Mark Royce (00:00):

Hi, Jamie!

Jamie Vesenka (00:00):

How are you doing there, Mark?

Mark Royce (00:03):

I'm good. I'm looking forward to talking with you today and getting a little information about your life with modeling and as a teacher, and I'm excited to share what you have experienced with our listeners. So I wanted to ask you a question and I'm not sure about this. Do you have a Russian background?

Jamie Vesenka (00:23):

I certainly do. Although it's kind of interesting. It's a little complicated because where they come from today is probably no longer part of Russia. In Czarist Russia time, the country extended out a bit further into parts of Poland and the Ukraine. And so I think technically my grandparents are... There's Polish descent and Ukrainian descent. The last name is actually Ukrainian. And there, it was very common. There were a lot of Russian people living in those parts of the world at the time. And so they did speak Russian even though they were in what would be considered different countries nowadays.

Mark Royce (01:15):

Yeah. You were born in the US.

Jamie Vesenka (01:17):

Oh yeah. I would be considered the third generation. My father was also born [here]. it's my grandparents who were born overseas.

Mark Royce (01:28):

Yeah. So where'd you grow up?

Jamie Vesenka (01:32):

I grew up mostly in a small town of Harvard, Massachusetts. From basically kindergarten all the way up through college. My parents, my father was a US AID worker. He actually did help people. He wasn't a CIA agent. He was in Indonesia at the time. And my middle sister was born there actually. He was offered a post in Afghanistan and he said, you know what? I don't think so. We left shortly actually before a coup in which the communists were beat back by a general. Bottom line is we left before the coup happened and returned to the United States. My parents bought a farm in Harvard, Massachusetts, a place that both of them actually had some history with separate from each other. It was a youth hostel and conference center and the family there, the owners, were interested in doing missionary work in Kenya and they were looking to sell. And my parents came at just at the right time. ABecause it was youth hostel, we had people from all over the world visit us. It was a really fun way to grow up.

Mark Royce (03:06):

So I know that, uh, you got your PhD in 1989. What university did that come from?

Jamie Vesenka (03:17):

That was the University of California, Davis. I was accepted to the graduate program in physics there. All the traditional physics that they were doing, basic sciences, was not something I was really excited about, but there was an associated engineering school called the department of applied sciences, which, had a number of faculty doing a variety of different applied things. There was professor De Groot, who was doing plasma physics. Professor I worked with was Yin Yeh. He was a biophysicist. He was studying how these fish in Arctic and Antarctic waters survive in the sub freezing temperatures, without having to pump their body with, or to get rid of the water that's essential for them to live. You can go ahead and increase your salt concentration, but it's not possible to live on that. And it turns out that they had developed these proteins called antifreeze glycoproteins, which inhibited the formation of ice growth within these fish. And it suppressed the freezing point by several degrees below zero degrees Celsius, which was really, really cool. And I studied it and I learned a lot about ice and I got a PhD out of it. After I left, I never looked at it again, but it was a very good experience.

Mark Royce (04:51):

And what did you do immediately after receiving your doctorate there?

Jamie Vesenka (04:56):

So I started hunting around for undergraduate research that could be inexpensive and easily done at the college level. And I learned about this new technique, called atomic force microscopy. It was part of this new scanning probe microscope revolution, which involved taking extremely sharp tips-- initially the scanning tunneling microscope, which, Bimmig and, Rohrer developed and got a Nobel prize in 1986 for in which they could bring a sharp tip close to the surface of a conducting substrate. And they could actually get electrons to jump over the gap, to do tunneling, and get atomic resolution. However, biological samples require a different approach. And this is where you can take a super sharp tip, much like a record player needle, and feel the bumps and the groove of a record player. And as the tip moves up and down, you can monitor the change in height in order to get information about the surface topography, but instead of having magnetic pickups in order to feed back on the tip going up and down and amplifying as sound... Electronic wave to make a sound makes sound come from speakers, you actually record the height information and it can do this at the atomic scale.

