy. So planetary science, how we know the moon orbits the earth and the earth orbits the sun. Building that heliocentric model in class, I think is very worthwhile.

John Baunach (17:18):

A lot of traditional astronomy courses do it at the beginning of their curriculum. You can also use modeling instruction to build out the evolution of a star. So you could start, you can basically gather data on stars, both intensity and color and create what's called an HR diagram and it tracks the life cycle of the stars. And you can see the main sequence stars and the red giants and other things. So what I love about modeling and astronomy is astronomy is all about gathering data, putting it together in some representation and then finding the big picture. And I think that, you know, astronomy maybe more than anything else that has the clearest path towards modeling instruction, just because historically it was limited by the kind of observations that can make. Almost all the, almost all the observations you can make an astronomy have to do with light.

John Baunach (18:22):

You can have a few meteors, you can have a few comets. You can send some probes up to planets. And now we have gravitational waves, but almost everything has to do with light. And so you have to understand the light model and what light looks like on a camera and why it hits it a certain way. And when you know those limitations of what a camera can see on the light, you can start to build a model out of, okay, well, there's a lot of light on this pixel and not a lot of light over here. And I see it changing. How can I find some sort of rules or some sort of order in that chaos? And I think astronomers still do that today. So I'm very excited to see where this curriculum goes.

Mark Royce (19:01):

So you think you might end up teaching astronomy at some point?

John Baunach (19:05):

I've pitched it for a couple of years. The problem is I pitched it at the beginning of COVID and I think we went into emergency mode. They're very interested in us teaching it. We have a lot of teachers with a lot of goals and electives. So right now I have a teacher who loves engineering mechanics. And I think I gave up my astronomy elective for that one. But he's a fantastic teacher. So at a small school, we work with, you know, a few electives, but they're ready for it whenever, uh, we have some space in our teaching load.

Mark Royce (19:39):

It's a small school. Is it a college prep high school or what?

John Baunach (19:44):

Yeah, Doane Academy is a college prep school. It's a K-12 day school. And I said 250 students, but in the upper school. So the traditional ninth grade through 12th grade, you have about 30 students per grade level. Yeah, it's a very small school. And I always say, I joke that I wasn't a good enough teacher to teach in public school for long where I have 30 kids in every class. So I try to find a space where I can work with fewer kids better. But I'm very excited about the school itself.

Mark Royce (20:17):

So you're the science chair at the school. And you guys have physics, chemistry, biology. Do you have any other science disciplines?

John Baunach (20:31):

Yeah. We have physics, chemistry and biology. Those are our core three subjects that every student takes. And then we have our electives like anatomy and physiology. We have environmental science and public policy, which is something, one of our teachers created. We have engineering mechanics and innovative design and hopefully astronomy, I would say. We also offer some AP courses. We have AP chemistry, AP biology, and I consider AP psychology science, although most colleges don't, but our psychology teacher's in the room with us. So we have a broad swath of science classes. And right now we're just aligning, I would say the spine of the curriculum and making sure that it goes physics, chemistry, biology, and then giving students a chance to branch off from there.

Mark Royce (21:19):

And in those three core science courses, you have developed a modeling approach in all of those. Is that correct with your teachers?

John Baunach (21:28):

At my previous school, we had vertically integrated modeling. Right now, I would say we're in the transition. We just had a chemistry teacher retire after 50 years. And so our new teacher is very excited to take a modeling workshop this summer. My biology teacher, who is teaching the upper level physics course, cause we're in the middle of this transition. He's teaching his first capstone biology course next year. He has gone to a number of modeling workshops. He also really loves the Harkness pedagogy, which, I don't want to say anything incorrect about Harkness, but I would say it's modeling minus whiteboards and plus textbooks. So it's a lot of student discussion. There's a lot of Socratic questioning and it's a lot of student-created learning and I find that that's so in line with what we want in the modeling and in the AMTA community that, where he feels comfortable doing Harkness, I'm happy with Harkness and where he uses modeling instruction. I'm happy with modeling instruction. So, but we are heading towards a vertically integrated, modeling instruction curriculum, which is exactly where I was before this job.

Mark Royce (22:37):

How did you get introduced to modeling?

