

Mark Royce ([01:18](#)):

Hi, Dan.

Dan Peluso ([01:19](#)):

Hi, Mark. How are you?

Mark Royce ([01:21](#)):

I'm doing well, living in California and the smoke is not bad today.

Dan Peluso ([01:26](#)):

No, I can see the skies. It's not red or orange and that makes me very happy.

Mark Royce ([01:30](#)):

Yeah. Well, I was on up against the Sierra and you're in the Bay area. And we had both had lots of different issues with the fires, any harrowing or, or interesting experiences that you want to share?

Dan Peluso ([01:45](#)):

Well, I usually wake up 5:30 or 6 in the morning and I believe it was a Wednesday and I get up at six and go to get my coffee. I set it on an auto and it was pitch black dark in my house. And it's usually at least a little bit light at that time. Right. And I was, this is a little strange. So then I go into my living room and it's, it feels just as dark as night and the windows have this strange eerie glow to it. I thought I was dreaming or something. It was really weird. And then, then I'd go outside and the whole sky is orange. And then, you know, the whole day was just this freaky kind of dreamlike state. And we had all the posts on the news where people were showing the skies in San Francisco and they were red and orange. And so it was, it was just a weird experience.

Mark Royce ([02:33](#)):

This, this has been the strangest year, and the fires. I've never, you know, I'm 60 and I've never seen in my lifetime, anything like this, you know, and I've lived in California my whole life.

Dan Peluso ([02:48](#)):

Well, hopefully, it's something to learn from. I mean, Australia had the same phenomenon happen last year with their fires. And this has been something that's been predicted by climate scientists for decades. And, you know, these events are going to continue to happen, but with more intensity and more frequency, if the whole planet doesn't start to come together and do something about the human impact on our world and on our climate.

Mark Royce ([03:17](#)):

That's absolutely right. So we're going to dive in to your world, which is astronomy education, science education in astronomy.

Dan Peluso ([03:29](#)):

That's right.

Mark Royce ([03:29](#)):

Do you ever have problems saying a-strom-oney?

Dan Peluso ([03:33](#)):

I have problems saying a lot of words. In fact, if anyone out there listening, if they want to tally all the words that I mispronounce and then let me know. I won't be hurt 'cause I mispronounce things all the time.

Mark Royce ([03:47](#)):

We will have a transcription posted on the website.

Dan Peluso ([03:51](#)):

Do you know, what's fun about mispronouncing words too. And it just made me think of something is, well, you know, with education, we always focus on the answer, right. And the correct answer. And I think that is just completely dead wrong and how we should be thinking about education and there's this example that Neil deGrasse Tyson talked about in a video that I watched, where he was giving a graduation ceremony speech. And he said, we have these students at a spelling bee and they're supposed to spell the word cat. And the first student says C A T and they're like, that's right. And then the second student says, K A T and that's wrong, dead wrong. And then the third student spells it completely dead wrong. Like, I don't know, X, B, D. Right. And then the K A T is marked just as wrong as the completely off the wall one, even though phonetically it's the same and in the dictionary phonetically, it'd be spelled that way. You know? So I don't know. I just thought of that tangent. That's going to be me in this podcast.

Mark Royce ([04:49](#)):

That's a great opening to some of the stuff I want to talk to you about because in my little bit of research. I found some things about you and I want to dive in now, I'm going to start with a controversial quote that I read from you.

Dan Peluso ([05:07](#)):

Good. Let's hear it.

Mark Royce ([05:09](#)):

You said I would argue that grades do not matter.

Dan Peluso ([05:13](#)):

Yes. And I will stick to that and anybody can come fight in their way to me. And I will completely stick with that statement because of the falling. So if you think about all the people that have been extremely successful in the history of humankind have some of them, maybe have had great grades. I mean, well grades, how old are grades any anyways, how long have we been giving grades? What do you think Mark?

Mark Royce ([05:38](#)):

At some level of judgment, people have been doing that since time began probably, you know, toward one another,

Dan Peluso ([05:44](#)):

But in schools, like how long have we been doing that in schools you think?

Mark Royce ([05:47](#)):

Oh, I don't know the actual...