Jamie Vesenka (06:29):

Nowadays, they can image individual atoms with the AFM. It wasn't happening initially. It was some other kind of averaged effect that worked for lattices, but now they actually can get tips that are sharp enough so that you can feel the surface and get structure. And in particular, you can look at things that are not conductive like DNA. And that's where I actually started. After I took a postdoc, at first, at the University of New Mexico, then at University of Oregon with Carlos Bustamante. And after two years there, I moved on to Iowa State University and I worked with Eric Henderson and did most of my research there. And, all this time I was looking for jobs. I graduated in 89, from UC Davis. And that's exactly the time that the iron curtain fell, which means it's a terrible time to try to get jobs as a physicist in academia, because you had this influx of Russians coming in from the former Soviet Union. And they're brilliant, you know, they just are, but they're, not being paid anything and they're starving. And so they came to the United States in droves. I actually applied for a job at Amherst College in Amherst, Massachusetts, and I was one of 825 applicants.

Mark Royce (08:03):

Oh my goodness.

Jamie Vesenka (08:06):

Finally in 1995, I landed a position at Fresno State and that's where I started my teaching career.

Mark Royce (08:17):

And you were teaching what at Fresno State?

Jamie Vesenka (08:20):

Physics. I taught physics. I taught there for three years and I was very interested in being a good physics instructor. I had just learned from a good friend there, whose name, eludes me right now, but it'll come back at some point. He was the director of the demonstration equipment. And he had told me about this thing called the force concepts inventory, as a way to assess how your students are doing. And so I took it out and I tested. I pretested the students, I post tested the students, I checked it against-- and I was spending hours and hours doing this teaching instruction. I tested against a colleague who was willing to do it. He arrived 10 minutes before his classes, three times a week and left immediately afterwards and never paid any other attention. And I discovered the post test scores of his students and my students compared to the pretest test scores were the exact same. And I had been spending so many hours and I was like what the heck is going on? And I realized at that point I had to do something different. So I started looking into different kinds of improved physics pedagogy involving active learning.

Mark Royce (09:47):

And how were you introduced to the modeling approach, to modeling instruction?

Jamie Vesenka (09:53):

That is a fun story, an embarrassing story, but I remember it to this day. So we had seminars, colloquiums, I think on Friday afternoons. I can't exactly remember, but we would have high school teachers come by periodically and especially when it was an education-related seminar. And there was this fellow by the name of Jerry Bodily from Fowler high school. It's a high school located just South of us in the valley. And he said, you know, Jamie, you should really come to one of my half-day modeling workshops 'cuz he was trained in modeling instruction. So I said, yeah, sure. So finally I got there, I took a bunch of graduate students. Fresno State had a graduate program and we bundled in the car and we headed on down there, even though the weather was really ominous that day.

Jamie Vesenka (10:47):

We got one of those very rare thunderstorm type of days. I showed up and we broke up into groups and we started doing this active learning stuff. We were working on the modified Atwoods machine. We were trying to study how the acceleration of the cart depended upon the force pulling on it or the mass of the cart. We were doing these two different experiments. And we were building all the knowledge and we were doing the force diagrams on these new things called whiteboards. I'd never seen 'em before. For me that was like, oh wow, I gotta bring these into my labs at Fresno State. And I drew some force diagrams on the cart and the weight, the mass that's falling attached the string between the two.

Jamie Vesenka (11:46):

And I drew acceleration vectors for the two. And I knew Newton's second law. The sum of the forces equals mass times acceleration. And of course, if you're gonna have... It only makes sense that if your mass is bigger, you're going to have to have a different acceleration. And I showed acceleration vectors for these two objects, which were attached by the same string, but they were different values. And when I was asked to present and explain this and try to rationalize it, I froze. I was like, this doesn't make any sense, how can this possibly be? And I realized at that point that, oh, I can see the mistake I made and I had to learn more about it. I found out about modeling workshops and I enrolled in one the following summer at University of California Davis, which was nice. It's a five-week workshop and it was on mechanics and boy, I learned so much about mechanics. It interesting to note that even after teaching for four years, and having gotten a PhD in physics with involving very high levels of mathematics, that my core conceptual understanding was very weak and, modeling allowed me to recover from that. And the following summer I spent four weeks, working, doing action research on waves. And what action research was all about was actually learning how to make models yourself, to work in the classroom for your students, given the materials that you had. And so the rest was history. It was really fun.

