

- Mark Royce: [00:00](#) So tell me like how you originally found out about modeling.
- Erica Posthuma: [00:05](#) I believe it was 2010 or 2011. Um, a friend of mine, a colleague that I worked with at a previous school who was looking for some summer professional development, she found it on our DOE website for the state of Indiana. And it just said chemistry modeling instruction. And it was two weeks. And so she didn't want to do it alone. And so she came to me and she said, Hey, I found this professional development that we could do at Marian university. And I was like, well, what is it? And she said, Oh, it's called chemistry modeling. And I was like, well, I already use models. I don't need to go to that. And she's like, well, we can hang out for two weeks and get paid to do it. And I was like, well, this sounds like a great idea. So I went for two weeks and I remember like on the on day one I walked in and the instructor said, after we had our seats and she sprayed some air freshener and she asked us to draw what happened. And I drew, I drew wavy lines of scent moving around the room and then we all presented our whiteboards and I realized that I hadn't drawn any atoms and I was like, Oh boy, I'm in trouble now because I have been teaching chemistry for 10 years and I don't know what I'm doing. So that's how I first came. That's how I first learned about it.
- Mark Royce: [01:21](#) That's really cool. So now you got paid to go. I don't think everyone has that great gift given to them. So I don't want to set up our listeners to think that if they go to one of these, they're going to get paid to go. Do you know how that kind of works in general?
- Erica Posthuma: [01:39](#) Yeah, so, um, several years ago we had a professor at the university of Notre Dame where he worked in the physics department and he applied for and received several grants to fund modeling. He found modeling. I'm not sure how he came, how he first found it, but when he found it in his mind it was how science should be taught. So he wanted to bring it to Indiana. Cause at the time when he found it, there was no one in Indiana doing it. So, um, with that grant he was able to provide stipends to teachers who wanted to give up two weeks of their summer to come and learn about this. Some years the stipend was provided as cash. Like we just received a check. And then the very first year that I did it, I believe that the grant was through the department of ed. And so participants didn't -- like I didn't receive a check, but I received a stipend where I was allowed to buy equipment for my classroom.
- Erica Posthuma: [02:34](#) So when you go to the modeling curriculum and you're doing all these cool labs and we're using these Vernier sensors and this

was, you know, a decade ago, my classroom didn't have, I didn't have anything, I didn't have any Probeware or anything like that. And so I used my funds to buy a classroom set of the really old lab quests cause they were like brand new then. Yeah. Um, and so that's what I use my, my funds for because when after I the workshop, I absolutely fell in love with this and I felt like I had finally found the tools I needed to teach science the way I knew it should be taught and I wanted to be able to do the labs I wanted to be able to do. Um, all the demos and things that I had seen when I did the workshops. So I spent the money on, on the probeware.

- Mark Royce: [03:19](#) pretty progressive approach. It sounds like -- was this just a school district that did this or was this a state or a regional thing?
- Erica Posthuma: [03:27](#) Um, it was Indiana and it was open to teachers in the state of Indiana. Basically they were public school teachers, they were private school teachers. We did have some teachers who were using this to like refresh their content knowledge. We had some teachers that were there because they were being asked to teach chemistry and they weren't licensed in chemistry. They were getting emergency licenses. And so it was kind of fitting a neat various needs for different situations.
- Mark Royce: [03:53](#) So for you personally, what was the biggest aha about modeling when you got introduced to it?
- Erica Posthuma: [03:59](#) Yeah, so I still remember this. Um, my instructor was Ray Howanski. Um, he's a curriculum director in Pennsylvania. Now. Ray had this way about him where we would ask questions and he would just say, "Oh, well, isn't that an interesting question?" And then he never answered the question. Um, so, um, at first it was really frustrating for me and, and Ray and I have become friends since then. And so he did. He has told me that several of us in that workshop challenged him frequently. Um, I went on and took, uh, several other workshops from Ray as well. But for me, the, the aha moment was when we were dissolving things in water and we had a, worksheet that asked like, is this a chemical or physical change? And I wrote down physical change because that's what every textbook had always said. And he was like, "well, that's interesting. Why is it a physical change?" And I said, well, because the textbook says so. And he's like, but what's your but why? Like, can you defend that? And I'm like, no, because I don't know that's just what the book says. And it was through that discussion that I started to realize I actually had agency over my own understanding and my learning and I didn't need to turn to someone who I felt was more of an

expert or more knowledgeable. I didn't need that because if I could reason through my answer and I could provide evidence and I could discuss it with other teachers or with other colleagues, peers, students, and they could question me on it and I could defend it. I didn't need to, I didn't need a book anymore.

