



Science Modeling Talks

Episode 60 - “The Case For Repurposing Education”

Guest: F. Joseph Merlino

Mark Royce (01:50):

Well, hello, F Joseph Merlino. It's good to have you here.

F Joseph Merlino (01:54):

Good to be here. Thanks, Mark.

Mark Royce (01:56):

I'm excited to talk to you today. I know you're not directly involved in modeling instruction yourself, but you have some great perspectives on it, and I'm excited to talk to you about it and share it with our listeners. I wanna ask you to begin with... initially, I know you were focused on math reform in education. Is that correct?

F Joseph Merlino (02:22):

Yes.

Mark Royce (02:24):

And so tell me a little bit about your background in that, and then maybe how you got connected and involved with science and the study of science and your work.

F Joseph Merlino (02:36):

Okay. I'll give you the sixty second summary here. So I started my career as a chemical engineer 'cause I love chemistry. And I was also pretty good in math. So when I went to the University of Rochester, I studied chem E, but I got into psychology, cognitive developmental psychology along with some other courses. And I actually graduated as a major in psychology, cognitive developmental psych. And I was really into Piaget. And so I went to grad school, studying Piaget. Didn't finish, but I went and got my master's in math as a math teacher and did that. And I always thought that science instruction and math instruction could be better. So I wanted to study the philosophy of it and the psychology of it to see if I could make a change. And I actually got an opportunity, after being a teacher for three years to work in an organization that was devoted to math and science reform.

Mark Royce (03:43):

So tell me about the early days of your introduction to the ideas around modeling instruction. How did that all come about?

F Joseph Merlino (03:54):

So I went to school in the seventies. At the time, there was a big battle between behaviorism and what we now call constructivism, but they didn't call it constructivism at that time, was continental philosophy. But the idea that

there would be an internal life to the mind was counter to what behaviorism was all about. So when I got into Piaget, it was the whole idea of, gee, that we could look at children's conceptual development, their misconceptions and so on. So I, I really took an appreciation of Piaget's approach and his way of asking questions to elicit what was the thinking of children. And so that was an early on really core belief of mine that I took with me when I did math and science reform project.

F Joseph Merlino (05:00):

So I started 35 years ago in reform, beginning with the interactive math program in Pennsylvania. And I had an NSF grant. I had another NSF grant for a math project. And then we got a math science partnership grant, which was a \$14 million project involving 45 school districts and 13 universities. And so we were doing secondary science and math and I was the PI for that. And the goal here was to involve school districts in doing some kind of math and science reform. National Science Foundation had invested millions of dollars in reform curriculum on the math side, but also on the science side. So I got familiar with the reform curriculum on the science side, and my job was to persuade districts to participate in the project.

F Joseph Merlino (06:05):

So we had money to provide for professional development of teachers, give them a stipend. So I dealt mostly at the assistant superintendent and curricular supervisor level. And so for them, they saw the need to move away from didactic instruction. The lecturing approach. They didn't have any idea of modeling. They really didn't, they may have known a little bit about Piaget, but they did know that they wanted something different. And actually, this idea that physics instruction and science instruction could be different, goes back to the 1880s when the association for the advancement of science did a survey of all of the physics teachers in the country at the time. Now in 1880s there wasn't too many high schools. And they were scathingly critical of the way physics was taught back in the 1880s.

F Joseph Merlino (07:06):

So this has been, they called it a travesty and all kinds of very strong language about it. So it's been a long tradition of the need to change things. And so assistant superintendents recognized that, but they didn't know what to do about it. So, how I got into modeling specifically is that, after Piaget there was a big movement for cognitive science emerged back about 30 years ago. And the idea of cognitive science, it was a kinder, gentler version of the Piagetian approach. At the time, there's a lot of controversy between that and people were trying to knock it down and so on. But the cognitive scientists came at it as a scientist and it was less European and more American. And the idea was, we're gonna study the cognition from a scientific standpoint.

F Joseph Merlino (08:09):

So picking up on this, an early proponent of that was Micki Chi, who was a cognitive scientist back in the eighties. And she continued Piaget's experiment with pendulums. And also with children's understanding of the solar system, et cetera. That led to David Hestenes' work and, and Halloun's work Okay. In physics. Because he picked up on that. Alright. He saw the same need for that. And, and Halloun developed the forc concept inventory. And that became a way of measuring something about children's conceptions of physics and the misconceptions of it. And so that started a little group, of physics professors like Eric Mazur and others that use the FCI to look at their own practice. And so I glommed onto that very early on. I said, well, that's interesting because prior to that, there hadn't really been good assessments on these concept inventories, which was new at the time.

