Mark Royce (00:00):

Hi, Marta. How are you?

Marta Stoeckle (00:02):

I'm good. How are you?

Mark Royce (00:04):

I'm doing pretty well, a little warm in California today, but it's okay.

Marta Stoeckle (00:09):

Warm here in Minnesota too.

Mark Royce (00:12):

So, tell us just for our listeners who don't know you, tell us a little bit about yourself and then we'll dig into some cool discussion about modeling.

Marta Stoeckle (00:24):

So I teach high school just outside of St. Paul, Minnesota. I mostly teach physics, but I get some chemistry and some earth science here and there. I've been teaching at my school since 2009. I'm also a PhD candidate in STEM education at the university of Minnesota, where I'm doing research on gender equity in physics classrooms and especially how students coming to see themselves as physics people through classroom experiences fits in with that.

Mark Royce (00:58):

When did you discover modeling, when did it come into your life?

Marta Stoeckle (01:03):

So I think it was around 2014 or 2015. I had been teaching ninth grade science and I was getting ready to switch to teaching our 12th grade physics course in the fall. And since I was going to have all the sections, I had this really cool opportunity to put a lot of thought into what direction did I want that course to go? What did I really want it to look like? I mean, as long as I was going to have to learn a new curriculum anyway, why not take this opportunity to really reimagine it? I started doing some digging into, ...the course is really designed for students who are planning to go on to college. At that point it was especially targeting students who were planning to major in some kind of STEM field. So I started digging into what kind of physics course is good preparation for college physics courses and modeling is one of the things that kept coming up.

Marta Stoeckle (02:00):

So I went ahead and I joined AMTA to get access to the materials. I started using them that first year without having been to a workshop. Though I was pretty consistent. I'd been able to join a video chat with some people who were pretty experienced at modeling and did a lot to keep me going through that year. After that first year, I was able to attend a workshop here in Minnesota, which did a lot to get me better at leading the student discussions. I was able to just keep going further and further with modeling.

Mark Royce (02:32):

I'm curious about what kind of difference, how you feel the workshop experience really helped you latch onto the modeling concept in your classroom?

Marta Stoeckle (02:42):

The first year I was doing the modeling materials, I really struggled to lead good discussions. Partly I hadn't seen examples of what does a good board meeting look like? What is a good student led discussion about problems look like? And I was trying to visualize it from the teacher materials and from conversations with friends of mine, from blog posts. But one of the things that workshop really did is I got to experience some of those types of discussions and dig into the nitty gritty of like, Scott Hoven, my workshop leader would do some pointing out particular moments in a discussion. And why did he ask that question right in that moment, which is something that's really hard to replicate in any kind of written text, which was the sort of stuff I was relying on. And so having that experience of seeing someone who knows a lot about facilitating those discussions, doing it and breaking down his teacher moves then gave me a much better toolkit and a much better idea of what I was shooting for when I came back in the fall.

Mark Royce (03:54):

What would you say -- you've been using modeling now since what year did you say it was?

Marta Stoeckle (04:00):

It was, I think 2014, maybe 2015,

Mark Royce (04:05):

So seven years or so you've been using modeling in the classroom. What would be your number one tip that you would give to new modelers or experienced modelers? What's your one or two great tips that you've learned over the years?

Marta Stoeckle (04:22):

I think one of the biggest things for me was to not get discouraged when lessons went a little bit rocky, especially that first year. One of the things I've learned, helping some other teachers start to use modeling in their physics classrooms and doing some teacher leader work in my district is especially when you've had a chance to get decent at that really traditional instruction. When you can lead a good lecture or give your kids or a really solid cookbook lab, when you shift to something like modeling instruction, it feels really different. And it's a very natural part of the learning process to have some moments that don't go how you want them to. And I think when you're used to feeling pretty competent and pretty skilled in the classroom, when you have those moments, it can be really disheartening. And so finding ways to work through those moments and to use them for your own learning.