Mark Royce: [05:37](#) Ah, yes. That's great. Well isn't that kind of what all new modelers are trying to do with your students is to help equip them to do their own learning and their own, uh, find their own understanding as they tackle questions?

Erica Posthuma: [05:53](#) Yes. Cause it was when before I could realize that my students agency over their learning, I had to realize that I had agency over mine. So that was a huge aha moment for me. It gave me a lot of confidence that I was, I was very much lacking. Modeling not only gave me the tools, but it gave me the confidence to be able to go in to my administration and say, I'm going to do this and here's why. I started small. I started by doing that like in my administrator's office, telling him like, this is what I'm going to do. Here's why and here's the research behind it. Here's why it's going to work. Here are the roadblocks that I'm going to have and here's how you can help me get around them. From that, I then took it to the state level. I did some state level presentations.

Erica Posthuma: [06:37](#) Um, after that, you know, those little stepping stones built me up to becoming more involved at the national level with the American Chemical Society and with the American Modeling Teachers Association. I started volunteering wherever I could. I presented at national ACS conferences. I was the co-coordinator when the ACS national was in Indianapolis, in my hometown. I coordinated the high school day program. Then from that, the Journal of Chemical Education approached me and asked me to write something for an academic journal about modeling instruction and AP chemistry. And in my wildest dreams, I never thought I would ever publish. I never thought I'd ever read an academic journal and then to be asked to publish in an academic journal, I was blown away. So I did that. I wrote something for their special edition, I believe it was 2014 in the fall when that came out. And I went through the process of peer review, which was a very humbling experience, but it also made me a much better writer. And then from that I was offered a position as a lead contributor for the Chem Ed Xchange, which is the online companion site, I suppose, to the Journal of Chemical Education. Uh, the target audience there is high school. Um, we also have like two year college and some middle school

activities we include. And so I was a lead contributor there for several years and now I'm an associate editor.

- Mark Royce: [08:05](#) You know, as I was reading your bio and some of the comments that I've collected from you and about you, I see how active you've been, but I got to ask you this, were you already really active in the science world of education before you discovered modeling or was it modeling that kind of sparked this energy in you?
- Erica Posthuma: [08:28](#) It was modeling that sparked the energy in me. I was not active at all, but to be fair, I was also, you know, young. I was, I, I think I took my, my first workshop when I was 31. And so I had, if I have the dates right, I gave birth in February and then took my workshop in June.
- Mark Royce: [08:51](#) Oh boy.
- Erica Posthuma: [08:51](#) So I had an infant, so I mean, was young. I had a very young family and so I was not very, um, very active outside of that. But it was the confidence that modeling gave me, it was the community of modelers that supported me. It was colleagues that I met that challenged me, that pushed me, that made me question and evaluate and reflect on my practice. That made me a better teacher, which opened so many doors and gave me so many opportunities that I never would have had if I had never found a modeling workshop.
- Mark Royce: [09:26](#) Wow. That's, that's pretty exciting. Yeah. So one thing I read, um, said that you collect antique and vintage chemistry and science textbooks. Have you been doing that for awhile?
- Erica Posthuma: [09:45](#) Um, so I do like to go antiquing and so I'll pop in and out of antique shops every once in awhile. And at one shop, I think I was shopping with my mom in my hometown and there was like a 1950s chemistry textbook and she's like, Oh, Erica, this is, you know, this is kind of neat when she'd look at this. And so I opened it up and they were particle diagrams and I was like, what is this? And so it was 1950s and, um, I just happened to open to the gas, like the chapter on gases and everything was explained in proportions and with particle diagrams. And I was like, I need this. And it was like a dollar. So that was my first book. Um, and then after that I started kind of branch out cause you can get some really old textbooks for like not a lot of money.

