NARRATOR: Welcome to Intersections: The RIT Podcast. Science is all about discovery. Today, science professor André Hudson talks with Kit Mayberry, RIT vice president for strategic planning and special initiatives, about what he learned about himself as a teacher and a scientist while mentoring three high school students on a project that led to published findings in an academic journal.

KIT: I haven't had the opportunity to ask this of too many of our capstone faculty. You are used to teaching college students – 18 to 22, roughly – master's students as well. But my guess is it's been a long time, if ever, that you've been in a teaching-learning environment with adolescents who are 17 or 18 years old. And I'm curious about what you see as the major differences cognitively, developmentally. And also, why do you like to do it? Because you clearly do.

ANDRÉ: Excellent question. I think I can put myself in their situation because I was that age once as a student who was interested in science as well. And so it kind of brings me back there in terms of someone who is giddy about science and wanting to be there. To be honest with you there is not really that many differences. I think aptitude, competence, interest and passion are ubiquitous regardless of age, I would think. But the key, I think, is more maturity in terms of how the students handled themselves. Did they want to be there? Did they show up on time? Did they put in the effort? Do they have what I call follow-up and follow-through? But the experience actually made me more cognizant of teaching. I think if I do this often or if I do this more often, it will actually make me a better teacher. Someone said, "If you can explain things well enough that even a baby could understand it, that means you know it." So how to break complex things down and many things at the same point to a point where it's easily digestible for students to understand. I think that's the beauty of teaching.

KIT: Did you find that these students, who were all seniors in high school and all college bound, did you find that they had the necessary pre-existing knowledge to jump off where you wanted to jump off? Or did you have to backtrack for them some?

ANDRÉ: One of things that the capstone provided is it started early enough in the process where we could liaise with the students. I actually met them so I could give them some background reading and some kind of things to get them up to speed as to what expectations are. I think that helped a lot. I think also their – for me in particular, they had Dr. Sara Montgomery who is their high school science teacher and also has a biological background. She was a major in biology and has her Ph.D. in biological sciences. So I think she actually reinforced things on their end. She was able to help us out a lot as well.

KIT: Yeah.

ANDRÉ: I think one of the best things in terms of teaching and learning that is very important is humility. And I think the first step toward learning is you have to humble yourself. This is one of the reasons that I'm fascinated by and love science, because the

topic itself humbles you. And you're approaching questions that you don't know the answers to. Professors are really not much difference than students.

KIT: Right.

ANDRÉ: We may be able to write better and articulate better, etc. But in terms of the process of approaching science, they are actually scientists already in that sense because they ask questions and then kind of figure out a way how to answer them and to tell people what the answers are. That's basically science in a nutshell. So they are actually scientists already.

KIT: In the case of these three young women and finding this bacterium that was unknown to you and unknown to most people, right?

ANDRÉ: Yep.

KIT: You really were equally in the dark.

ANDRÉ: Yes.

KIT: You had the language and you had the terminology; you had more context. But you were as new to it as they were.

ANDRÉ: Exactly.

KIT: Do you think they realized that?

ANDRÉ: I mean, going through the process, I don't think they knew about it. Or I didn't know about it going through the process until we got toward the very end. But I think inquiry-based learning rather than – I could have designed something that was very cookbook.

KIT: Where you knew the results.

ANDRÉ: Where I knew the results or they were just confirming it. But I thought about the process of science. The goal was not to do something successful, it was to ask a particular question. And so we could have found a bunch of things that were known and ubiquitous and not as interesting and they just happen. And I think it's a great story how science, a lot of science, is serendipitous.

KIT: Yep.

ANDRÉ: A lot of the great findings were completely by accident. You approached it one way, you were thinking a different thing, and you accidentally find something that diverts you in that particular direction. So, I wanted to create a project or an experience that

had all aspects of science. You ask the question that's unknown, it's novel, you design it, you discuss it, you collaborate.

KIT: And what was the actual question? If you can reduce it to a single question, what was it?

ANDRÉ: So the question was: Can we find a bacterium or bacteria from common places that people would use or have contact with that could produce antibiotic compounds toward other bacteria? That was basically the question in a nutshell. Can we identify bacteria or a bacterium that we could exploit for something useful? And so they isolated a plethora of bacteria, and we just happened to find one out of the many that they isolated that had these useful properties.

KIT: If I understand correctly, because this bacterium has antibacterial abilities, right? Is that right?

ANDRÉ: Yes.

KIT: It could be a way of using the bacteria to the good. Right?

ANDRÉ: Yes. Exactly right.

KIT: And really leveraging its abilities to kill other bacteria, basically. Right?

ANDRÉ: So the purpose of this publication is to tell the scientific community that we've isolated this one particular bacterium. It has these properties. And then we will keep on studying it in our lab because it never ends, as you know…

KIT: Yeah. Right.

ANDRÉ: …to kind of find out what these compounds are or what this compound is. So identify the compound using a series of biochemical experiments downstream and then to go from there. It wouldn't surprise me if we have a follow-up paper at some point in the future describing exactly what are the underlying biochemical properties of this particular bacterium.

KIT: The amazing thing is this is something they can put on their resume.

ANDRÉ: Yes!

KIT: From now on out.

ANDRÉ: Yes.

KIT: That's extraordinary! Really.

ANDRÉ: To provide some context, I never got my first publication until I was a graduate student. And here they're all high school students and they contributed in a major way. That's why they were co-authors on the paper. But I think what I told them is it will be reposited somewhere for the end of time. It will be there. This is something you can show your kids and your grandkids and your great-grandkids, etc.

KIT: Yeah. That's right.

ANDRÉ: When you're doing science, you're basically leaving a piece of yourself for now and forever more. When we are long gone, someone could look them up and find that they made these major contributions to science.

KIT: And will you continue doing this research? Is that what you're saying? You will be following it up?

ANDRÉ: Yeah. So, the research in my lab, one of the projects in my lab, has to do with antibiotics and discovering antibiotic developments. It's a theme of my lab. So, we're always working on projects that are related to that particular theme. So, yes, we will continue to follow up.

KIT: And you'll stay in touch with them?

ANDRÉ: Yes. I got their contact information and told them whenever they got their institutional email at their respective schools that they're going to to keep in touch. And I think mentoring never stops. Even for me. I still keep in contact with high school teachers, college professors. Everyone needs a mentor. Yep.

KIT: Your situation and what happened in your lab was extraordinary. You probably wouldn't have predicted anything quite like it. But the whole partnership and capstone experience, I think, is an amazing gift. There are very few schools that I know of in Monroe County, for example – suburban, urban, private, public – where selected students would even come close to having an opportunity like this has been. And it's an opportunity even when a unique bacterium isn't identified. And I think they're very lucky, I think you all are lucky, I think we're all lucky to be watching this.

ANDRÉ: One of the things that's very important to me is to expose students and to give them an opportunity. But also to show the scientific community that underrepresented students can do it just as well as anyone else. For a lot of time, the mantra was, "There's not enough. We don't have the pipeline. We can't find them." So forth and so on. And they're there. You just have to – whether it's the faculty on the faculty realm, whether it's from the students, etc. – you just have to find it. And this is why peer impact is so important. To provide an opportunity where students see someone from their same race or age demographic or socioeconomic background, immigrant status, so forth and so on, is very hugely impactful because what it says there's an example. And I could get there.

KIT: Exactly.

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