F Joseph Merlino (09:22):

So before long, other disciplines got into the mix. You had chemistry concept inventories, biology concept inventories, math, calculus concept, and so on. And this became a thing among college professors, disciplinary based education research. That became a thing. And so the driver for the recognition that we needed to change, do something other than lecture, was these FCIs, these concept inventories, which demonstrated that we needed to make a change. So the question was, okay, we know that there's these very durable misconceptions of Newtonian physics,

for example, but also in optics and other things as well. What do you do about it? How do you alter instruction in a way that would move kids to that? And more than that, how would you persuade teachers that they needed to try a different approach? That there was such a thing as a subjective psychological standpoint of the student that needs to be appreciated and understood by the teacher and not just material that was transmitted-- The transmission model of an authority figure to a receptacle.

Mark Royce (10:49):

Wow.

F Joseph Merlino (10:50):

Does that make sense?

Mark Royce (10:52):

Oh, yeah.

F Joseph Merlino (10:53):

So that's kind of where philosophically I was coming from.

Mark Royce (10:58):

Okay. Did you actually meet Dr. Hestenes?

F Joseph Merlino (11:03):

Yeah, I had a gin and tonic with him.

Mark Royce (11:05):

<laugh> cool.

F Joseph Merlino (11:06):

Yeah. And then I met Colleen McGowan and, one of our, who was working with him, Jane Jackson. So I started to use modelers as a way of responding to my districts. I had 45 districts need to change their science programs. So modeling. So these modelers became people that I used as consultants to satisfy these school districts. So along the way I met guys like Ray Howanski, who is now, uh,

Mark Royce (11:43):

CEO

F Joseph Merlino (11:43):

Involved as CEO of the program as well. Well, Ray was in one of my districts.

Mark Royce (11:49):

Okay.

F Joseph Merlino (11:50):

And he was the science guy. He was the science department head. And there was another guy that was the supervisor. And, and there was also a math person, so that person we're all in a reform group. And that's how I met Ray. And then Ray became a curricular director. And so I've used modelers all along in all the projects I have. We have

one project right now in Egypt that I've been involved with for 12 years. And we involve, Hestenes' FCI and modelers from that project in the very beginning, people like Jeff Skykes and others that we've used.

Mark Royce (12:31):

So are you introducing modeling instruction in Egypt? Are they, is it being promoted and received well over there?

F Joseph Merlino (12:42):

Yeah. We're doing it. I just had your guy, Mark Lattery, just came back from Egypt. He used it not only at the high school level, he used it with physics professors.

Mark Royce (12:55):

Wow.

F Joseph Merlino (12:56):

So you want me to tell you this story about Egypt?

Mark Royce (12:59):

Sure.

F Joseph Merlino (12:59):

Okay. So right after the Math Science Partnership program, that was lasted for about nine years. And right after, around 2011, uh, we had a group of Egyptians come to our office and they wanted to have a STEM school. Uh, but they had no curriculum. They had no teachers trained, they had no materials. And they were opening the school next month. And they wanted to be a model for the whole of Egypt, Uhhuh <affirmative>. And the, the, uh, Egyptian Profe, the Egyptian Minister of Education and a delegation came to my office, U-S-A-I-D people, US Agency for International Development. And so they were looking at STEM schools in the United States, and they, there was some in Philly. And so, uh, I said to, uh, the minister, I said, good luck. You know, you got, you want, you wanted to have this model school, and you <laugh> you're opening it in one month and you got nothing. And he said, well, I'll see you in Cairo.

Mark Royce (13:58):

<laugh>, Uhhuh <affirmative>.

F Joseph Merlino (14:00):

This is like in August of 2011. This is like, if you remember the Arab Spring world, they were still in a midst of revolution. So I didn't even have a passport at the time. And, uh, 'cause I, I was a homeboy. I wasn't much of a world traveler. But, uh, four months later I was in Cairo. And I've been there forever, ever since. So one of the first things we did to persuade the minister and others of a need to change is we gave the FCI to the students, and we also gave it to the professors.

Mark Royce (14:39):

Huh.

F Joseph Merlino (14:40):

Who were who, I'm sorry, to the teachers who were gonna be teachers as a criteria for their being hired under the understanding that we wanted teachers who understood physics, at least the average of what the students did. Right.