Erica Posthuma: [10:32](#) Cause weirdly enough people don't care about chemistry textbooks from 1865. Um, but my, my oldest textbook I believe is um, maybe 1853. Wow. And it predates the periodic table. It still discusses phlogiston and um, it talks about energy as caloric, um, and how it, it transfers from one thing to another. And so, um, I do, I get that out sometimes and I read it to the kids when we start talking about energy. Um, and I say like, we haven't always had this model. Like this is the model. Like this is published in this college textbook. So you know, this is what was believed and we collected better evidence and new evidence. And then they had to go back and change the model. And that's what we do in class all the time is we're constantly clicking new evidence and going back and changing the model. I do have the textbook that's referenced in some of the, the older sources that were drawn from when chemistry modeling was created. Sienko and Plane is the textbook. And it's this like beautiful, like art deco style. It's not that old, but it's, um, it's really, it's really neat. And so you can read through like kind of some of the things that we see in our curriculum and you where it comes from. And so I liked that. That was cool.

Mark Royce: [11:56](#) I think it's really great you share the history, the past of scientific development to show the, the students that it's not a static thing, that they're learning some stodgy thing that everybody has known forever, but they are actually learning what is at the cusp of the cutting edge of scientific knowledge today. And I would hope that would encourage them to think that maybe I can be a part of that progression. Yeah.

Erica Posthuma: [12:25](#) And I think that's really important. Um, and that's what I hope that they get from it. You know, and sometimes they'll have kids come in and be like, can we look at your really old books? Um, and I'm very lucky that, uh, one of my best friends that works with me at my school, she's a Bookbinder by training, so she's, she teaches art. One of the classes that she teaches is bookbinding. And so sometimes I can find books where the covers are coming off and you know, they're not in great shape, but, um, there's some really cool information in them and so she can rebind them for me and so that they'll last a little bit longer. Um, my favorite thing is when I'll flip through an old book and I'll find like little class notes like tucked inside or sometimes I'll find like little love notes that, you know, from a college textbook. I think that's really fun. So

Mark Royce: [13:10](#) I was just remembering what you were saying a couple minutes ago about right after you had your first workshop. One of the authors that you told me you read was Robert Millikan and he said, I doubt if I've ever taught better in my life that in my first

course in physics. I was so intensely interested in keeping my knowledge ahead of that of the class that they may have caught some of my own interest and enthusiasm. And I think your enthusiasm is being translated to your students as well. I would hope.

Erica Posthuma: [13:44](#)

I would hope so. I have had, um, well just this year, I have a young lady who she so in, in Indiana, at least in our school when freshmen come in, I take biology, sophomores, chemistry, and then they can choose after that they can choose to go physics or they can do an AP class. Well this young lady came in as a freshman and she had already had biology, so she was a little bit ahead. She took chemistry one as a freshman that put her in organic and biochemistry, which is a class that I teach it put her in that class as a sophomore. This year, she's a junior and she's taking AP chemistry. So she's out of chemistry classes. There aren't any more that are um, you know, normally offered. We do independent studies and we do, you know, things like that we could create a class for her.

Erica Posthuma: [14:29](#)

But she came to me this year and she said, I don't have any more chemistry classes to take. I would really like to do an independent study and I want you to be my advisor. And I was like, well it depends on the topic cause I, I'm not super confident in some parts of it. Like if you want to do electrochemistry there's probably somebody better that can help you with that. She's like, I want to do chemistry education, I want to learn about how we learn. And she's like, I really am interested in the way that you teach and the and why you teach that way. Um, and then the grading system that I use, I use standards based grading, which at my school, um, I'm one of the only people that does that. So, uh, she was very intrigued by that and she's like, I want to learn more about it. Like is there a class? And I was like, well, you came to the right place.

Mark Royce: [15:14](#)

Yeah.

Erica Posthuma: [15:15](#)

So, um, I think that we're going to have a class on the science of learning next year.