John Baunach (22:39):

Yeah. So back in 2014, my department chair, when I applied for a job then, she insisted that I go to a workshop, before I stepped foot in the class on the first day. So I was teaching ninth grade physics at the time and she sent me to the one workshop that was available before the end of the summer. And it was the 11th grade mechanics modeling workshop with Aaron Debbink and Ben Buehler in Western Kentucky. And it was three weeks. It was geared towards, like I said upper level physics, but it was absolutely life-changing I would say when it came to being a teacher. I had been teaching for two years or so with, I would say, a traditional method of textbooks and showing kids how I do physics and standing up at the front and feeling very smart and then maybe watching 20% of them get it. And what happened with modeling is I realized now instead of 20% of the students getting it and 80% being left in the dust, I felt like it inverted where I've maybe felt less confident about what I was doing as a teacher, but 80% of my students were with me. And they actually on average were learning a lot more physics than they had before.

Mark Royce (23:53):

So your department, as you are moving them toward integrated modeling, are you finding a welcoming attitude from your staff?

John Baunach (24:03):

Yeah, the teachers in my department, I really try to make sure we do everything together as a team. I am as a department chair, I think my job is to go to the department chair meetings, but the reason they're at the school and the reason that I trust them is that they're the experts in their field. And so I really do my best to not force a teacher into modeling or a pedagogy they're not comfortable with, but I find it really important that they understand the larger goal and that we're all on the same page of having as many students as possible. Maybe not learn science content. I don't think that's the right goal, but I think learning how to think like a scientist, that's the goal we aim for. And so that tiny shift has

helped a lot. And just having our conversations not be about how many units do you cover in chemistry or biology and more about, well, our students really don't understand cellular respiration and where can we kind of start that conversation in chemistry and maybe even in physics when it comes to energy transfer. And so what I'm doing in ninth grade physics will have ramifications for kids two years down the road. And I think when we talk about it like that, not as isolated, sub-disciplines of science, but as one giant unified tree of science, I think everybody gets on board with the mission of teaching science.

Mark Royce (25:27):

Talk to me about how you as a leader have been influenced and what experiences have influenced your thinking?

John Baunach (25:38):

Well, I think I've always had great department chairs to work under before I became my own department chair and I found that they were very good at keeping my focus on the students. And so they would run interference if there was any interference to be run. I still spoke with parents, but if it ever got too confusing or too emotional, let's say, they would be happy to jump in and aid me. And they always made sure that I felt like I was growing as a professional and growing as a teacher. Because we all know that teaching is hard and teaching is never going to be perfect and they did not expect perfection. They just expected me to keep working and getting better. And so that's what I've seen and what I've tried to emulate as a department chair. I hope by my people would say I do that.

John Baunach (26:30):

I also listen to a lot of podcasts, which may be obvious since we're on one now, but I find... There are two podcasts that have influenced my general teaching philosophy. And that's a Cult of Pedagogy with Jennifer Gonzales and Truth for Teachers with Angela Watson. And I find these two women are fantastic educators. They have wonderful people on the programs and it helps me frame my job as an educator and as a teacher in a lens that keeps it from being too overwhelming and too life consuming while still being a good teacher. So I really stress to my department members and to every teacher I talk to, you know, find a balance because you cannot fill these students' cups if you're not taking care of yourself. There's a 40 hour work week, which we, I think we're all promised, but as teachers, we never actually get a chance to experience.

John Baunach (27:28):

And so we'd spend a lot of time in meetings just talking about what do we need to do to make our lives a little bit easier, or when we assign homework, do we need to assign every worksheet in a modeling curriculum if we're using it? Or can we just say do this for extra practice because you we'll see it on the test. And I've moved towards not assigning homework at all anymore, or not grading homework when I assign it. Which is a bit of a shift for a lot of people. But something I find wonderful.

John Baunach (27:59):

And we've also changed to using standards based grading, which is... You know, I think that's actually been a bit bumpier than modeling instruction, believe it or not, because, you know, inside the classroom, I find that parents and administrators, they trust you to be the expert in your content, but what comes out of it and how kids earn grades, especially in the upper school where it has to go on their college transcript or their high school transcript to colleges, there's a lot more anxiety around it. And so

we found that we have to be very open in our communication about what we expect from students, how we assess them and then how they can improve on that grade later.

Mark Royce (28:45):

So assigning less homework, how are you finding that that influences your student learning outcomes?

John Baunach (28:52):

You know, I haven't found that it affects it very much at all. Which was surprising to me. I do a lot of pre-test and post-test, and I found that that does not seem to be a factor. What I think I realize is that a lot of my students -- we're an independent school, but probably not a normal independent school-- A lot of our students have a second job. A lot of our students will go home to environments that maybe are not the best, conducive environments for like sustained quiet study. They may have siblings they have to take care of, they may just be crowded. They may have other things going on. They play a lot of sports. And so what I found was that I had some students who did homework. The ones who did that, they were going to do it anyway.