Mark Royce (14:54):

Right.

F Joseph Merlino (14:55):

Huh. And we weed out a lot of, we weed, we, we weed out a lot of, uh, teachers. And, and the courses were done in English. But what we did was compare the FCI, um, content and cognitive demand to the physics exams that were being used in Egypt for 12th grade exit exams. Hmm. Okay. Mm-Hmm. <affirmative>. And by the way, in Egypt, it's like national exams and it determines your life, these exit exams. And so there was physics exit exams, and they were never, they were not happy with these exams. So what we used, I don't know if you're familiar with the survey of enacted curriculum?

Mark Royce (15:38):

I'm not No. But some of our listeners may be.

F Joseph Merlino (15:41):

So the survey of enacted curriculum, I'll just give you a quick thing is, is a, is a grid of, uh, 250, 200 science topics with five different cognitive levels of cognitive demand. And what you do is you rate a test or a book, uh, according to that, and you can have a map of the concepts and the skill and, and the cognitive, cognitive level of the content. Mm-Hmm. <affirmative>, when we compare it, we use that instrument and we had the, we trained the Egyptians to use that instrument so they could see for themselves, we looked at their, uh, their test and then the FCI and they could see a comparison that the FCI was much more conceptual, uh, than their tests were. And we said, well, that's what you want. Right? Yeah. We want that. So the FCI became a way into persuading the teachers that they needed to do something different. Yeah. And it also became, came the philosophy that we used with the Minister of Education and his people. 'cause they saw the results to say, well, we're going to then in, uh, give you professional development in a way that would teach for conceptual understanding. And that's how we got the modeling in.

Mark Royce (16:59):

Interesting.

F Joseph Merlino (17:00):

Okay. Alright. And so we use guys, as I mentioned, like Jeff. We used other modelers that come to mind, to provide the professional development. And we've continued that with Egyptian professors since we had another grant to come along. Actually, a contract to take five Egyptian universities and redo their entire teacher preparation program.

Mark Royce (17:31):

Wow.

F Joseph Merlino (17:31):

In five majors in an integrated approach that would model the STEM schools that would be in line with those STEM schools. Now, the professors were just like the teachers in Egypt, they were all didactic. They're all, everything that the AAAS was talking about, that's what the professors were like. So we had to do the same thing with them. We gave them the FCI.

Mark Royce (17:58):

Wow.

F Joseph Merlino (17:59):

Okay. And we gave them the chemistry concept inventories, not as a test, but them to argue among themselves. So we said, take this test and I want you to take it among yourselves and then compare your answers. And they didn't have consistency. There was discrepancies among them. And they argued. I did very little, when I did the professional development with 'em. All I did was give 'em the test and say, what do you do? And they were arguing with one another. And it made them understand that they needed to do something different because they themselves had different conceptions of things. So then that opened the door to bring in guys like Mark Lattery.

Mark Royce (18:42):

Uhhuh <affirmative>.

F Joseph Merlino (18:43):

Who could show them a different approach. So the modeling became, we had to use the assessments as a foot in the door as a way to open the door to then introduce a different pedagogical approach.

Mark Royce (19:01):

Interesting. So those who in Egypt who have been introduced to modeling now and maybe had some training through Mark and others, is that proving to be a boon for them as instructors and their schools?

F Joseph Merlino (19:22):

Yes. And. Yes and. That's not the whole story, because what we were able to do, everyone talks about integration, right? You wanna have conceptual understanding. You want the disciplines to talk to each other. How do you do it? So what we did is we designed a curriculum based upon Egypt's grand challenges. That's what they wanted. We said, listen, this is in the middle of a revolution. You want a new model school. So the first thing we did, and this gets to the book I wrote later, we can talk about that. But the idea, what we saw in the United States was a lack of intentionality and reasons to study a discipline. Why are you teaching me this? Why are you teaching me this?

F Joseph Merlino (20:19):

So when we went to Egypt, we said, what do you want for your country? You're in the middle of a revolution. What kind of future do you want? Well, we got a lot of problems. You step off an airplane, you see pollution, recycling needs, you see overpopulation, you see arid land, you see a lot of solar energy that's not being used. We've got a lot of challenges. We would like to solve these challenges. So I said, well, what do you want your students to be able to do? We want our students to be able to solve these grand challenges, or at least equip them to do so. And we had the very best students, by the way, and they were boarding schools, government boarding schools. That was the first school.