Mark Royce: [15:20](#)

Awesome. I think the science of learning is really what modeling is trying to employ. You know, from everything I've seen in my -- and I'm not a teacher by the way. I'm not a science guy. I'm just a tech guy, techie, you know, audio and video dude. But my wife, because of her involvement is why I've gotten involved and it has been fascinating. But one thing that I know about my wife is that her intense desire to be effective as a teacher drew her to the modeling instruction methodologies. But it was also

driven by her desire for the kids to know that the teacher cares about them. And I'm quoting you when you said, I think students learn better from people who they know care about them. So I tend to get to know my students pretty well. Can you expound on why that is about the way you think and kind of how it drives you?

Erica Posthuma:

[16:21](#)

I always was willing to work a little harder when I thought that the teachers were invested in me. Um, I went to a big public high school. I'm a, I'm a public school educated person. I went to a big public high school, I went to Indiana University. It's a huge public university. And you know, having teachers -- knowing that my teachers cared about me, that was not something I took for granted because oftentimes, you know, they had this huge student load, um, you know, and so it was kinda hard. But the teachers that you remember and the ones that impacted you are the ones that you felt connected to. And it's not necessarily my favorite subject area. You know, where that happened. But it was a class I was willing to work in because I felt like they were invested in me. And so being able to give that to my students, especially at the type of school I'm at, we have a really high achieving humanity students. We have really high achieving math and science students as well, but our humanities kids are like, we really recruit into the humanities. So they come into chemistry, very intimidated. They're intimidated by the math and they're intimidated because they don't think that they're quote "math kids" or they've been told they're not "science kids." You know, they're really good writers, but science and math doesn't come as easy to them.

Mark Royce:

[17:32](#)

Another author you mentioned was Bryant. James Bryant Conant. That's it. He said, I don't see how a person can go very far in any branch of science without a thorough understanding of mathematics. Do you remember when we were talking about, I'm not a math kid, I'm not a science kid. I'm a writer, or a musician.

Erica Posthuma:

[17:57](#)

Um, I think that chemistry can be accessible to students who aren't necessarily math kids. The way that chemistry modeling approaches mathematical relationships is through logical reasoning and proportional reasoning. The information that is presented to students is presented in a multitude of ways. I ask my students to provide explanations graphically, mathematically, narratively, symbolically. So the more connections they can make between these different representations, the more real the math becomes. My class is often the first time that students will see a graph that represents something. They see graphs in math, but it's not

representative of a data set. It's a graph. Right. In my class, the first semester we spend a lot of time in graphing and I make them write out a sentence like for every one gram of water there is one milliliter so that they have to make meaning of what the graph is telling them.

Erica Posthuma: [19:01](#) We talk about what does a Y intercept mean? What should the Y intercept be? If this is the data we're looking at, what should that Y intercept be? Should it be a zero or should it not be a zero? If it's not a zero, why is it not a zero? So we have to talk about what the graph looks like and why it looks that way and it's the first time that they really start to see why a graph is useful and what a graph can provide us when it can give us predictability, power. We can have the power to predict if we can get a correlation.

Mark Royce: [19:30](#) So you just said that the chemistry coursework is accessible to kids without a strong math background, but do you feel like, uh, it can be used to help push their understanding of mathematics as well?

Erica Posthuma: [19:46](#) Yes, I do because they start to see how one variable affects another and they can start to see how mathematical relationships affect other variables. So especially like it comes, it comes out a lot in the gas unit. Um, we look at a series of data points and um, ask them to predict what the answer is going to be before they actually do the math. And I always, I had always taught the gas relationships by using  $PV = nRT$  or  $P_1 V_1 = P_2 V_2$  where my students set a plug numbers into an equation and get an answer. They couldn't evaluate the answer to see if it made any sense. They didn't know, they couldn't predict what the answer should be really. Um, and in fact they probably didn't, you couldn't even tell me if the, if the volume should go up or down if pressure increases, they probably couldn't have done that prior to teaching with modeling, I gave a gas laws exam and the most missed question of the entire year was on this test and was a question like if the volume of a gas decreases by a third, what will happen to the pressure?

Erica Posthuma: [20:54](#) And my kids couldn't answer it because there were no numbers there. They couldn't plug it into an equation cause they didn't have any numbers. And so now I can give that to a chem kid after, you know, half a semester. And they're like, that's the easiest thing in the world. I'm like, why? Why can't your kid to answer that? I was like, cause I was a bad teacher.