Mark Royce (13:32):

It's interesting. You said you first learned about the force concept inventory before you were introduced to modeling, is that right?

Jamie Vesenka (13:42):

Yes, that is correct.

Mark Royce (13:43):

And it's interesting. I believe Dr. Hestenes was kind of key to the force concept inventory.

Jamie Vesenka (13:50):

Oh yeah.

Mark Royce (13:50):

And he is also considered the father of modeling. That's interesting that you were introduced to both of those things, kind of in that order.

Jamie Vesenka (14:00):

Yeah. The person who introduced me to it is Roger Key. He was actually from Kansas state. And he'd worked with a very famous physicist there, Dean Zollman, and there were all these active physics learners, active engagement. People were talking to each other and Roger said, Hey, you know, try this out and see what happens. And it made a big difference.

Mark Royce (14:32):

You went to Davis for that five-week workshop. I think that might have been the same when my wife went to. Did you meet Brenda?

Jamie Vesenka (14:40):

I think that's where I met your wife, Brenda. Yep. At that particular workshop.

Mark Royce (14:45):

That was a little while ago.

Jamie Vesenka (14:47):

Yeah, there was a lot of very successful graduates from that workshop. They went on to do modeling instruction all over the United States. Mark Schober was at that, went to New York eventually and set up a very large program there.

Mark Royce (15:02):

So most of the people I interview for this program are high school teachers. I have a few middle school teachers, but you're at the university level. Talk to me a little bit about modeling in the university setting, how you employed it, just tell me a little bit about that and your experience.

Jamie Vesenka (15:22):

Well, the first physics education research grant I got funded actually was an NSF CCLI course, curriculum and laboratory improvement and the award supported the funding for training of physicists in modeling instruction. It was while I was at the University of New England. And part of what I was to do with the funds was also to adapt and implement the instruction to the college environment. And the idea being that there was perhaps a little bit higher level of sophistication expected in the college environment, than the high school environment. And of course now, I know that it's really so dependent upon where you're at. There are some high schools in this country who graduate students that are just extraordinarily well prepared to do physics. There's a lot of colleges which barely get them off the ground in terms of what would perhaps be considered physics first at some other places.

Jamie Vesenka (16:43):

It turned out to be a pretty good fit, just making some marginal changes, to include additional curricular items that were expected of the college students just to take the, standard modeling curriculum and make it work in the college environment. The challenge with the college environment initially, of course, is we don't have studios. We have a lecture and we have a lab. And that is just a, a horrible, horrible situation in order to try to have students learn about this because it's quite difficult for them to get anything out of the lectures. And most of the learning I always felt was being done in the labs. But I attempted, I attempted to have students do problem solving and whiteboard presentations in the lecture classroom. We kept the presentation of ideas to a minimum and they were meant to support laboratory activities.

Jamie Vesenka (17:45):

So they had to do the labs first before we would go ahead and discuss it in the classroom and then have them do activities based on it. That turned out to be pretty hard, because the students took labs on different days of the week. Some of them would have had the lab a week before class and some of 'em had just barely had it. And so it didn't have any time to set in, so it wasn't optimal. But something changed at UNE around 2007 or so. There was an interest in starting a pre-pharmacy program, which meant a huge influx on number of students, which meant money to build a new building. And they built a new chemistry and biology building with a ground floor that was unfinished.

Jamie Vesenka (18:48):

At the time I had a colleague Charles Tilburg, a super, super smart physical oceanographer, who was brought in to teach the excess number of service physics courses required to handle the influx of the pre-pharm majors. And we had this horrible rundown laboratory in an old building-- physics laboratory. I had managed to cobble together the sensors and the like to do modeling instruction, modeling type labs there, but it was ancient. It had chalkboards, it was very difficult to get around. Actually, I don't think it was even safe according to fire standards. They were very lucky that it didn't get shut down, but it only handled 18 people and, since Charles was extremely successful at grants, he had the ear of the Dean and he told the Dean, you know what?