Marta Stoeckle (05:20):

And one of the things it took me awhile to see is that even though I did not, I felt like a worst teacher. The first year I was doing modeling instruction overall, because just my lessons were very clumsy, but my students still learned a lot more physics than they had in previous years. So really trying to find that evidence that, okay, I don't feel great every day, but my kids are clearly learning this stuff and I'm

learning how to get better at the teaching I'm trying to do so that then the next year I could come back and it felt even better.

Mark Royce (05:56):

Wow. That's really cool. I saw an article called musings on instructional shifts that you had shared. Talk to me about that because I'm sure that modeling was a part of a shift for you in your approach in the classroom. Talk to me about your musings on instructional shifts.

Marta Stoeckle (06:18):

Yeah. So what prompted that. This year I ended up getting an opportunity in my district. My title is I think science standards or secondary science standards implementation TOSA, which is a mouthful, but the short version is I'm leading some work for the 6-12 science teachers to transition to some state standards based on the next generation science standards. And one of the things I've really been charged with is to figure out how do I take teachers who've gotten really comfortable with a very traditional approach with verification labs, with lots of lecture where they rely on telling students a lot of things. How do I help those teachers move to instruction where students are doing more figuring things out for themselves. And I actually just wrapped up a few days of curriculum writing with our sixth grade science teachers who are launching some new curriculum in the fall.

Marta Stoeckle (07:14):

So we're going to be going all in on trying to teach differently. And so I've been doing a lot of reflecting on my own experience shifting as well as watching teachers. One of the big things I took away. I think a lot of modelers, we kind of fall into "ah textbooks they're for propping up ramps. We don't need those." And so I was kind of dismissive of the idea of adopting a core instructional resource at first. But when I look back at my own shift, having the modeling curriculum available to me as a core instructional resource was something that really helped me start thinking differently about what my teaching could look like. And then with the sixth grade teachers I'm working with watching how the conversation has shifted once they settled on a core resource to pilot, they ended up not going with the middle school modeling instruction, but they went with something that I think has some really similar underlying philosophy and seeing how they can focus a lot on seeing how the phenomena are carried through the unit, and being able to use this as a tool to better understand how to teach in this way has been really eye-opening for me.

Marta Stoeckle (08:30):

And then another thing I've been able to bring from my experience with modeling... I had to do a lot of learning. How do I help students develop the skills to have conversations, to make good whiteboards, to communicate their thinking, to design and experiment ... all those things that aren't strictly the physics content, but that they need to know how to do to get at the physics content in a modeling classroom. So I've done a lot of learning about how do you scaffold that for students? How do you help them work effectively in groups? And so I've been able to do a lot of PD for the teachers in my district where I share some of that learning to help them see, all right, my kids can't do this really, really cool stuff right now, but here's things that I can do to get them to the point where that really cool stuff, you know, we see in classroom videos and the like is very doable for my students.

Mark Royce (09:24):

I know that you're very interested in educational equity and you've been studying how classroom experiences influence a student's science identity, especially as it relates to underrepresented students. Can you talk to me about what you're finding in your explorations there, cause I I'm very interested in, I think a lot of people are interested in equity in the classroom.

Marta Stoeckle (09:59):

So one of the things I've done as part of my own research is I interviewed a group of students at the end of the school year and asked them questions about self-efficacy and physics identity to try to get at what were some of those things that helped shape their beliefs. Labs came up with almost every single student as something really important. What was really interesting to me is I had a lot of students who talked about the guided inquiry labs and the paradigm labs that are an important part of modeling as something that really helped them feel like a science person. And when they were able to see how the data they took led to that physics knowledge, they felt a really strong sense of ownership over their learning and really started to feel good at physics, which was super cool and super exciting.

Marta Stoeckle (10:51):

What was kind of fascinating to me is I also had students who talked about some of the frustrations and mistakes and all those things that happen very naturally when kids are doing guided inquiry, that led some kids to think they weren't as good at physics. And I even had some students who talked about both views in the same interview. So they talked about labs as really making them feel good at physics and really making them feel bad at physics. So one of the things I'm thinking about is, how can I do a better job of normalizing some of those frustrations and you know, occasionally having bad data, things like that, those things that seem to hurt self-efficacy during labs, how can I do a better job of normalizing that to minimize that negative impact while still maintaining that positive impact of kids figuring things out for themselves?