- Mark Royce: [21:15](#) No, you just didn't, You were a little less informed. Yeah. So you mentioned earlier in this conversation about the um, the sequencing. You mentioned how your school, the sequencing was biology first. Yes. Then chemistry, did you say?
- Erica Posthuma: [21:36](#) Yes. Bio, chemistry and they can choose something.
- Mark Royce: [21:39](#) Okay. So there's a lot of push these days for a physics first, the sequencing. I'm curious about your thoughts on that.
- Erica Posthuma: [21:48](#) I would love an opportunity to teach in a physics first environment. I would love for my school to be able to offer a physics first environment. Um, so if students come into chemistry and they have a basic understanding of physics, and when I say a physics first, um, I mean a conceptual physics. Many places when you talk to physics teachers, I've had physics teachers tell me, Oh, you can never do physics first. The kids need to have trigonometry precalc calculus in order to do physics. And I say, that's not true. That is absolutely untrue. You can teach so much physics without any of that math. You can do it all in algebra. And I get a lot of pushback from physics teachers who don't want to teach conceptual physics because they don't think it's challenging. And I disagree with that because I think the conceptual physics can be much more challenging than physics that uses calculus because you can't rely on the math to give you an answer.
- Erica Posthuma: [22:45](#) You have to reason through it. You have to understand relationships and you have to understand basic forces and what's happening. You can't just plug something into an equation where it spits out an answer. So if my kids had had an understanding of basic physics, I could expand on things like Coulombic attraction. You know, I could go into more depth and I could probably move a lot faster in chemistry, uh, cause as it is now, when my kids come in and see me, this is the first time that they see positive negative charges and attractions and what we eventually learned to call bonds, um, which you know, that, and then when we talk about like the electron, if they had the conceptual physics first, my class would be even much even more robust, even more rich than what it is now.
- Mark Royce: [23:31](#) Cause they'd walk in with a more concrete foundation in that area. Yes. [inaudible] that's cool. So Erica, many teachers are being required to meet NGSS standards these days to be shown through testing. How do you feel that modeling can be a part of addressing those requirements?

- Erica Posthuma: [23:53](#) Um, so at my school we have started to look at taking the uh, standards outlined through NGSS and seeing how we already align with them and looking for opportunities to incorporate better alignment. So chemistry at my school is the only course taught through modeling. Uh, biology and physics -- they are not. Um, I have tried to incorporate some, most of my AP and my organic class is taught through modeling pedagogy as well. And what we found when we start digging into this is that I can point to parts of my curriculum and say I'm aligned to NGSS. I'm aligned to um, some of the bigger goals. Like students can formulate, refine, evaluate, testable questions. Students can synthesize and develop models. Um, students can analyze and interpret data. Students can construct explanations based on evidence. Like these are things that are tenants of modeling. They are ingrained in the curriculum in every unit throughout the entire year.
- Erica Posthuma: [25:03](#) So I didn't have a whole lot of work to do in aligning my course. But what this did when we started really looking at our other classes is it highlighted for the other departments where they could incorporate more things, um, that were more modeling. Like, like how can we do more inquiry? How can we give students more of a chance to evaluate data? How can we give students more of a chance to interpret data? Um, how do our assessments align with evaluating the goals that we've outlined? So modeling, um, has already given me a headstart in that department. Like I have a great foundation on which I can just build and make it better.
- Mark Royce: [25:49](#) I think some of our schools crank out teachers who have a very rigid way of thinking about their role as a teacher. I know you've got some opinions that probably are a little different. Can you share a little bit about that?
- Erica Posthuma: [26:06](#) Well, first of all, I would say that, uh, you know, I spent 12 years of my career in public school. I had a student load of about 180 kids. There were some things going on at the state level in my state that were, it was making it very difficult to be the kind of teacher that I wanted to be. So I was very lucky to have found a school that not only supports my philosophy but supports me as an educator and as a professional. And one of the ways that they provide that support is by ... Like I have a much smaller student load and I have very supportive and administrators. My administrators never tell me no, I get a "Let's look at that" first. Um, so I would say that my philosophy about education and what you just described, there is no one size fits all teaching method or there is no one size fits all classroom or strategy.