John Baunach (29:35):

And the ones who didn't do homework were being penalized for something that, for a lot of them, was out of their control. And so what we talk about now, I stole this from Brian Vitalia another modeler, homework's practice. And we tell them, you should do it so that you can be ready for the exam or the quiz at the end of the week. And if they don't do it, I still mark whether or not they turn it in. And if they turn it in, I give feedback. But I don't put it into a grade book as a grade. And what I find is that a lot of students who don't do homework for Monday through Thursday, if we have a quiz on Friday, they don't do too well. And so the conversation then becomes, well, what happened? Why do you think that? And as I said, Brian Vitalia another modeler, he talks about homework is practice. And you don't--- just like in basketball practice, you don't get any points for the goals you score in practice, but it does help you get ready for the game on Friday night. So it doesn't mean you shouldn't go to basketball practices, it doesn't matter. It just means you're not going to get extra points.

Mark Royce (30:44):

That's good. So what would your best tips be to young modelers? Those who are starting out, those who are exploring the idea of modeling instruction, what would you suggest that they consider?

John Baunach (31:01):

I think there's probably two things I could say. One is just an acknowledgement and one is a suggestion. And the acknowledgement is that your first year of modeling teaching is going to feel like your first year of teaching and you're not going to do that great of a job. And that's okay. And I say that because I know some people will be very hard on themselves and I've heard previous guests on this podcast talk about it, but that first year feels like your whole world has been turned upside down. It doesn't matter how much content you know. You may be very good at giving a great traditional lecture. You may have good verification labs, I would say, where you do labs at the end, rather than at the beginning. And so to try to figure out how to do that at the beginning will feel like you're teaching an entirely new class.

John Baunach (31:51):

And so whether it's a new teacher in the field or a new teacher to modeling, I say that a bit tongue in cheek, but like, it's okay to not be great the first year. And just like I was told, as long as you're moving

forward, as long as you're reaching out for help and learning how to get better. And as long as you're reflecting on those days, that don't go perfectly, right, you're moving in the right direction. And I think that leads into my actual advice, which is, do not teach in a bubble and do not teach when you're isolated, because I think 95% of the time as teachers, we spend alone in a room with a bunch of teenagers, which is exhausting if you think about that for too long, but also it's very isolating as an adult and as an educator where we don't get a chance to talk to other teachers and say, well, how would you do this?

John Baunach (32:39):

And how would you do that? One thing I found was, at a previous school, we had lunch together as a department, nearly every single day and a lot of times it was just us talking, but it gave us a chance to just say, well, I had that student last year. Yeah. They're struggling now and not surprised. Here's what I found worked. Or I had an online professional learning community with some other teachers, if I don't have other modelers in my school where I can say unit two in physics is not working the way I thought it should. Can someone help me get it back on track? Just having some sort of support system will make you feel better, but also help you get better. So that's my biggest tip. I would say to new modelers and new teachers in general is don't go in alone and don't expect to be perfect.

Mark Royce (33:30):

So what is like a secret you wish you had known before you started modeling? What are the big ahas, I guess is one way to say this. What are some of the big ahas about using modeling instruction?

John Baunach (33:43):

The thing that comes to mind when you ask that, and I think I had an inkling of this before I saw modeling, but now it was like getting beat over the head with it is knowing how to do science is not the same as knowing how to teach science. And that probably sounds obvious to every educator, but as someone who didn't go into education training, and as someone who just loved physics and thought I could just show my love and have everyone else, you know, be inspired. I couldn't be a dead poet's society teacher. I wasn't that kind of teacher. And no one is. I think that's something I realized with modeling and why I feel like it's okay to say it's okay to not be, you know, super inspiring. You're super great. Or to not feel like you are the smartest person in the room, maybe, is that teaching science and teaching physics is different than doing it.

John Baunach (34:37):

And so it's a new skill set. It's something you have to learn and something you have to practice that's different than practicing physics or studying it yourself. I feel like if I could go back in time as a college student, I'd be a much better physics student now that I know how to teach. Because I know what I need as a student that I didn't know I needed before. And just also recognizing that not every student is going to be like you. I was a student that was very, I would say I was a good student. I was someone who did the homework. I was someone who showed up. I took a lot of AP courses and I think modeling makes it very clear that not every student is like that. And not every student should start there. And I think maybe modeling gives you an opening to teach students how to become better at learning where traditional lectures and traditional teaching, I just think it's very easy to gloss over that and to think that because I gave a good lecture, that means everyone got it. And that's not really true, you know? So that's the biggest thing for me.