Dan Peluso ([05:50](#)):

A couple hundred years, maybe 150 years? I don't, I don't know. I'm just guessing too. I don't know exactly how much, but I mean, we've had schools for a while, but, you know, I think the point is, is that there's been people that have been successful not based off of their grades. And some of those people have dropped out of school or college and maybe have gotten average grades or below average grades, but they've still made a huge mark on society and have been innovative. And it wasn't about the schools that they went to wasn't about the GPA that they got or the test scores that they achieved. In fact, a lot of schools are getting rid of standardized tests because they find that there's a lot of inequalities in them and a lot of biases in them and they don't really test you for what you know, and your abilities and that can actually be kind of harm harmful to our society. But what does make people successful is their initiative, their drive, their ambition, their curiosity. And we don't, we don't cultivate that in schools. We don't teach that in schools like we should.

Mark Royce ([07:00](#)):

Yeah. And I, I hear a hint of Yong Zhao in that.

Dan Peluso ([07:06](#)):

Yeah. So Yong Zhao, and if the listeners aren't familiar is this really inspiring education reformer. And I enjoy him a lot and I found out about him when I got my masters of education. So I got my masters of education at the University of San Diego in 2016, 2017. And I student taught at a school called High Tech High Media Arts. And they're one of the schools that is most well known, I guess, around the world, apparently, at least that's what I was told, for what they do with project based learning or PBL for short. And, when I was researching it, I found this quote from him. And I tell it to my students on day one. And you know, I've only been teaching for a couple of years, but every year, so far, the first day I tell my students this quote, "what makes someone successful in the 21st century is definitely not your ability to memorize facts. What will make someone successful is your relentless capacity to innovate, to create. It's your ability to network, to make friends from your own circle and from other countries, it's your ability to see through challenges, to look for opportunities in problems and to take action, to change things instead of waiting for someone else to do something."

Mark Royce ([08:27](#)):

That's a great statement for your students.

Dan Peluso ([08:31](#)):

In fact, I tell them on day one that the American education system has failed them. I'm completely honest and blunt with them. You know, I tell them that they shouldn't believe everything that I tell them. I tell them that they need to be skeptical and they need to think for themselves that they need to be curious and cultivate their creativity, that they need to work with each other. And the world that we live in today. Okay. If you want to be successful, then you have to be able to innovate. You have to be

creative and you have to be able to think for yourself. I would argue that these are also really important aspects of what make a great society in a democratic world.

Mark Royce ([09:12](#)):

Teaching them how to learn.

Dan Peluso ([09:15](#)):

Yes. And I think that's something that ...Wait, what is this podcast? What's the show?

Mark Royce ([09:22](#)):

Science modeling talks.

Dan Peluso ([09:23](#)):

Oh, yes. Yeah. So modeling, right? And I think modeling actually helps with that tremendously because what does modeling do? It allows students to work like a scientist, to work together, to collaborate with each other, to be creative, to evaluate evidence, to be skeptical, but also, you know, to encourage their curiosity and wonder, you know, the things that we want, scientists or the things that scientists do well that drive great science. We want our students to do that. And they're not going to do that if we use the traditional model, which is based on, you know, a grading system, which is based on, you know, a direct instruction model where they have to take tests, just regurgitating information, you know, they're not going to know how think they're not going to be able to weigh evidence and know what is true and what is not true based off of that,

Mark Royce ([10:19](#)):

I read in your blog. You think you share with your kids how to think, not what to think. Expand on that a little bit.

Dan Peluso ([10:28](#)):

I mean, there's this great cartoon in that blog blog post with a student, with their -- literally --their brain opened up. And then the teacher is just dumping information into their head. And, you know, that's our traditional model of education, right? Is this one way path, the currency in the classroom are grades and information. And to cultivate this idea of letting students, you know, know how to think, we have to completely change how we do education and a lot of great teachers, like modelers and education reformers, like Yong Zhao and people that do PBL. And there's a lot of people out there that are trying to do this. And I think unfortunately, the education system is still based on a model that is, you know, over a hundred years old. It's kind of like this like industrial line of just trying to get people to listen to instructions and follow orders. And, you know, this is also really bad for, student culture and student empowerment. And, you know, we drive out the culture of students and we're not real with them. It just needs to change completely, I think.

Mark Royce ([11:47](#)):

How would you... Okay, you're King of the education world. How would you make those changes?