Marta Stoeckle (11:47):

One of the places I saw gender differences in those interviews was students' perceptions of whether I thought they were good at physics. The boys really consistently when asked if I thought they were good at physics, talked about assessments where they had high scores and they said, well, you graded it. You gave me a high score. You must think I'm good at physics. Girls tended to talk about assessments where they had relatively low scores as evidence that I believe they're good at physics. And they talked about the feedback and then having retake opportunities in my class as a way that they saw, I must believe they can improve so that even though they didn't do well today, they saw all this evidence that I believed, all right, you can still get there and you can still do this hard stuff, which that to me was really powerful. And so how do I get more students to take those growth mindset messages from feedback on quizzes, because I'd love for every kid to get a quiz with a low score and think, oh man, my teacher thinks I'm great at physics.

Mark Royce (12:58):

Now what you were just talking about-- is this related? You did an article called gender self-assessment in classroom experiences in AP physics. And this is related to that work. Is that tied to your PhD pursuit?

Marta Stoeckle (13:15):

It is. Yeah, I did. Um, I've done this research as part of my PhD work and then, three paper dissertations are really common in my department where instead of doing one big study, you do three smaller related

studies. And so my advisor and I are thinking that this might be a good paper, number one in a three paper dissertation. So I'm hoping to, for the next piece, get some video of students working in small groups, cause the interviews also raise some questions about gender dynamics in those small group interactions. So I'm hoping to do some more in-depth analysis of what's going on there.

Mark Royce (13:56):

Talk to us about what else you've learned in your studies here.

Marta Stoeckle (14:00):

Yeah. So with the small group stuff, in the interviews, when students, when I asked students, if they thought their classmates believe they're good at physics, a bunch of the boys talked about, well, my classmates ask for my ideas, they ask me questions. They give me positive feedback when I share what I'm thinking. And so clearly they believe I'm good at physics. And so they were getting all of these messages from their peers that their peers had a lot of faith in their abilities. The girls that I interviewed, only one of them talked about those kinds of experiences. And what was really interesting is she didn't cite them as evidence that she was good at physics and her peers were seeing that. She talked about them as evidence that she was essentially fooling her classmates. She talked about, you know, I'm generally a good student, but I'm not that good at physics. And so they're just taking that general good student and assuming I'm good at physics. And so one of the things I'm really curious about is are boys getting more of that feedback from peers, or our boys and girls perceiving that feedback differently. And so boys are putting more weight on it or interpreting it as more true. Whereas if girls are tending to take that belief that they're somehow fooling their classmates, then they might be less likely to talk about it. So I think what I need to do is actually observe some groups and see what's going on there.

Mark Royce (15:35):

How do you plan it? What are your strategies for getting that group work data put together? What are you thinking?

Marta Stoeckle (15:42):

So probably what or what the plan had been for spring of 2020 was for another grad student from my program to come in with some cameras and some audio recorders. I was gonna ... I was going to plan the groups out ahead of time to have some groups that were all one gender and then some groups that were mixed gender. And then we'd just plop a camera and an audio recorder down at each of the tables that I wanted to really focus on. And then do some discourse analysis, which means you get a transcript of the audio. Sometimes you add details about things that kids were doing, and then decide what we really wanted to focus on and do some kind of coding to try to figure out what were the key moments. That was planned for, uh, I think April of 2020 was when we were going to do that. So that fell apart and then this year has just been so strange that we decided, you know, what let's try for next year.

Mark Royce (16:41):

So you're still planning to, to pursue that, to do that?

Mark Royce (16:48):

Interesting. How are things going with your schoolwork, your high school at Tartan?

Marta Stoeckle (16:54):

So I ended up taking a leave of absence this year. I have some health issues that make too many hours in front of the computer tough to manage. So teaching remotely was going to take a pretty big toll on me. And I was fortunate to get some pretty flexible part-time opportunities. So I did the teacher leadership work with my district. I kept taking courses for my grad program and then I've been doing some content writing for pivot interactives, but then I'm all set to go back in the fall. And I'm really excited to be back with kids.