- Erica Posthuma: [27:03](#) You know, for every student, every student is different. I do believe that there are strategies and philosophies that encourage deeper thinking, deeper understanding and developing skills that are necessary. I think that there are definitely like strategies that are better at that, but by no means do I believe that I have all the answers. Um, I attended a workshop once where there was a quote about the strategy that we were talking about and he's like, this isn't a silver bullet. There's not one problem that's out there. There's not one challenge that's out there that we need to address. There's a multitude of challenges that are out there. You know, my, my end goal and one of my students just asked me this too, like at the end of the year, what do I want my kids to be able to do? I want to be able to improve science literacy period.
- Erica Posthuma: [27:54](#) I want, I want to be able to improve science literacy. If my kids can't recite the molecular weight of carbon, I really don't care. What I want my kids to be able to do is question. If they see something, I want them to be able to question it. If they see a phenomenon they don't understand, I want them to be able to question it. I want them able to question it and I want them to be able to design a way to collect information to answer it. Or if someone gives them an answer, I want them to challenge it. I want them to have the confidence to know that they can challenge it. They can ask questions about it. I asked them simple questions like when you lose weight, where does it go? You know, we studied that law. Mass is conserved, law of conservation of mass.
- Erica Posthuma: [28:38](#) Mass is conserved. Well, when I got pregnant I gained 60 pounds and then I lost it and my baby didn't weigh 60 pounds. So where did it go? And they look at me like, why are you asking me this question? But then they start thinking about it and they start, you know, they start throwing out answers. They thought they knew the answers to this. And then when they say it out loud and they look at what we've been studying and they're like, Oh, that doesn't make any sense. Or how does a straw work that gets all, they love that question. How does the straw work like it just does. There's really a reason why. Like God, my life used to be so easy. 'Till you start asking these questions.
- Erica Posthuma: [29:22](#) I don't care if they, if they memorize the periodic table, I don't ask them to do that. I don't ask them memorize periodic table. You don't need that to survive life. But to be a productive member of society, you need to be scientifically literate and solve problems, solve problems.

- Mark Royce: [29:37](#) So Erica, I know that you're pretty active with social media. Can you share with me a little bit about what you're involved with, the different social media channels and kind of what you're discovering in that process? Because it's a wonderful burgeoning method of communication, I guess it's not that burgeoning. It's been around for awhile now, but uh, tell me a little bit about what you're learning and promoting and all that kind of stuff.
- Erica Posthuma: [30:03](#) Um, well I am the Twitter moderator. I am the Twitter account for AMTA and I also have administrative access to the AMTA Facebook page. In addition, I do a lot of tweeting surrounding my role as the, as an associate editor for ChemEdX. So I, I run two different, I run two accounts. I run my personal account and I run the AMTA account. I think that between the two of them we have over 4,000 followers. So
- Mark Royce: [30:30](#) well go ahead and give us those Twitter handles.
- Erica Posthuma: [30:32](#) Okay. So, um, AMTA is @AMTATEACHERS and then, and my account is @EPOSTHUMA. So depending on what account I'm on, I have, I have a different role on my personal account before I started taking over for the AMTA account on my personal account, I started building a PLC online. So, um, within the public school I taught in before my current position. Um, I had some great colleagues but not everyone was using modeling and not everyone was teaching in the sequence I was teaching in. And it's really hard to be the only person doing that and it's really hard to be writing 100% of everything that you need to do. Cause I did not have a textbook. I was not using a textbook. I was writing everything. I was using the chemistry modeling curriculum, I was adapting it.
- Erica Posthuma: [31:23](#) Um, I was writing quizzes and tests and worksheets and activities and I was really trying to develop new things for my classroom to meet the needs of my kids. And it was very overwhelming. So I went on Twitter and I was like, #chemmod, I need help with unit two, you know, and I just say the topic and then I would have people respond and they'd say, well, I made this, try this. Or you know, like, have you looked at this website? And so I learned so much just from talking to people on Twitter. I met some of my very best friends on Twitter. I connected with, um, a teacher named Ben who was teaching in Minneapolis. I had never met him before, but he tweeted out a link to his blog and I read it and I was like, this person's real smart.
- Erica Posthuma: [32:08](#) I want to be his friend. So I DM'd him and I started talking to him and I was like, Ben, you have a great voice. You have a lot of