Dan Peluso ([11:56](#)):

I would first off not be the King because I want to be a good educator and I want to educate other people to do that. But if I were to try to inspire or motivate people in what to do, I would say that they need to keep an open mind. And listen to the different ideas that people have that are research based to show that this helps people. You know, we want to create a classroom that is gonna get the students excited about being there, not hating to be there. Like how many times the students like call out sick, or like, whine about going to school. I didn't want to go to school a lot of the time and I didn't like it. And I'm sure there's a lot of students that feel that way right now. So how can we make it a place where they actually want to go there? Well, you know, they need to, they need to be able to follow their passions and they need to be able to follow their curiosities and they need to be able to make choices and they need to be able to work together. And their cultures need to be embraced. And if we can find some way to do that and to cultivate their creativity, which, you know, I'll come back to Yong Zhao again, he and a lot of people that he works with say that we completely crush the creativity in our schools. We kill it at a very young age, you think about the kid jumping in a puddle and then, you know, we're, you know, "stop jumping in a puddle, you're making a mess" or, you know, "stop playing around because you're, you're going to create a mess" or something. We drive the curiosity and the creativity out of them and think about all the wonderful and brilliant minds, the Einsteins and the DaVincis and, and all the, all these creative ideas that we don't cultivate because our system doesn't really doesn't do that. And I don't have all the answers to how to do that. I don't know. I just know that I feel, and a lot of people feel -- it's not just me -- that how we do it, isn't right. And that we need to do something about it. How are we going to do that? I don't know. We got to work together. We have to talk about it. And we have to, we have to keep an open mind and we have to, we have to do our research and be willing to take a risk. Right? There's no great change unless...we don't make progress unless we take some risks and try things out.

Mark Royce ([14:25](#)):

I was curious about what your thoughts are, because I grabbed a paragraph off your blog. If I could, if you'd indulge me to read this. "If we replace the education system into one that encourages and develops collaborative processes, creativity, problem-solving, curiosity, and other reasoning skills for all students, regardless of color or gender from the earliest age, through high school and beyond, I claim we would transform our society into a conveyor belt of movers and shakers, innovators, free thinkers, and happy driven citizens." I love that.

Dan Peluso ([15:11](#)):

Thanks. I like it too, but I guess I'm a little biased.

Mark Royce ([15:16](#)):

Sure. But the problem is the culture of the education system, as it exists. Our education system is pretty locked in, and there are a lot of people who are with you that are wanting change.

Dan Peluso ([15:33](#)):

Yeah. There are.

Mark Royce ([15:34](#)):

So, you know, I guess the question comes back again to how do we do that?

Dan Peluso ([15:38](#)):

I think the people that also agree that there needs to have this change -- they need to keep on doing what they're doing and they need to not give up. And then the teachers that are younger, or even the teachers that are older, any teacher really needs to not be afraid to try new things. A lot of people are afraid like, Oh, you know, I've had some experiences in the very short little time that I've been teaching that, I was like, "Oh, well, I can't do that because they want us to focus on, this: these standards." And we have to get this test by this date. Right? Or, you know, I have to align with this test with this other teacher. So I have to give the same test, you know, and I felt myself like, "Oh, I have to do that because that's what I'm told that I have to do," where I have all these creative ideas and I want to innovate, and I want to do all these like special projects and, and like, you know, do all these like amazing things that I'm excited about. And if I'm excited about, then that excitement hopefully is going to spill out and the kids are going to get it, you know, but then, but then I'm told I have to follow a mold as a teacher. Right? So I think the teachers need to not be afraid to take risks, you know? And if that means that their school fires them or they're ostracized, then do it. Do it for yourself and do it for your students. And a lot of teachers do that, and there's a lot of amazing teachers and educators out there that, are gonna follow the dream and you have to follow the dream and, and not, you know, and you're, you're going to be, you know, you're, you're, you're gonna run into problems when that happens, but you can't let that hold you back. So don't be afraid and take risks.

Mark Royce ([17:22](#)):

Mm that's good. You mentioned that you haven't been teaching that long.

Dan Peluso ([17:26](#)):

Yeah, no. I've only been teaching for, I guess three full years. I had my one year student teaching, but you know, they traditionally don't count that as like a year of teaching.

Mark Royce ([17:36](#)):

Yeah. So some people are gonna say, Oh, you're just a newb. But you've been teaching. I just want to clarify, you've been teaching high school, astronomy?

Dan Peluso ([17:49](#)):

Physics. But it's astronomy themed physics. I'm an astronomer. And I'm also now working on a PhD in astrophysics. So I kinda like astronomy. And in fact that's the reason why I went into science. I'd never, I didn't like science when I was in high school and I didn't care about it. Never thought I'd become a scientist or even a teacher, nonetheless. And I wanted, I think teachers should put their passion into it and I've always put my passion around astronomy when it comes to science. And when I've taught physics, when possible, I've tried to theme it around astronomy, not always, but, you know, here and there.

Mark Royce ([18:33](#)):

You mentioned to me before this interview that you really respect and appreciate modeling instruction.