F Joseph Merlino (20:57):

So we designed a curriculum around, you know, they talk about backward design Grant Wiggins. We designed a curriculum backward design from these grand challenges in cooperation with the Egyptians. So when we teach physics, we're also teaching mechanics in math at the same time. And we're teaching biology and chemistry at the same time. Not every day, but the same week. So we're aligning the material to each other in service to a larger purpose. So one of the first things that they study, for example, is statics. Because one of the grand challenges is building buildings that can withstand falling apart. And we have these capstone projects, semester long capstone projects. This is a senior high school model. So it's 10, 11th and 12th. Every semester we have five big capstone projects. One of the first capstone projects is to design a building that can withstand stress and be energy efficient.

F Joseph Merlino (22:08):

Well, so the subjects, physics and the math, is based upon statics and right triangle trigonometry. So kinematics is,

statics is taught very early on, but it's taught not in isolation. It has a purpose to it. So that's the difference. So now when we are teaching the pedagogical side of it, it's in the context of a larger idea of intentionality and a reason to study this. So that together, that has been very successful. And our kids have gone on, we have 21 stem schools now in Egypt. Government schools, boarding schools that are serving as a model for the country. They have gone on to win international competitions, the most prestigious being the International Science and Engineering Fair. Prior to us being involved, for 10 years, they only had four winners total, total four winners. Since we've been there, they've had over 40. And most of them have been, almost 90% of 'em have been from these STEM schools. And this is a population of 17 million kids. They are producing really exceptional kids. And they know it. The Egyptians see it, they see the kids, their presentation skills, their way of questioning. We've had professors who judge the capstones giving them questions as if they were PhD students.

Mark Royce (23:49):

Wow.

F Joseph Merlino (23:50):

And so the professors were persuaded that this was really something. 'cause they could answer their conceptual questions very well. In fact, the students asked the professors the questions,

Mark Royce (24:01):

<laugh>.

F Joseph Merlino (24:02):

And so that became an opening for how we could do the second project of transforming teacher preparation in each of these majors. 'cause we had to transform not only education majors, we had to transform the disciplinary teachers as well, so that we produce teachers who could teach in the same way that we provided the professional development to. So that's why Mark Lattery was over there teaching the professors modeling, so they would understand it.

Mark Royce (24:34):

That's really great. <laugh>. You know, I know modelers are influenced and employ in their classrooms the idea of formative assessment as an approach. And so can you, for those who maybe don't know, well kind of define what it is, what formative assessment is, briefly. And then tell us what you've learned about it in the work that you've been doing.

F Joseph Merlino (25:05):

So getting back to Piaget, again, Piaget was all into formative assessment because it was about semi-structured interviews to try to elicit as students were doing something, their understanding. So it was a progression of that. But we got very early in the formative assessment, in our projects. We were involved with Dylan William, I don't know if you know Dylan William, was a big formative assessment guy back in the, and we had a grant from NSF specifically on formative assessment with mathematics. A randomized control trial where we demonstrated success with that. But we've been promoting formative assessment for the last two decades. This is a big part of our work. Not only the United States, but in also in in Egypt. And the idea of the formative assessment that we talk about is that if you're cooking something, for example, if you're cooking, a dish, a stew, for example, you sample it along the way, and then you add ingredients as you need in order to suit it to the taste.

F Joseph Merlino (26:12):

So it's an ongoing feedback loop that is not only for the teacher's benefit, but for the student's benefit. And so we got into this from Young Women's Leadership Charter School in Chicago back in 2009, where the idea is that a

curriculum would be divided into learning outcomes that lasted one to three weeks. And it would have strategic thinking, you know, we use web step of knowledge to judge whether a learning outcome would be proficient in that. And then we developed a software program that could track students' progression along these learning outcomes. So in our Egyptian schools, we have 270 learning outcomes over three years in the STEM fields. And we have a similar amount in the humanities. And we actually have a software program. We call it PARLO, for proficiency based assessment and reassessment of learning outcomes. And others have done the same thing. Oregon has a very similar kind of idea as well. So we have trained the teachers in formative assessment. We've trained our trainers of teachers in that. And it's a big part of what we do.

Mark Royce (27:33):

Yeah.

F Joseph Merlino (27:34):

It goes hand in glove with modeling. Mm-Hmm.

Mark Royce (27:39):

Yeah. That's awesome. Yeah. Well, you've got a relatively new book that's... Is it out, is it being distributed now? Is it available or is it ...?