Mark Royce (17:30):

Yeah. Most teachers I've talked to feel the same way. Pivot Interactives. You've been doing some work with them, for them or to contribute to their library. Is that correct? Tell me about that experience for you and about what you think about, I know pivot interactives came up on the radar, about what a year or so ago that I heard about it and, seems pretty exciting.

Marta Stoeckle (17:53):

Yeah. I've been using it in some of my classes for a couple of years now. I had piloted some chemistry activities. We have a very, very highly tracked chem program. We have four different levels of chem and I piloted some of Pivot's chemistry stuff with our most basic chemistry track. So over the summer and last spring, Peter, who's one of the founders of pivot interactives, realized that one of their big gaps is most of the activities in the main library are really written for an AP level, are very open-ended. And a lot of teachers needed things that were more structured to be able to support students asynchronously or support students who needed a little more coaching through the math. And so he reached out to me in August and said, Hey, we'd love to hire you to write activities that fill this niche using existing videos. And so that was kind of the first project I took on. They're currently labeled as "scaffolded" in the library. Trying to figure out how do I still get kids doing some of that scientific thinking, but put some tools in place to give them some feedback along the way with multiple choice or help narrow their focus a little bit. So it's not so open-ended.

Mark Royce (19:19):

For me, and for those who may be listening, who aren't familiar with pivot, or might be interested in learning more, how do they find out more about pivot interactives?

Marta Stoeckle (19:31):

The website is pivot interactives.com. And then kind of our bread and butter is what we call interactive video, where we have a studio team that records really high quality videos of all kinds of different experiments. And then we set it up in a way where students can collect data directly from that video

Mark Royce (19:54):

Interactively. Yeah. Cool. Pivot interactives.com. You used a term in, I read a bunch of stuff about you and, uh, you use the term about -- you like to front-load vocabulary,

Marta Stoeckle (20:12):

Or actually I don't like to front load vocabulary.

Mark Royce (20:15):

Okay. That's it. The context was comparing front-loading versus... Okay. Explain that to me.

Marta Stoeckle (20:23):

So in my teacher prep courses, especially in the ones on reading strategies, one of the big things that was really pushed is you should front-load vocabulary. And so if you think about a lot of textbook readings where at the front of a section, they have those bolded vocab words and definitions for those words. I was taught that that is best practice. You give those kids all those right away, but the problem is you are giving kids ... If you give the kids all that vocab at the start of a unit you're giving kids maybe like half a dozen of these really technical words that have really specific meanings. We want to be really careful about how we use them. And it's really overwhelming for kids. Around the time I was getting into modeling, I did some other professional development with actually with the person who's now my doctoral advisor, where I was introduced to this idea of activity before concept and then concept before vocabulary.

Marta Stoeckle (21:27):

So you skip that front-loading. You dive straight into doing some kind of hands-on activity. So like with the modeling stuff, instead of introducing the word velocity at the start of the unit, you have kids go start playing with those tumble buggies. As kids work through the activity, they start to build up this concept. So they get the concept of, oh, the buggies travel the same distance for every second. And as they talk about that, you get to the point where there's kind of a need. Well, wouldn't it be nice if we just had a word for this? And then as the teacher, you whip out the word, how about we call it velocity? And I think that general approach is something that is probably pretty familiar to a lot of people who do modeling instruction. No matter what phrasing they use to describe it, but my experience has been, especially with ELL kids and especially with kids who have learning differences, especially around reading, that's been really beneficial because by the time that we get to that technical word, they have something in their head to attach it to, instead of trying to cram in all of these complicated words before they really have any meaning.

Mark Royce (22:44):

Right. So do it before you define it?

Marta Stoeckle (22:48):

Yes. So like the, essentially the kids, you know, they, they do a lab, they start talking about a thing and they essentially work out a definition before they have a term for it.

Mark Royce (23:03):

I know that you do some instructional leadership with other teachers in your district or in your state. I'm not what, what's your experience been along those lines?