Dan Peluso ([18:44](#)):

Yeah. And I only found out about it... Um, let's see. Maybe a year and a half ago, so they're going to really criticize me cause I'm on a modeling podcast and I've only been a modeler for like a year. Oh gosh. Yeah.

Mark Royce ([18:59](#)):

But how did you get introduced to it?

Dan Peluso ([19:03](#)):

I began a PhD with the University of Southern Queensland USQ. They're located near Brisbane, Australia. So I've been flying back and forth, from Australia to the Bay Area. I do it all remotely. It is kind of a cool little university where I can actually work on a PhD remotely. And one of my advisors is-- actually, I have like 20 advisors by the way-- But, one of them is Colleen Megowan and I think you know Colleen, right?

Mark Royce ([19:41](#)):

Yeah, I do. She's been instrumental in helping us get launched and I've done interviews with her and she and I are very good friends. She's an amazing lady.

Dan Peluso ([19:52](#)):

Yeah. And I think a lot of modelers will know Colleen. So before I even met Colleen, I met somebody by the name of Carl Pennypacker who has the most awesome name in the world, by the way. Carl, if you hear this, everybody loves your name, you know it. Just pat yourself on the back cause your name's awesome. So he's an astrophysicist. He got his PhD, I think, at Harvard or Princeton in 1978. He worked on this project with one of his students named Saul Perlmutter -- you ever heard of Saul Perlmutter before?

Mark Royce ([20:28](#)):

I've not.

Dan Peluso ([20:29](#)):

So Saul Perlmutter won the Nobel prize in physics in 2011 for the discovery of the expansion of the universe via dark energy. And Carl Pennypacker was involved in this project. But then he --this guy loves education and he's known around the world for astronomy education. And he started this education initiative called hands-on universe and that turned into global hands on universe. And it started in the nineties. And what they do is they try to make astronomy education more powerful by giving teachers and their students access to robotic telescopes, training them in astronomy data analysis, making models to grow their understanding and inspiration from that data. And back in 2016, the American Modeling Teaching Association, or Teacher's Association, AMTA, they partnered with, Global Hands on Universe and Carl to develop a modeling instruction astronomy workshop. And I met Carl while I was teaching at the school in Vallejo where I live and he was running the afterschool astronomy program. And he knew that I was trying to get into a PhD program, but, you know, honestly I was kind of about to give up on getting a PhD program and that's a different story, but he came and he gave me this opportunity to work on my PhD with USQ. And, I had some ideas, he had some ideas, and one thing led to the next thing and I became a student with them and we decided that we wanted to use this modeling instruction astronomy as a portion of some of the research that I'm going to be doing. And then Colleen came aboard and, you know, I went to the modeling instruction, astronomy workshop, the first and only one that has ever happened. It was in Louisville, Kentucky at the University of Louisville in July of 2019. And that was my first introduction to modeling. And I tried to do some of that in the classroom that following year. And I researched it more and I read some literature reviews and learned about it and, I suppose, got hooked on it.

Mark Royce ([22:43](#)):

So modeling instruction started with physics with Dr. Hestenes, but it's moved through the disciplines, chemistry and biology, and now astronomy is pretty new. You're young in this modeling thing. Talk to me about how just the general modeling concepts of instruction have influenced you as a newbie. I think there's a lot of people who've been doing it. My wife's been doing it 20 years. Colleen's been doing it however long she's been doing and all the, you know, those who are listening, there's differing experiences in time with modeling. And I'm just curious with a guy that's had it for a year. What, what are your insights?

Dan Peluso ([23:28](#)):

Well, I, like probably many teachers, started teaching pedagogy or methods that I was taught. So I thought that, if I was just excited and inspirational and I was the Sage on the Stage, then it would work with the students. I learned very quickly that was not true. And when, in your first year of teaching, the teachers always say, that's your hardest year. And that was my hardest year and you get better. I mean, teachers, it's a practice and you get better I guess, every year. In my third year teaching, whenever I started experimenting with this modeling, I noticed something pretty magical. First off, I didn't have as much behavior problems as I did before. Second off the kids were excited about what they were doing. They were creating, they were talking to each other about what we were trying to learn and it was just like the light bulbs above everyone's head just started shining. And, it was just kind of this magical thing. And anyone who does modeling or has experienced modeling, I think they're familiar with that. And I was, Wow, this is pretty incredible. And, it was just this thing that I never experienced before. And, you know, later I would study these different types of educational ideas, like PBL and the inquiry based learning and using other methods. And it's just like, why don't schools do this more? And it's just how amazing it is. And it works. You know, there's all the research that shows that it works. And it just surprises me that it hasn't taken off more than it has. And I know there's a lot of people that do do it, but...