things to share. I would really, really love to see you come to a national ACS event. We're doing. Um, a lot of modeling presentations. Uh, this was back when ACS was in, uh, Kennesaw, Georgia. Um, a couple of years ago, I have never met Ben in my life. We start talking on Twitter and he's like, well, it's so expensive. I'm like, I will get you a grant. So I showed him how to apply for a Hach grant through ACS and he got the grant and he came to Georgia and we met in person and, um, he gave this amazing presentation. So he's this young teacher, um, very first national conference he's ever been to any presents and he kills it.

Erica Posthuma: [32:52](#) Does great. Um, and so now he and I are really good friends now. We talk all the time. Um, I met one of, uh, she's probably one of my soulmates. Um, and she's an AMTA a member, her name's Ariel and she teaches in Boston. And uh, we started talking on Twitter one day and now she's one of my closest friends and we've probably only ever been in the same room, maybe four times in our lives, but we talk all the time. We get online and we'll go on Skype and we'll write a quiz together or we'll develop a lab together. So that's been really powerful.

Mark Royce: [33:25](#) well that sense of community is, it seems to be a kind of in the DNA of the AMTA as well. I mean it's been around for 20 years. I know and it's maturing, but I think the social media channels that should be tied to it could really help stimulate even more of that sense of community that the AMTA members have.

Erica Posthuma: [33:47](#) I agree.

Mark Royce: [33:48](#) So talking to those who are listening to this podcast right now, what would your advice be if they're either an old, long time-- not old-- longtime member or considering it or just being introduced for the first time to the idea of modeling instruction? What, what are the things you'd like to say to those folks?

Erica Posthuma: [34:08](#) as the face of AMTA on Twitter? If someone reaches out to me on Twitter and asks me a question either through a direct message or they tag me in something and they ask me a question, I try to respond to every one of those. So there has been many times when I'll get a question on Twitter and I will respond to that person and say, here's my cell phone number, call me, we'll have a conversation or they need to find a resource. I will find it for them. I will direct them to it. But I feel like that's very important that our constituency or our membership knows that you have someone there. You're not just like putting something out into the universe and no one's reading it. Like we are reading it, I'm reading it. I want to

address those questions and make sure that the teachers have what they need. So that goes into part of like what it means to be part of this community.

Mark Royce: [34:56](#) Yeah, I think there's room for more to help you with that. I would, I would guess in the networking and you know, so if anybody's listening and wants to jump in and really partner with Erica, that would be great.

Erica Posthuma: [35:11](#) Especially bio people. Bio. I need some, I mean I have some physics resources. I have several teachers I'm close with that are physics resources, but our bio community is our youngest community. Um, and so, uh, anything that we can do to kind of strengthen and support our, our bio modelers, that's always helpful.

Mark Royce: [35:30](#) Great. We haven't mentioned the AMTA website here yet, but would you want to talk about that and how it resources members?

Erica Posthuma: [35:39](#) You can go to the members-only website and check out the, the resources they have been updated. They're not all brand new but some of them have been tweaked. Some things have been rearranged. We've added some resources. We have distance learning modules, we have happy hours where you can sit and do a like a video chat with other members from across the country and you can connect to people that way. You can ask questions. There's usually a board member or um, you know, Colleen or Bill will be there to kind of help out. Every once in a while we'll have those video, those online meetings about a specific topic that could be interested. You could be interested in. I think those are all listed on our website, on the members only website. Many of those are member benefits. If you are considering becoming a member, reach out to the community, talk to people, ask them what modeling has done for them. We have distance learning modules available for members and for non-members. Every once in awhile we have resources that are freely open. We want you to come in and see what we can do. We want to invite you to come be part of the community. You know, while you can become a member and have access to all of our materials without ever having a face to face workshop, nothing replaces that face to face workshop.

Mark Royce: [36:53](#) Every modeler I've talked to says that. I hear that a lot. Explain why.