Jamie Vesenka (19:50):

These physics labs are terrible. They're so embarrassing to show prospective students to come. Wouldn't it be nice to have some new physics labs in the basement, in the lower section of this new building, because it's not being used. And so he persuaded the Dean to do that. Over my complaints, because they went from 18 students to 24. And when it comes to studio environment, smaller, I felt, was better, but they cranked it up to 24 students. And we got two labs and I did the math very quickly, and showed, you know, what, with the number of instructors and lab teachers, we could just go ahead and divide these, these labs up and not have any lecture at all, just have studio physics. Cuz we had enough staffing to do it regardless of whether it was lecture-lab or just studio. And I persuaded a new interim department chair to go this way and he's persuaded the Dean and we switched over to studio physics, around 2008 or something 2009. And we've never looked back. Studio physics has been a lifesaver when it comes to students trying to learn physics, which for a lot of them who've never had it before, it's the best environment because they get the kind of attention that they need in order to make sense out of the stuff.

Mark Royce (21:28):

How is studio physics different than like the lecture lab approach?

Jamie Vesenka (21:33):

Oh, it's, it's hugely different. Studio physics is more similar to the way modeling is done in the high school level. You know, you come into a physics lab. And you get your lecture. And when I say lecture, I mean short discussions that lead into the students participating and then having Socratic dialogue with them in order to explore different kinds of physical concepts. Whereas the lecture is literally-- I, at one point I had a hundred students in a large space and even back then they were starting to spend a lot of time on their phone. The phones were getting smart enough to connect to the internet. It wasn't a very healthy environment. And it was hard to keep them engaged all the time.

Mark Royce (22:22):

I understand that. So you're at the University of New England and this is from what period of time?

Jamie Vesenka (22:28):

I started in 2000 and I'm still there today.

Mark Royce (22:31):

Okay. Well you're in Germany right now. How did?

Jamie Vesenka (22:34):

I'm in Germany on sabbatical leave. So, you know, as a college professor, you get the opportunity for sabbatical leave periodically. I actually took one here for a full year in 2005/6. Actually only half a year in Germany. This time I'm taking a full year off in Germany. And it's really helpful because I really can stay focused and work on one particular project.

Mark Royce (23:03):

Which is what? What's that project?

Jamie Vesenka (23:06):

I'm doing atomic force microscopy of four stranded DNA quadruplex AFM. And I'm also making the addition of I'm trying to attach gold nanoparticles to it. The group that I have has found ways to excite gold nanoparticles with visible light and get a small wavelength shift -- it's called local surface plasmon resonance. And that change in color of course, spectrometers, very inexpensive, very cheap. And this is a fabulous technique it's being routinely used now. And actually for diagnostics. You attach these gold nanoparticles to antibodies and you can figure out, just from color changes, whether somebody's infected or something like that. That's the hope for it. And they're doing a lot of studying in that area, but I'm actually doing the, "what does it actually look like" because the AFM can actually see the gold nanoparticles that actually can see the DNA or the antibodies or whatever. So this gives us an opportunity to confirm what's being seen with, from the spectra with actual images of what the structures look like. Right now I've got two projects that I'm going to, I have some prelim data for, I'm gonna start writing up an outline for some papers. I think one of 'em will be chemical education. The other one will be a surface science paper. And if I can get those two done, I think that would be pretty successful. I'm also introducing modeling to colleges over here in Germany. I'm going be going in the beginning of February down to, FA Hochschule, in Rosenheim and teach a course to a bunch of physics professors, a modeling a half-day workshop to some physics faculty at Rosenheim. And have them explore the idea of active learning, which is fairly novel to them right now. They have no experience with this kind of active learning instruction.

Mark Royce (25:14):

You need to share with them, the resources available at the AMTA.

Jamie Vesenka (25:18):

Yeah, I will. I absolutely will.

Mark Royce (25:21):

Yeah. And of course our podcast that we have quite an archive of interviews that they might find interesting. So that's really cool. Hey, I wanted to ask you, in reading your bio, I noticed that you're actively involved with teaching physics to life science students. Who are mostly like coming from a biology background and stuff. Talk to me about the, well you called it the IPLS movement, introductory physics in the life sciences movement. Tell me a little bit about that and your involvement there.