Mark Royce ([25:29](#)):

Several thousand

Dan Peluso ([25:31](#)):

Was there like 10,000, maybe 10,000-some teachers?

Mark Royce ([25:35](#)):

It's somewhere in there. Yeah. I don't know the exact numbers, you know, I'm not a teacher or a scientist. My wife is a very accomplished and, cause I'm kind of a production guy, I built the podcast.

Dan Peluso ([25:50](#)):

I think that makes it great. It gives a lot of really good character. And that's good. That's a good trait that I think a lot of people have trouble with is saying that they don't know the answer to something. And when there's been times where students have asked me something I don't know. And I say, "I don't know, I don't know the answer to that." Right? And they're like, what? You don't know, you're the teacher you're supposed to know everything. Right. And I'm like, no, I don't know everything. And you know, nobody does. And you have to be honest when you don't know things. And that's what science is about is being honest about what we don't know.

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

Yeah. Then you can say, let's go find out.

Dan Peluso ([26:30](#)):

Exactly! Exactly. Yeah. I think there's a lot of teachers in this like old style of teaching that like, you know, they're the Sage on the stage and they have to keep up this, put their chest out and like, you know, I know everything and like, no, you don't.

Mark Royce ([26:43](#)):

I know you're preaching to the choir when you are talking to other modelers about this whole idea. It's great. So I want to --you've been teaching, but I know that you're shifting, you're pivoting out of teaching. Tell us about that.

Dan Peluso ([27:01](#)):

Yeah. So, it was actually never my intention to become a teacher. I mean, I've always loved it. I mean, I'm a people person. My mom says that whenever I was a little kid, from the time that I could walk and talk, I would just go and just mingle with people and I would leave the table at the restaurant and just go talk to random people. Right? I, at one point in ...I didn't have a bachelor's degree. I'm 36 now. I didn't have a bachelor's degree until I was 33. And before I got my bachelor's degree--degrees, actually-- I have two of them not trying to, I'm trying to, ... But, so before way before that, I worked in education technology and I installed smart boards and I'm sure a lot of teachers know what smart boards are. If you don't, they're these like whiteboards they're smart, cause you can write on them and annotate over them and make it more interactive. And I used to give trainings to teachers. This was kind of my first experience back in the K through 12 classrooms since high school. And I got a lot of compliments from the teachers and saying, well, you should be a teacher or where do you teach? I was like, I'm not a teacher. And, that was the first time I thought like, well, maybe I'll be a teacher one day. But then when I went back to school for science, my original goal was to be a professional scientist, to be an astronomer. And when I graduated from the University of Pittsburgh in 2016, I had toyed, I had really wanted to go get my PhD right then. But, you know, going back to school, as you know, in my early thirties, I was going back to school full time. I was doing part time jobs. I was driving for Uber, driving for Lyft, waiting tables. You know, it was a really hard time for my wife and I, and I think we needed a break. We needed a break, you know? So I was like, well, you know what, I'll, I'll do an easy job. I'll teach high school. [laughter] But no, seriously though. There's a lot of great science outreach people that are really popular, obviously Bill Nye and Neil deGrasse Tyson, and, you know, Brian Cox in the UK. And they always talk about the importance of inspiring youth in science. Right? That's where we really need to make the difference. Is like these young kids? I was like, you know what, like maybe I'll still get my PhD one day, but you know, maybe I can really make a difference, you know, and inspire kids in science because whenever I was in high school, I didn't care about science. So maybe I can relate to them and maybe I'll learn and maybe I'll grow and, you know, maybe they'll help me and I'll just give it a shot. So I, it was kind of a thing, like a last minute decision. I was actually at a science conference, in Texas, the lunar planetary science conference. And I'm probably mispronouncing that, but I met this gentleman, there is this older gentleman. And he was an educator and I had just applied to UC Davis in the PhD program in planetary science. And I got the denial letter while I was in this conference. And I was really, really sad about it. I was like, it's the end, you know? It's never going to happen. Wah, cry, cry, cry. And then I ran into him and it was almost kind of like the serendipitous moment. And, you know, he said, you should try teaching. You should try teaching science. I was like, yeah, yeah, maybe I will. And then I, I

applied and went to university San Diego, and then I've been teaching for three years and now I'm going to do my PhD.

Mark Royce ([30:45](#)):

So you love teaching. I can tell.

Dan Peluso ([30:48](#)):

I do.

Mark Royce ([30:48](#)):

Why are you leaving?