Erica Posthuma: [36:58](#) Well, first of all, at least, and speaking from my experience, I was not taught like this. I was taught in a very traditional setting

where I sat in a desk and the teacher told me what to write down. I wrote it down, I memorized it, and I put it on the test. When it came time, when I started working through these modeling materials in my workshop, it was very challenging. It was very frustrating and it was very humbling because I'd been teaching for 10 years. I had two degrees and I'd been teaching for 10 years and I had been successful. Like my AP scores were the highest scores in the school. My kids went on and became doctors, like my kids were successful and I could not figure out what a BCA table was. I could not figure out how to logically think through relationships because I was too reliant on the algorithm.

Erica Posthuma:

[37:47](#)

And that was really humbling for me and very frustrating because it's a mind shift and how you have to think about these things. And I'm speaking for myself, I'm sure that there are many chemistry teachers out there that understand things in a way that I didn't understand them. But if I hadn't had that community and that support and someone walking me through it and doing the labs with me so I could see it and I could do it before I had to apply it, I either would have given up and not done it. Cause I would've thought I couldn't do it or I would not have been doing it well. There's no way I could have implemented this well without practicing white boarding and in groups practicing questioning in groups because that is a skill that I think in, I facilitate now like I'm a workshop leader and so we have that conversation before we start white boarding and I say, you know, my colleague who teaches with me, his name's Ryan.

Erica Posthuma:

[38:45](#)

I say like Ryan and I have been doing this for a very long time. This is not something that came naturally to us. We have practiced this. We have sat down for years and written questions that we're going to ask in order to elicit the responses that we need. So this is not something that just happens without practice. You must practice this. We've read research on it. We've tried different things. We've seen what works and what doesn't work. We can anticipate the misconceptions we can anticipate the answers. We know how to craft these questions to arrive at the solution we want and when you don't have that face to face workshop and you don't get to practice that and you don't get to be in student mode and you don't get to practice in teacher mode, it really makes implementing this material very, very difficult.

Mark Royce:

[39:31](#)

You kind of answered my next question cause I was going to ask can somebody get to be an excellent modeling instructor

without the workshop? Was kind of the question I was coming to.

- Erica Posthuma: [39:43](#) I'm not going to say no cause I think that there are some phenomenal teachers out there
- Erica Posthuma: [39:47](#) I know that for me my kids wouldn't be doing as well and benefiting as much as they are from this. If I hadn't done the workshop and I continue to do the workshops I did, I think I took three or four as a student. I took three or four workshops before I started leading them. And then in leading them, I also, I still get to practice every summer cause I'm still, I'm asking questions every summer and I'm looking at the materials every summer and I'm learning from my teachers that I'm training, I'm learning from them every summer and I continuously learn from my co-facilitator. Ryan, I mean, without him I wouldn't be half the teacher I am, I mean he pushes me, he challenges me, questions me, makes me question what I do. And, um, he's just been a great resource. So
- Mark Royce: [40:29](#) you're really, uh, promoting the idea of community again in what you just said? Yeah.
- Erica Posthuma: [40:36](#) Being a member of AMTA, the biggest benefit that I have received is the community that I have become a part of is that collaboration. It's the way they challenged me to think about things. You know, they pushed me to be a better teacher and we also have a lot of fun together. Um, one of my modeling friends who I met on Twitter, we're in this little group chat now, three of us that are all modelers across the country. There's a, there was a catch phrase that we were throwing around for a while that AMTA, we're a culture, not a cult.
- Mark Royce: [41:12](#) Yeah,
- Erica Posthuma: [41:13](#) no, there's some people out there that think we're a little weird. Um, we're not, we're, we're, we're just a group of teachers who are passionate about the same things, who energize each other, support each other. And I think we are pushing science education in the direction it needs to go.
- Mark Royce: [41:29](#) That's awesome. Well, Erica, I want to thank for taking the time to talk with me about these things and it's exciting to hear the great things that you're involved with. And it's also very encouraging to know that our students around the country are being influenced by wonderful people like you and other

modelers that are so passionate and so committed to the students and to the work they're doing. So thank you so much.

Erica Posthuma: [41:56](#)

Oh, you're welcome. It was really fun talking to you. You too.