F Joseph Merlino (27:53):

It's out. Yes. It's been out. It's new. It came out in April of this year.

Mark Royce (28:01):

Tell us about it.

F Joseph Merlino (28:03):

<laugh>.

Mark Royce (28:03):

<laugh>.

F Joseph Merlino (28:05):

All right. I'll give you the sixty second version of it. So it is called New Era-New Urgency: the Case for Repurposing Education. And it came about as a result of an NSF grant. We took about 14 years to write the book. But the starting point for the book was that our educational system is obsolete for the times that we're living in. The framework that we have right now comes out of the nation at risk report back in 1983, which talks about the global threat that we have over our economic security. And so that we needed to ramp up achievement basically for economic... To be able to have enough workers who could compete. So that became, and still is, the paradigm for how we operate.

F Joseph Merlino (29:04):

But if you look at what has changed in the last 40 years, everything from AI to disinformation to all the cyber communications that we have, we're living in a different world. Climate change, et cetera. But the purposes that we have. And so the idea of a purpose is that it has three components. It has content, it has something internal and has a social moral dimension to it. Okay. So college and career success alone is not a purpose as we define it. Because it doesn't tell you the content. It doesn't tell you, you know, so a purpose that was a purpose, a nation at risk was a purpose. Well, we realized that teachers and students could not articulate well at all why they were teaching algebra, why they were teaching cells or physics. Like why? So this prompted us to go back and look at the origins of

education 400 years ago and look at is there a correlation between the profound changes that have happened in our lifetime with different purposes of education?

F Joseph Merlino (30:16):

And lo and behold, we came up with about 13 different purposes of education that has emerged over the course of 400 years. So the very earliest purpose was to form a new Israel. Pilgrims when they came over, wanted to form a new Israel. And so their education purpose was all about religion. And so on. We traced that. So that's part one of the book. And part two of the book, as every teacher knows, you have to deal with issues of wealth inequality of the students and the districts. You have to deal with issues of nativism, of minorities. How do you deal with minorities? You gotta deal with inequalities, particularly around black and brown people. And you have to deal with anti-science attitudes in the community at large. And we called those shadows. And so in part two, we talk about these four shadows that --not foreshadow <laugh>-- FOUR <laugh>, that every teacher or reform person like myself has gotta confront before they walk into a school.

F Joseph Merlino (31:20):

Right. So do schools need more money? Yes, they need more money. But so do neighborhoods. So do neighborhoods. So do communities because, if you have children in poverty and neighborhoods in poverty, you're not gonna be able to do much adding more money to a school. It's a drop in a bucket. So it has a broader policy context. And that's what we talk about. And then in part three, you know, I've been doing reform and my colleague who also wrote the book, Deborah Pomeroy, who's a chemistry teacher for 50 years talks about the illusions of reform. And there's like four chapters in that, beginning with the illusion of college and career success.

F Joseph Merlino (32:09):

And I'm all for college, but you have to unpack all that it is 'cause a lot of it's about prestige. So we go through that and we talk about why it hasn't worked. And then in the last part, we talk about our adventures in Egypt and how we can bring that back to the United States. And it's all about articulating a case, the case for repurposing education in our time in our country. And we don't talk about what that purpose should be. We deliberately do not talk about it. We suggest it because we talk about the process by which you can come to arrive at a consensus to a purpose

Mark Royce (32:52):

Yeah.

F Joseph Merlino (32:52):

Like we did in Egypt.

Mark Royce (32:54):

Wow. Wow. Yeah.

F Joseph Merlino (32:58):

Yeah. It's really cool.

Mark Royce (33:00):

So what, I'm just curious about what channels or vehicles are opening up for you guys on bringing what you have learned and developed in Egypt, into the US? How are you guys bringing it over?

F Joseph Merlino (33:17):

I,

Mark Royce (33:18):

Is it through NSF or other agencies?

F Joseph Merlino (33:22):

So we're talking about a big picture here. Like a really, we're challenging the entire, you know Yeah.

Mark Royce (33:31):

Education in America, <laugh>

F Joseph Merlino (33:33):

Education in America writ large. Okay. And to do that, we really needed to be, have it scholarly. We needed to do two things. We needed to write a book because we have a lot to lay out. So it's not a slogan. We had to lay out a case, like a legal case for it. So, it had to be scholarly, because we wanted to pass muster. And yet we had to write it in a way that ordinary people could read. And not necessarily educators or, you know, educators and university people, but also your neighbor as well, who's interested in education, it would be readable for them.