Jamie Vesenka (26:01):

Well, IPLS had its genesis probably in the early 2010s. I wanna say 2011, 2012, 2013, there were different groups of people who were recognizing that, you know what, biology students are required to take physics, but it's probably only one year that they're gonna take maximum. How do we optimize it? Because if you teach the traditional sequence that is taught for physics majors and engineers, it's not terribly useful for them. Most of the materials that are covered, they'll never ever see again. What is the best content for them to look at? And there's this, particularly this group, led by Joe Redish over at University of Maryland, which develops-- it's called Hamberg University of Maryland Biology Education Research Group. And they develop a introductory physics course, specifically tailored to their biology students who are going on for various types of life science careers.

Jamie Vesenka (27:18):

And they develop a pile of laboratories that are definitely out of the usual mix. In fact, if you take a look and you speak to a biologist, and you take a look at the curriculum, there's a lot of things that really are never, ever seen by a biologist. They never look at circular motion. Projectile motion - meh. I mean, definitely exercise science majors might do that simply because they deal with sports, but the average biologist, no. And furthermore, all they really need is a good understanding of speed and velocity. Acceleration and unbalanced forces, They're really not necessary. If you do some biomechanics and you're interested in the actual motion, then you can make an argument for it. But I'll tell you the linear accelerations that we talk about are ...when you go ahead into rotational systems, they're far more complicated. So you, you have to be very careful on how you approach that.

Jamie Vesenka (28:24):

But a lot of these "sacred cows" that we normally cover, especially like magnetism, not necessary at all in biology, because it's hardly ever used. There's only a few, very small, applications. And so to do a good introductory physics for life science course, you want to get rid of those things that aren't gonna be necessary and cover things that really are. Levers are pretty good because there's good analogs when it comes to basic biomechanics, how your arm muscles and leg muscles work and stuff like that. When it comes to momentum, I found that the traditional place where it was located, which is usually later in the curriculum, it actually made a lot more sense to put conservation momentum, right in front of understanding ideal gas laws because of kinetic theory and diffusion and diffusion is really, really important for biologists.

Jamie Vesenka (29:28):

And they don't get very good models about it. They're usually just these hand waving things that don't explain the statistical nature of diffusion and random chaotic motion. Fluids is super important. And what I just discussed, ideal gases. Gases are fluids. It leads into a really important point that fluids are almost never covered in college. And when they are, they often include a lot of emphasis on Bernoilli when it comes to dynamics. And it turns out the Bernoulli relationship is often misapplied to physical problems. One that I like to point out is, if you take a beach ball and then you take a leaf blower and then everybody can balance the beach ball above the leaf blower and tilt it at an angle. And the speed of air coming out of leaf blower is really fast.

Jamie Vesenka (30:27):

You know, up to 110 miles an hour. Which is about 50 meters per second. That's the reason why I chose that number. And if you go ahead and use the Bernoulli relationship to estimate how large a mass a 40 centimeter object, like the size of a beach ball, could be lifted up, you've you get this absurdly huge number: 15 kilograms. That makes no sense whatsoever. Okay. That's when I realized, oh, the Bernoulli was being inappropriately applied and it actually, they do this a lot in physics textbooks. They're getting smarter about it. One of the worst ones was understanding airplane lift, which is not about Bernoulli; it's about attack angle. In other words, just the wing being like this smacking into air molecules and pushing the wing up. It's very simple. In any event I started looking into, well, what parts of fluid dynamics are important?

Jamie Vesenka (31:27):

This is when I learned about the Poiseuille law, or Hagen–Poiseuille law. I'm not exactly sure how to pronounce it, but it's actually quite useful to understand circulatory system because it involves something called viscosity. And there is a point in which chaotic, turbulent effects and laminar effects start to switch. And that's described by something called a Reynolds number. And these are all fluid dynamics terms that I started to learn about and realized, you know, this is what they need to know because when I spoke to anatomy and physiology, these teachers say, oh yeah, I'm so glad you're covering that. Because they don't get any deep understanding of it in their biology classes. So it was pretty cool. I also learned from that, that there's in fluid dynamics and in circuits, there's a lot of analogs. And so covering electric circuits is a really good segue to help students understand fluid dynamics. Because the resistances due to viscosity can be treated in a fashion similar to the resistance that impedes the motion of electrons through a circuit.