Dan Peluso ([30:51](#)):

Cause I got other things I want to do. And I might come back to teaching one day. Right? I was inspired by Carl Sagan and there's probably Carl Sagan's quotes and name probably pop up like on websites and blogs that I've written like a whole bunch. But I watched his cosmos series that was on PBS and eighties, I watched it on Netflix, on Nintendo Wii. So that would be like 2009, 2010. And I started reading popular science books, like A Brief History of Time and books by Phil Plait, and Neil deGrasse Tyson and listening to podcasts about that. I was like, Whoa, this is cool. And then it was like, well, science is not just interesting, kind of fun. And like, you know, exploring the universe is pretty rad, but wow, this is like, you can like change society. And it's about, you know, it's about fighting against dictatorships and, you know, protecting yourselves from charlatans, people who try to sell you quackery for profit, whether that being like an actual product or an ideology. And I was like, wow, this is like pretty awesome. So I want to be a scientist and an educator and do outreach. So I want to get my PhD. I want to do science. I want to publish papers. I want to do outreach. I'm not sure, you know, what the next five or 10 years are going to, where I'm going to be. People are like, you know, what's your goal for five, 10 years? I don't know. I'm riding the wave where I'm at right now. And we'll see what happens. And will I come back to teaching one day? Maybe, you know, I do love teaching, but I don't have to be in a classroom to teach.

Mark Royce ([32:37](#)):

Do you have immediate plans that you can share?

Dan Peluso ([32:40](#)):

Yeah. So I am starting my PhD full time. I did it part time last year, while teaching full time. That was a lot of work. And this year I've been very lucky that I am going to be able to pursue my PhD full time under the support of a stipend from my university, University of Southern Queensland, as well as, something that I still, when I, when I say these words, I'm not going to believe they come out of my mouth, but I'm also going to be working as a researcher with the SETI Institute, SETI the search for extraterrestrial intelligence and my job title for them is unistellar education associate. And what I'm going to be doing is developing a global citizen science network for K through 14 educators and their students.

Mark Royce ([33:45](#)):

Citizen science?

Dan Peluso ([33:47](#)):

Yeah. What is that? What is citizen science?

Mark Royce ([33:49](#)):

You just said it.

Dan Peluso ([33:51](#)):

So citizen science is basically, anybody that wants to contribute to science, they can contribute to it. So, some examples is, there's different websites and apps out there where, if you're interested in science, you want to help scientists work in the field. Maybe you can collect some data, maybe take some pictures of the sky and that can help with climate change.

Mark Royce ([34:14](#)):

Is that like crowdsourcing?

Dan Peluso ([34:17](#)):

Yeah. It's kind like crowd crowdsourcing in a way. But, it's also have a lot of educators have been exploring doing this in the classroom. And something that I started researching when I was doing my masters of education was project based learning and PBL and how PBL can be much more motivating if it has real applications. So when you're doing something that actually is, making a difference and you're working on a real project that means something.

Mark Royce ([34:52](#)):

Okay. You mentioned PBL earlier. Remind me what PBL is. Project based learning.

Dan Peluso ([35:00](#)):

Yeah. I have a good example of a PBL project that I'll try to sum up real quick that I did before. And it was for my unit in energy for my physics class. And what we did is we learned about energy through learning about asteroids and asteroid impacts. And if you didn't know, there's these giant rocks in the sky, that impact Earth from time to time. If you look at the moon, there's evidence of it. In fact, just as many asteroids hit the earth as they hit the moon, except on Earth, we have erosion and plate tectonics that kind of erases that evidence, but they're there. Right? So what we did in this project is students work in groups and they're given a piece of paper with a hypothetical asteroid on it. That's going to impact earth on a certain date and time. And then there's a set of latitude and longitude coordinates, and there's some unknown and known variables that they have to solve for such as like the energy when it impacts or the equivalent Hiroshima bomb, equivalency of bombs that would explode if that asteroid were to impact. And then some of them are getting an asteroid that impacts their school. Some of them are getting one that impacts Hollywood or a famous city. And some of them are happening in 10 years. Some of them are happening in a hundred years. Some of them are happening like a thousand years from now, but the one that happens in a thousand years from now would destroy all of humanity. And what do they have to do? They have to save the world from the asteroid. And if the world's...

Mark Royce ([36:29](#)):

Bruce Willis did it already.