F Joseph Merlino (34:11):

So that was the first thing. And to get it published. But the thing is, as an academic book, it's marketed to an academic audience. So we've had, myself and Deborah, have had to try to market it and make other people aware of it. So that's why we do podcasts. But the other thing we wanted to do was test it out with the readers. We wanted to get feedback from people to say, is this any good? You know, is this, does this move you in any way? Is it any, so we've been very fortunate so far that every person that has given, we've had about 11 reviews so far. It's on Amazon. And they've all been extremely positive. And we've had academic people look at it and we've had, you know, a dress maker look at it, you know, so, uh, and we needed to have, so we wanna start, we wanted to begin to place this on the agenda to be able to have a conversation about it, about the need to, think about repurposing

Mark Royce (35:17):

NEW ERA- NEW URGENCY: the Case for Repurposing Education. That's a big title. It's heavy. And I hope it's a really successful book for you.

F Joseph Merlino (35:35):

Thank you. Uh, yeah. Our goal here is to get the message out. Is that I think if people, you know, we're not possessive of it. We're just giving, we're giving out the lay of the land in terms of the history and where we are and our experience in Egypt, that it's a gift to people to have a reference point to help them think about. And so can I just give you a quick example of what I mean?

Mark Royce (36:02):

Sure.

F Joseph Merlino (36:03):

So people talk about like, education for democracy is something that Jefferson talked about as one of the earlier purposes. And that purpose came about because there was a country to form. There was no need for democracy before that. But now something's changed and there was a need for democracy. So we're at a point now where we have to look at that, and we would say, when you look at a purpose, it's not just adding a course. So it's not like add-

ing, unless I had a civics course, no. It means that if that's your top line purpose, then you have to filter all of your courses through that lens.

Mark Royce (36:40):

Mm-Hmm. <affirmative>.

F Joseph Merlino (36:41):

So you look at, well, what does democracy mean? You know, well, it means diversity. Well, what does diversity mean? So it's unpacking things. Well, there's all kinds of diversities. There's biological diversity, there's human diversity, but there's also physical diversities. And along with diversities is the concept of unity. So in physics, there are so many diverse particles, elements, et cetera. But what's the unifying principle behind that? So when you teach physics, you're teaching it through the lenses of diversity and unity. That's what I mean when you have a holistic approach, you still teach your same physics, but it's the context that then changes that when you go to biology, kids get that same idea. And then, so when they go to social studies, they're realizing, well, what does diversity mean? Well, we're looking at unequal rights or no rights.

Mark Royce (37:35):

Hmm.

F Joseph Merlino (37:36):

For example, inequalities we're looking at. And how do you find unity among diversity in the United States, which is a prelude to having a democracy. That's what I'm talking about. When you have a holistic, so then when you have modeling, that modeling is set within a curricular context that makes sense.

Mark Royce (37:59):

Yeah. Well, I love your thoughts and approach on integrated education. That's a really important thing, I think, for us in this country to develop and become better at. So that's great. Well, it's been really fascinating talking with you today. I wish we had more time. Maybe we will revisit another time. That would be fun for me. I just want to thank you for taking your time to do this. It's really, I think, a fascinating insight into the work that you've been doing. I think our listeners are gonna be very fascinated by this conversation. And hopefully we'll look up more about what you're doing and find out more about, well maybe read the book.

F Joseph Merlino (39:01):

Read the book. Read the book. Now let me say, may I just give you -- So it is on Amazon. It's an academic book. It's 90 bucks on Amazon. But there is an ebook edition. That is \$35. If you have a code,

Mark Royce (39:19):

You know what you need to send me links for those. And then I will post them on our science modeling talks.com website, so people, when they go to listen to this conversation, there'll be a lot of other resources there for them, you know, to learn about you. You send me any links that you have that you want me to share with our listeners-- websites or blogs or whatever you've got going on. And, and especially also to the Amazon, links to get the book or any other links that you have. Okay. That would be very cool.

F Joseph Merlino (39:58):

You won't regret it.

Mark Royce (39:59):

Yeah, no, <laugh>. Oh, we won't regret it. No, that's awesome. So F Joseph Merlino, thank you so much again for this time. I appreciate it very much.

F Joseph Merlino (40:11):

Thank you. As they say in Arabic, which means thank you so much.

Mark Royce (40:17):

Ah, awesome. <laugh>. You take care. Bye-Bye.