Mark Royce (32:42):

You mentioned in the bio that I read on you, that you discovered this thing called physics in a box, iOLab. That's kind of a cool thing. Maybe share with our listeners.

Jamie Vesenka (32:55):

Sure. Tim Seltzer, and this fellow by the name, Matt Sealons, they're in Illinois and they were trying to develop a tool that could be used by their engineering majors to do hands on data collection at home. And they get some NSF funding in order to build these things. And actually I learned about it because I was on a National Science Foundation review panel and I said, oh, wow, this is awesome! I wanna learn more about this. So I contacted them afterwards. And, it was amazing what they were doing. They were already several generations into the development of it. They had come up with this box that has a dynamics wheel. So you can measure position and time data at a hundred Hertz, which is still better than any other major physics suppliers out there, which is really shocking.

Jamie Vesenka (34:03):

It makes fantastic... It just collects absolutely amazing position-time data, which means you have excellent velocity and acceleration versus time data. It's got a force sensor on it up to plus or minus 10 Newtons. It's got a three axis magnetometer, three axis accelerometer. It's got a microphone and an audio generator. It's got a circuit setup there so that you can connect up to do circuit analysis if you want to. It's got a pressure sensor built inside-- a barometer. And it runs off of a radio frequency signal, which means that it's completely disconnected: no wires or anything like that.

Jamie Vesenka (35:02):

In fact, it was one of the things they were surprised to learn when I said, oh, I can use this to do hydrostatic pressure, which is one of our laboratories that we do. I would take the IOLab. I would put it inside Ziploc bags. I triple zip locked it. And I shoved it down into a very tall tube of water. And as long as it's plastic, you know, like a, one of your plastic, four liter types of, uh, graduated cylinders, um, it did a fabulous job of measuring pressure as a function of depth, even though it was immersed in the water, send its radio frequency signal out to a dongle. A USB dongle attached to your computer collects just amazing data. And when it came to the pandemic, when other people were scrambling to figure out what the heck they were gonna do, we had a small cache of them and we just set it up so the students could take them and do their own experiments at home when we had to have lockdowns.

Jamie Vesenka (36:01):

And, the following year we had them rent them and I trained everybody in my group on how to use them. So we had a much more smoother transition into the COVID pandemic environment than a lot of other physics groups had because we were already, I had already been actually working on-- I called it pandemic planning, although I never expected to actually use it. It was actually designed for an online course, and having an inexpensive, physics-in-a-box unit is essential for good hands-on learning and to do it remotely. And this is exactly the perfect tool for it. And so yeah, I'm a big advocate for it because it really takes very high=quality data and it's easy to operate and the software does a lot of great stuff. It has this Furier transforms built into it so that you can analyze your sound spectrum. It's pretty cool.

Mark Royce (37:16):

Sounds really neat. So any other cool, uh, tricks and tips you wanna share that you've learned?

Jamie Vesenka (37:17):

Other than to say that you definitely need to have a good sense of humor? Because we live in pretty challenging times right now and if you can keep your students engaged, and be excited, I think that, that serves more than just about anything else.

Mark Royce (37:40):

The classroom really needs teachers who are really engaged with what they're teaching and relationally connected to their students. It is, I think, more and more critical in these days with relational disconnection that's happening everywhere, you know?

Jamie Vesenka (37:58):

Yeah. It's very challenging right now. I'm glad I'm not teaching this year because I know it's been extremely hard on everybody. They're exhausted. But I'm girding my loins, so to speak, to get back in there when I return. And we'll just have to see how the pandemic pans out. I think having these iOLabs are gonna be very helpful for students at home because my suspicion is we're not gonna be able to have... We'll have to go to back to partial classroom sizes again.

Mark Royce (38:36):

So can our listeners, to find a iOLab, more about it, and how to get ahold of 'em... Is that they can just Google iOLab?

Jamie Vesenka (38:48):

Yeah, I'm actually looking it up right now. iOLab science is what it's called.

