Kevin Knudson Spotlight Video Transcribed

Kevin: “Hi I’m Kevin Knudson, Professor of Mathematics here at the University of Florida. I’ve been here for seven years. I was hired at UF to be the director of the UF Honors Program. I did that for five years and then I decided after some experiences with teaching mathematics here that I really wanted to get back into the department and try to have an impact over there. So I moved back to the math department in 2014 and I’m now the associate chair.

(00:41) That’s a good question. You know I think the first thing you need to do is be clear about it, you know? When you walk into a classroom, and maybe you’re feeling some resistance from the students, which often happens. You have to break it down and say “Look, here’s where you’re going to need this, and here’s why it’s important.” But more than that, you have to show them that mathematics is beautiful.

(01:02) It’s everywhere! I am sitting in a garden, and as I was walking around I was taking a look and immediately I look at the plants and I see the symmetry in them, or I start counting the numbers of petals on the flowers because those numbers tend to be fibonacci numbers. There’s all sorts of mathematics, everywhere you look!

(01:20) And I think we’ve made a mess of it in some sense, in the schools K-12 of what we do to teach students. We’ve divorced mathematics from the original motivation. Mathematics began as trying to navigate, trying to understand the stars, trying to figure out how the planets work and all of that. And there’s really some beautiful geometry and mathematics out there that was driven by a problem. And we have taken the problems out of it for a little while and we show students, here is quadratic equations and here’s what you do with them. Ok, so what? Why do we care about them? I’ll tell you why we care about them: Your headlights! On you car are parabolic mirrors and those quadratic equations represent the shape of that thing, and we need those to make light go in a certain and those things have properties that are really important. So the idea to make mathematics engaging I think is to make students really see why this matters. Why it’s going to be important to them. And also, try to be clear when you explain these things.

(02:39) I’ve had a lot of practice with this actually. I’m married to an artist and my wife always claims that she is no good at mathematics. I actually come across this all the time. Every mathematician has this story of going to a cocktail party and the cocktail party goes like this: You meet somebody for the first time, they ask what you do and you say “Well I’m a mathematician” and it’s always “Ugh! I hated math.” Well, okay. What this really means is, I figured out; that algebra was a stumbling block from which the person never recovered. So my wife, being an artist sort of leaned that way too. She sort of felt like “Well, math is hard for me.” Well, except it isn’t. She’s a graphic designer and very visual in nature. So, over the years to sort of explain what I do in terms that anyone can understand, i’ve gotten her to realize that she is actually pretty good at this stuff. So the trick is to have multiple ways of explaining things.

Mathematics if often a problem of translation. We can have a physical or geometrical situation that we're trying to understand. And what do we do with that? Well, when you think about it a little bit we often translate things into equations. Once we have those equations then we have algebraic operations. It's that translational step that is really the problem. So the trick is to really focus and develop ways of having multiple explanations and multiple different ways to explain things so that students who maybe don't see the gritty algebra part can understand the over riding geometric picture. There is almost always a picture in everything to do with mathematics. I think that is another misconception that mathematicians sit around playing with numbers all day. We really don't, I don't really think about numbers. I think about bigger structures, and what those things are, what those objects are. How they relate to things and those around them. What happens when you rotate them, and turn them and look at them from different points of view. If you can help students see that there might be different ways to get out of a problem instead of focusing on the one path to get to a correct answer, that's really the trick.

(04:55) So the physics department has this wonderful invention called the light board. It allows you to stand and write on a piece of glass using fluorescent dry erase markers, and through the technology of shooting through a mirror the result is right reading. What I really like about it is it allows you to create some videos where you're actually working problems at the board. So the students can see a person! And sometimes I mess up, but you know it's okay. It's important, and that's another thing, it's important for students to see faculty make mistakes, we're not perfect.

(05:38) There is no secret, okay? I thought about this question a lot, okay? "What's my little trick..." I don't have a trick. I show up and I communicate to my students that I love mathematics. And my students know this, they say it on my course evaluations: "Wow this guy really loves math." And if you do that, you just show up, and you're well prepared, and you've thought about what you want to do, and you have a clear plan for the lecture, or the class, or however you're doing it, it might be flipped, it might be interactive, or whatever. If you show up with a clear plan and you're enthusiastic about it they will follow you. That's the trick. (END)