Dan Peluso ([36:30](#)):

Exactly. Yeah. Bruce Willis did it. And then, it was the other movie Deep Impact where they did it too. So yeah, if you get Aerosmith to write the soundtrack and then you send the star of Diehard out to an asteroid, then you will save the world. But, ...so they had to work together and they had different roles. So some of them were like, more sciencey roles. Some of them were like doing outreach and outreach is important in science. It's so important in science. But then they had to develop this plan. Like how are they gonna deflect it? How are they going to detect it? You know, how are they going to coordinate their efforts around the world? How are they going to make sure that we work together in order to save the world. So this is a project that they get excited about and they had tons of fun. We had tons of fun doing this. And, that's a project-based learning unit. Right. And did they have a test at the end of that unit? No. They had a project. Right. I would argue and I claim, and there's research to back this up too, that they learned much deeper than taking a test and you can assess them in the same way through this project because they're actually applying it. When you're in the workforce and you're a scientist or you're an engineer or you're I don't know, a computer scientist or any job, like, did they give you tests? Well, I mean, there's probably some jobs where they test you. Right. But no, you're assessed by the projects that you do and your performance. So, you know. So what are we doing in education? Where, like, we give them these tests and, you know, it's all about testing and it's all about the answers. It's all about the grades. And then once you're out of college, it's like no more tests and you know, what are we preparing them for?

Mark Royce ([38:21](#)):

Yeah. Man. It sounds like you're just shifting your focus as a teacher. You're not going to be in a local high school classroom, but you're still going to be very involved with education. It sounds to me like it. Tell me how you perceive your new role as being an education influencer. And I'd say, even, you know, how does it relate to your modeling love?

Dan Peluso ([38:51](#)):

The project that I'm really excited about is we have these telescopes they're called unistellar eVsopes. And this is a new consumer telescope. It's completely autonomous. It's controlled with your phone, takes all the guesswork out of like how to use a telescope. I mean, how many people out there listening, you know, you have, or know someone that has a telescope and it just sits in the garage or in their basement and collects dust. Cause you don't know how to use it, or you try to use it and you can never find anything. So it's, a cool telescope that allows you to not have to worry about that because it just works on an app and everyone could use an app. But the magic of this telescope is they created an MOU with the SETI Institute where the SETI Institute is creating the citizen science network for this telescope network. And the idea is that it's already been done is that users of this eVsopce can get an alert on their phone. And that alert will say, there's an interesting scientific target that you can go out and observe with your telescope in your backyard, in your garden such as an occulting asteroid or an asteroid flying by, or an exploding supernova star, or a transiting exoplanet, a planet that orbits around another star. And we've actually had success and this telescope can observe exoplanets, planets around other stars in our galaxy.

Mark Royce ([40:16](#)):

And it's that powerful? This is a consumer,

Dan Peluso ([40:19](#)):

This is a consumer telescope and what's different about this than most consumer telescopes that most people will buy, is that it has, it has a digital camera in it. It has what's called a CMOS light detector. So just like your phone has like a light chip in it, like a CCD light chip in it collects photons. This has a light chip in it that collects photons collects light, and it has a computer onboard and it can, it can save that astronomical data and then astronomers, we can then analyze that data or the students can with their teachers by using certain pedagogy, such as modeling instruction,

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

Assuming the classroom has access to one of these.

Dan Peluso ([41:07](#)):

Exactly. So what we want to do is we're applying to a lot of grants and trying to get fundraisers going to get these telescopes in the classrooms, anywhere we can around the world. And then I want to work with teachers and their students to develop a project-based learning, citizen science, modeling instruction thing, and see what can happen. The idea is that it's going to be completely student centered and it's like giving the observatory to the students, that telescope that they have, they're gonna work with their teachers. They're going to collect data on scientific targets, such as exoplanets. And they're going to analyze the data using modeling instruction and other techniques. What's their project? They're scientists. And in many cases, I hope they will even publish and they will publish their results in junior journals, or maybe we'll even create our own journal just for citizen scientists to publish, democratizing science and making it better

Mark Royce ([42:11](#)):

High school students to be published, you know? Yeah.

Dan Peluso ([42:13](#)):

And it happens. It happens in other places around the world. And, you know, what's also incredible about this? Teachers. A lot of teachers want to do science too. A lot of science teachers want to do science and this, I think will maybe reinvigorate teaching and education. Maybe some teachers, you know, they lost that passion. Maybe this could give it back to them or maybe some new teachers will get interested in becoming a teacher because they can do science, you know? So it's maybe another way to make teaching more exciting too.