Jamie Vesenka (38:56):

So this is MacMillan now, is supporting the, hardware and the software. The software is free. If you just type in iOLab and do go Google search, you'll find it. And Matt Sealons kept a very large repository of iOLab materials that are on his website. I think everything has been transitioned over to the MacMillan site, because they did purchase it.

Mark Royce (39:27):

I wanted to check in with you the NCLB, you mentioned having a little bit of a problem with that. Uh, you wanna talk to us?

Jamie Vesenka (39:41):

It's really hard to be positive about no child left behind. At the time it was done, I know that there clearly were good intentions, but because you dangled accreditation and money at the end of it, you know, carrots and sticks, it was abused. Specifically people focused in on trying to have their students do well on assessments. And instead of doing it as it was intended by having the students build understanding, from actually looking at evidence and constructing knowledge, it went into a model that rapidly devolved into memorization, regurgitation, and teaching to the test. And some places were caught for doing exactly that. Unfortunately I have not seen any major changes or divergence from that path, prior to the last administration, there was some hope that they would get rid of it, but they changed it to race to the top or something like that.

Jamie Vesenka (40:57):

It didn't fundamentally change this model of teaching to the test. And so what happens in the college environment is oftentimes it's the first students have actually been challenged and asked to critically think and look at evidence in order to try to answer questions about, or make decisions on how things will behave. They're used to getting equations and plugging in numbers and getting numbers out and thinking that that somehow is physics. And of course there's a lot more to it than that. And depending upon your environment that you're in, you can have a situation where you get what we call a lot of intransigent students, students that feel like no, I'm not learning because I'm actually having to work to understand what's going on. I should just be told what's going on. So it's made for a very challenging time.

Mark Royce (42:01):

A big complaint I've heard from many modeling instructors is that their students are coming in, especially in high school, the students are coming in from eighth grade or whatever, not having been exposed to a modeling approach. The focus of teachers is to help the kids learn. And they're coming in expecting to be just fed information and seems like what you're suggesting here is that the No Child Left Behind has actually promoted that kind of poor instruction approaches. And before kids are getting to where they're being asked to really figure this out.

Jamie Vesenka (42:40):

It has consequences. And the consequences are that if you are expecting to be told, you may not look into the evidence and evaluate it. And so now, especially with the absolute exponential growth of information on the web, people don't do a good job distinguishing fact from fiction. In fact, it's more about whether or not they think that this fits with their view of things, which is not science. It's opinion. And we can't afford opinion. We need to have science right now. So it's a very challenging environment right now that we live in.

Mark Royce (43:28):

If you were to have a tagline, James Vesenka's tagline, what would it be?

Jamie Vesenka (43:36):

You're gonna have to help me out and define a little bit more what you mean by tagline.

Mark Royce (43:39):

A tagline is like, here's my underlying, this is my overwriting statement of how I live my life and how I approach it.

Jamie Vesenka (43:47):

So you're basically saying what I want to have on my tombstone.

Mark Royce (43:53):

Well, I wasn't thinking that, but I, yeah, that works.

Jamie Vesenka (43:57):

Okay. So, epitaph, look at the evidence and what does the evidence tell you? Honestly, that's real data not made up stuff. So that's, I think this is what it's all about. Honestly, in the college environment right now is let's take a look at good quality data and make sense out of it. And then find ways to represent it that will help people understand what is really going on. And gosh, try to get at the people who are pushing misinformation for whatever reasons. I think a lot of it is driven by just pure economics. They can make a lot of money doing it, which is very sad. Yeah.

Mark Royce (44:54):

Well, Hey, Jamie, it's been great chatting with you. I really appreciate you taking this time out of your day to join us and to share your experiences. It's been fascinating.

Jamie Vesenka (45:09):

I appreciate that. And I do wanna leave on one positive note. I do know that there are a lot of kids that're coming to college and they want to see a better world, and they're really highly motivated now because of climate change. And so I, think there are more and more people who are looking at the evidence and saying, you know what, it's time to do something about it. And so I do have some hope for the future.

Mark Royce (45:35):

That's Great. Yeah. Thank you. And. thanks for the work you're doing and for your contributions to education.

Jamie Vesenka (45:45):

Thanks. Appreciate that.