Mark Royce (35:46):

How does modeling instruction meet the need for your students' wellbeing and their learning process? How would you say modeling instruction measures up in that assessment?

John Baunach (36:00):

I think that modeling gives the opening to allow students to bring exactly what they have to the table. They don't have to be a good math student or a good physics student before they walk into my classroom. I want students to come in as they are with all their trauma around science and math, with all their baggage around education, with maybe their own self doubts. And I think modeling allows these students to open up, to be vulnerable, and then to realize there's healing in this community, both of, you know, trust and camaraderie and allowing students to say, oh, that was a great idea. I'm so glad you said that Sarah or I'm so glad, you know, I think modeling gives a chance for student voices to be heard. And it's only when students, only with humans can say something inside that maybe they are afraid to say, and then have it accepted by the community.

John Baunach (36:56):

That's really the only time that we, as humans can heal. And I think a lot of students in education today have been hurt by teachers. Not intentionally, but something that we, as I said, we're not perfect. We're gonna fail sometimes. And I think if we accept that as part of the students that we let into our classroom, that we're going to give some space to let you heal to let you say I wasn't a good science student last year, but this is a new year and maybe I'm at a new school and maybe I've got a new teacher and maybe it's a new trimester, a new quarter. I get to start over anytime. I want to kind of redefine who I am. I think that is something modeling does so naturally because it's so tied to how we as humans think

Mark Royce (37:46):

The read that I did, that you sent me about who you are a little bit, one of the things you mentioned was that you think it's important for teachers to find some way of assessing themselves and your success each year. Talk to me about your journey in that and what you would recommend to others.

John Baunach (38:07):

Yeah. I think that as educators and especially as scientists, we should be willing and ready to maybe perform science experiments on ourselves as educators. And at the very least we should be ready to gather data on ourselves. And so the best thing I've found is, for me, I like to use pre- and post tests. That just puts me in a position to say, what do these students know coming in, before I've done anything to them before I've caused any damage or done anything good. What are they coming to me with when it comes to their knowledge, when it comes to their comfort with science, when it comes to their discomfort with science, maybe, and then at the end of the year, say, well, what's changed because that's a great way to measure what was my impact on these students and whether or not you're using modeling instruction, whether you're using some other pedagogy or maybe you're not sure what kind of pedagogy you're using and you're just trying to get through the day. I think it's still important to get some sort of baseline for yourself of saying when I'm in the room, this is the change that I, that I've make in students' understanding or in their confidence or whatever metric you care about. And then from year to year, you can just say, well, if that's what I care about, how do I make it better? How do I give them better scores? And I don't think it should be something that is formally assessed or assessed for a grade. And I don't think it should be something that is, you know, a standardized test for the stage

or for administrators or whatever. I think it can be something that you keep track of in some way. Because I'm not in a public school, I don't have to do as much standardized testing.

John Baunach (39:47):

So for me, pre and post tests are not as big of a deal because they're not taking a bunch of other ones in addition to mine. But if you feel like your kids are tested out, maybe you should, you can keep track of who's raising their hand in class. At the beginning of the year, you know, once a month, or if you have discussions who's contributing. And then at the end of the year, who's contributing and maybe look back and say, well, did I get as many people as I wanted to? And you don't need a hundred percent, maybe some kids just don't want to contribute but they show it in other ways, but come up with something that you, as a teacher feel is important for kids to leave your classroom. And I think once you do that, that's really, I think our job as an educator, as professionals, that's one quantitative way to get better. So I use pretests. I used the classroom test for scientific reasoning. I use the FCI, I use the TUG-K too, sometimes, just throwing out some names that people can look it up.

John Baunach (40:48):

It always helps, and I have some other things now with the computational modeling stuff I use as well to say how was their project in the beginning versus how was their project at the end? But I think it's just important that you don't have to share with anybody. I don't force any of my department members to share it with me, but I think it's a really important thing as an individual to reflect on how can I be the best teacher I can be.

Mark Royce (41:13):

That's really good. Awesome. This has been a great conversation and I want to thank you very much for taking the time to spend with me to talk about modeling. It's been very enlightening and I appreciate it very much.

John Baunach (41:27):

Thank you, Mark. I've really enjoyed it.

Mark Royce (41:30):

Yeah, me too, man. So I will look forward to seeing you again sometime in the future.

John Baunach (41:36):

I hope so. I'd love to chat.

Mark Royce (41:37):

I hope you have a great week this week.