Mark Royce ([42:44](#)):

That's very cool. Very cool. So, Dan, I know that you have a very eclectic background and your experiences and knowledge, and one of the things that you and I share is musicianship. And I was excited to know that your band you've been involved in the music industry. And I find that a lot of science people have a connection with musical talent and other artistic endeavors. It's interesting to me how the brain works, those things together. Tell me about how you look at creativity science, which sometimes is presented as kind of pedantic and more of a science than an art.

Dan Peluso ([43:29](#)):

Yeah. I would argue that creativity is vital for science. Some of the famous examples that I always mention when this topic's brought up is Albert Einstein and the fact that when he would get stuck, at least what I've read is that when he'd get stuck on a problem, he would go play the violin, and he was a violinist. And this would help him work things out. Richard Feynman, a famous physicist. He was a bongo

player. Another famous example, Brian May from Queen. And if you've seen the Queen documentary movie that came out, at the beginning of the movie, Brian May is in a PhD program in astrophysics and then Queen kind of became a big deal. So he left his PhD program and was a rock star for like 30 plus years. But then he came back and got his PhD, so I think it's, something in common, but even besides the fact that there are people that have done music and science, I mean, just... Einstein's idea of riding on a light beam, it was a really creative, radical idea. I mean, and this is another reason why we need more diversity in science too. So people can look at problems from a different angle than what the traditional scientists are looking at. But it can also get people excited about science. There's this this educator, by the name of Christopher Emdin, have you ever heard of him? So, he is out of Columbia University in New York City and he has a couple of really cool books. In fact, his book called, For White Folks who Teach in the Hood ...and the Rest of Y'all Too. And, he brings up this idea. It's just an awesome book. I read it this year. I wish I would've read it like four years ago when I first started to become a teacher. And it's amazing. So please, I highly recommend that book, but, in the book he presents something called reality pedagogy. And something that he says is that education should not be a way out of your neighborhood. It should be a tool for improving it. And one thing that he did with science education that's really exciting, is that he worked with GZA, who's a rapper from the Wu Tang Clan. And if you're not familiar, GZA has written some amazing raps with Wu Tang Clan that are very inspired by the cosmos. Talking about exploding stars and black holes. And I'm not a rapper. My music that I do is more like singer songwriter, pop rock, but, I do love hip hop. And one thing I do know about hip hop is that if you're going to rap, you have to really know your subject. Especially if you're freestyling. Christopher Emdin worked with kids in New York city and in the Bronx. And he had them get engaged with science by doing these rap genius battles, where they would rap about the science concepts, and then they would battle other students from other schools and compete. And then the judge was GZA from the Wu Tang Clan. It's pretty amazing. You can look up the video. So YouTube this, and you can find the videos. It's really cool. And it's really inspiring. And there's actually this company in Nashville, Tennessee, called Notes for Notes, and they put recording studios in boys and girls clubs throughout America. And I actually have a friend that works there. And one idea that I have and put him on the spot here is that we'd maybe put some of these eVscopes in the schools and these kids can write about exoplanets and science and, you know, can be collaborative and they can get excited about music and, when you write about music and as a songwriter myself, okay, you have to explore these concepts deeply. And that puts meaning behind it. And it makes it exciting. So you can learn from this.

Mark Royce ([47:16](#)):

Yes, that's awesome. Hey, it's been an amazing pleasure to talk with you.

Dan Peluso ([47:24](#)):

You too, Mark. Thanks for having me.

Mark Royce ([47:26](#)):

I'm glad that your name was given to me actually by Colleen.

Dan Peluso ([47:30](#)):

Yeah. Thank you, Coleen.

Mark Royce ([47:31](#)):

So you've mentioned some very cool things that our listeners are probably going to want to check out. Can you send me links and such, you mentioned a conference that you were afraid you messed up the name of it, and you've talked about GZA and you know, any links and stuff you've shared with us that you would like to share with our listeners, send me that list and we will post it on the website and on your show, which will be easy to find. We'll have show notes and links and a transcription of this if people want to see it in written form.

Dan Peluso ([48:03](#)):

Fantastic.

Mark Royce ([48:04](#)):

So please do that. I want to say thank you so, so very much for participating in this dialogue with us, on Science Modeling Talks, and I wish you the best of luck. When do you start the SETI thing?

Dan Peluso ([48:18](#)):

October 1st. So next week.

Mark Royce ([48:21](#)):

That's the day that this podcast will be posted.

Dan Peluso ([48:26](#)):

Oh man. It must be fate.

Mark Royce ([48:30](#)):

That's great. Okay, Dan, thank you so much.

Dan Peluso ([48:33](#)):

Thank you very much. Take care.

Mark Royce ([48:35](#)):

You too. Alright. Bye.