Marta Stoeckle (23:17):

So mostly it's been in my district, though I've had a few opportunities to go elsewhere. So the PD that I met my advisor through was working on STEM integration curriculum. And so after going through that professional development as a participant and writing some curriculum, I had some opportunities to get some training on instructional coaching and leading PD and work with some teams of teachers who were going to be implementing a curriculum to help them with the content knowledge and with the STEM integration instructional strategies. So that was kind of, that was really fun. One of the groups I worked with was a group of fourth grade teachers, and they were getting ready to teach a unit on lever arms. At the same time, I was doing a lot of relearning rotation to teach AP physics one for the first time.

And so to be able to have those conversations where let's really dig into what does a fourth grader need to know about levers at the same time, as I'm thinking about what does an AP one kid need to know about torque, and then to be able to kind of see how does that concept build across grade levels was so much fun.

Marta Stoeckle (24:31):

Plus it was a neat experience to be able to visit some of the classrooms, to do some of the coaching pieces, and just see an elementary classroom in action, which is not surprisingly a very different perspective than high school.

Mark Royce (24:47):

What grades are you teaching at the high school?

Marta Stoeckle (24:51):

Uh, 11th and 12th grade primarily.

Mark Royce (24:53):

So your chemistry or your, I mean, your primarily physics is in what, 11th grade?

Marta Stoeckle (25:01):

Uh, physics is 12th grade. Though we just made some changes to our grad requirements that we think might get some 11th graders starting to take physics.

Mark Royce (25:11):

I know that you, I think it's more recently have joined the AMTA team. Is that on staff?

Marta Stoeckle (25:22):

I was elected to the board last year. And so I'm coming up on my one-year anniversary as member at large.

Mark Royce (25:30):

You've also been involved with the communications team. Is that right?

Marta Stoeckle (25:38):

Yeah. So one of the things the board started thinking about last summer, actually even before I joined the board was... The listserv had been a really great tool for a long time, but there were some limitations there there's limitations to an email listserv. And there were a lot of new tools out there that could provide some new capabilities for building a modeling community. And so, Theresa Marks the board president at the time asked me to be on the communications committee. So I got to work with Teresa and then Holly McTernan and Kelly Warble, and then Wendy Hehemann who works for AMTA. We did some trying to figure out, well, what would we want out of a communications platform? And we eventually decided that Discord seemed like a platform that would do a nice job of promoting more interaction-- is really what we were hoping.

Mark Royce (26:43):

Now I'm not really familiar with Discord other than I've heard it announced through the AMTA that there's, you guys are trying to build a community of AMTA members there. Why did you choose it over some other platforms, social media platforms? I mean, help me understand a, what Discord is and how it ties into the AMTA community

Marta Stoeckle (27:11):

Discord was originally designed for gaming. Um, so people, so it has voice chat and text chat capabilities. And so a lot of people use it to, when you're playing a video game online with people somewhere else in the country, you can use something like Discord to talk to them while you're playing. We were really intrigued by the text chat capabilities on Discord. You can do a lot of replying directly to people, which we thought would make it easier to have structured threads. There's a lot of ability to attach files. So for example, if somebody has a really cool project that they came up with, or there've been some conversations about standards-based grading, where people are able to share their list of standards over the Discord server. But then having that ability for multiple different kinds of chatting, we're hoping is going to be useful. So like right now, most of the conversation has been typed out by text, but it does have that voice chat capability. And so I think, Karle Delo, who is, who ended up getting hired recently as our marketing specialist, I believe she's hosted some happy hours on the voice channel. So people can actually pop in there and talk to each other.

Mark Royce (28:39):

Live conversations with multiple people, multiple voices, or one-on-one.

Marta Stoeckle (28:46):

You can do any of the above. How ever many people join the voice chat channel. That's however many people the conversation is between, and then we set up the texts so that there's different text channels organized by topic. So for example, as a physics person, I can join all the physics channels. And so there's a spot where I can go to talk about AP physics. There's a spot for people to go talk about physics first. And then about physics in general, we also have channels for things like equity. We have channel for assessment so that people can go to those places and find what conversations have been on discord so far on that current, on that particular topic, as well as start new ones.

Mark Royce (29:33):

Okay. You, you triggered something, you mentioned physics first as a topic. How do you feel about -- you teach physics in 12th grade -- physics first promoted as a ninth grade course? What are your thoughts on that? I'm curious. I hope I'm not opening up.

Marta Stoeckle (29:53):

I've taught some ninth grade science. My district does, or currently does two trimesters of earth science, and then one trimester where we pretend to cover all of physics in 12 weeks. And I've taught that one trimester physics course. When we've had conversations about physics first, the main pushback I hear is the math. You know, ninth graders can't solve quadratic equations, so they can't do physics, but there's a lot of really interesting physics you can do without quadratic equations. I think really focusing on graphical solutions can make a lot of kinematics really, really accessible to ninth graders, even without that more involved math. And so you have to do some really thinking about, and really planning for what does a physics course for ninth graders look like, but I think it's doable. And then I'm really intrigued by that storyline you can start to build across different grade levels if they have that

foundation in physics. Well, when they get to chemistry, they can bring all kinds of ideas about energy. They can start applying ideas about forces to bonds between molecules. So I think that could be really valuable for a chemistry course, which then provides all kinds of foundation for biology. So I've never taught it, but I think it has a lot of potential.

Mark Royce (31:23):

Yeah. That's, I think that's the argument I hear for the physics from the physics first people is that it helps to lay a foundation that the other sciences can build on, and always refer back to. So it's good to have it in there. Anyway, I won't go into that and make that a thing. So back to Discord, which is a interesting name to me, for something that's trying to create community, because discord, the term means chaos or conflict. So anyway, I always thought that was a funny name, but, how can people who are interested, that are connected to the modeling community, get connected to the discord channels that you guys have set up?

Marta Stoeckle (32:12):

So Carly has sent out some emails to members with a link to join the Discord server. And so if people click on that link, it will take them to a page where they can set up an account and join our server. Once they're on there, there is a welcome message where they can choose what channels they want to join. So for example, I've got a colleague doesn't teach any physics, so she could care less what's on the physics channels, but would love to see those chemistry conversations. And so she can react to that. So on the welcome message, you can choose some emojis and which emojis you choose decide which channels that you automatically get assigned to. So you can pick all of them. You can pick just one, you can pick none of them. Um, and then once you've joined some channels, you can start messaging.

Mark Royce (33:05):

Cool. Do you know how many people are connected so far in the modeling community?

Marta Stoeckle (33:11):

I think we're up to a few hundred. I haven't checked the total count lately, and there's been a lot of good conversation on there, which has been really exciting to see.

Mark Royce (33:21):

That's great. I think the more interaction and the more conversation and communication between modelers is just really healthy. You know, it's like the more we stimulate this cross-pollination of ideas, the better off we all are.

Marta Stoeckle (33:38):

Absolutely. And there's so many really contextual challenges that someone might have. You know, you're struggling with something based around your school's schedule or based around some quirk of the courses your kids have taken before. And there might be somebody out there who has dealt with something really similar and can help share their strategies or help be a thought partner to figure out how do you address that with your students?

Mark Royce (34:09):

Yeah. That's great. So Marta what are your plans for-- do you know if you're going back face to face, first of all, do you know yet?

Marta Stoeckle (34:20):

Right now my district is operating on the assumption that we'll be at full capacity fully face-to-face in the fall though, my district is launching a fully online high school that kids can opt into. That's something we were working on prior to spring 2020, and this past year just accelerated those plans.

Mark Royce (34:41):

What are you going to be doing in the meantime between now and then?

Marta Stoeckle (34:45):

Let's see, I've got a few things to write for my grad program. Pivot has plenty of things they'd like me to work on, and then hoping to get out for a few camping trips, visit Northern Minnesota a time or two yet this summer.

Mark Royce (35:00):

Nice. That's great. Well, it has really been fun talking with you and very informative. I really appreciate your contributions that you're making to the science community in general and especially the modelers. And I wish you the very best of luck.

Marta Stoeckle (35:19):

Well, thank you. It was fun chatting with you as well. Thanks for having me.

Mark Royce (35:22):

It's been great. You take care.

Marta Stoeckle (35:25):

You too.