Jennifer: This is my favorite thing to talk to students and teachers about whenever they are hearing about these programs because they'll look at you and go, what does it cost? Well, it costs $0. Everything is provided by DTRA. Students and teachers come to the university for two weeks. We feed them, we lodge them, we take them to do really awesome activities and we give them this great scientific research experience while they're there.

Speaker 2: This is the ORISE featurecast, a special edition of Further Together, the ORAU podcast. Join your host, Michael and Jenna for conversations with ORISE's research program participants and their mentors as they talk about their experiences and how they are helping shape the future of science. Welcome to the ORISE's featurecast.

Michael: In today's ORISE featurecast, Jennifer Tyrell and Kayla Kenario from our K through 12 STEM education team talk about the Joint Science and Technology Institute, which we manage for the Defense Threat Reduction Agency. Applications are now open for both JSTI, Aberdeen Proving Ground, and JSTI, Albuquerque. Jennifer and Kayla talk about the benefits of these two week residential experiences for students and teachers alike. Jennifer Tyrell and Kayla Kenario, welcome to the Further Together podcast.

Jennifer: Thank you so much for having us. We're excited to be here.

Michael: So today, we're talking about the Joint Science and Technology Institute, of which there are two. Tell us what JSTI is.

Jennifer: JSTI is a summer research experience for high school students, high school teachers, and also middle school students. JSTI is designed to give teachers and students a real world research experience and give them also a collegiate experience at the same time. JSTI is sponsored by the Defense Threat Reduction Agency, which is part of the Department of Defense. And the goal is not only to let students know about STEM career opportunities that are available to them in the future, but also to expose them to the type of research that is currently being done by DOD scientists in labs across the country.

Jenna: Great. Michael mentioned there are two. So explain that aspect of it.

Jennifer: Sure, the flagship program is JSTI Aberdeen Proving Ground, which happens in Aberdeen, Maryland in July, has been running for seven summers. That program was so successful that the sponsors wanted to expand and create another location. So in 2019, we started the JSTI Albuquerque, and had just wrapped up our first year with that.

Jenna: Great.

Michael: So last year, last summer, I had the opportunity to be at JSTI Albuquerque for about first couple of days and talk to some of the students and some of the teachers, and the amazement that they had of being there, and being in the University of New Mexico environment, and working on research programs in actual labs and out in the field preparing to do rockets, and all of that stuff. They were having a blast.

Jennifer: What you experienced is exactly the reason why we do the work that we do. What you got to see were those students getting aha moments and being inspired, and that's exactly DTRA's goal from this. We don't want students sitting in a classroom getting lectured at and being bored. We want to inspire students to be so interested in the topic that they've been exposed to that they want to take additional math and science courses and eventually pursue a career in that area.

Jenna: Talk to us a little bit about who is eligible. Is it just students in those two areas, or students across the United States? Who can apply?

Kayla: The eligibility requirements for each of the programs is a little different. For JSTI Aberdeen Proving Ground, middle school students who are rising six, seventh, and eighth graders, high school students who are rising 10th, 11th, and 12th graders, and high school teachers who teach in the STEM area are all welcome to apply. They need to be US citizens, but they can be from anywhere in the United States. All States are eligible. But also, they accept applications from students that attend Department of Defense educational association schools across the world as well.

Jenna: That's super cool.

Kayla: Yeah, the high school students and teachers often come from multiple countries and have just a whole different cultural experience as well.

Jenna: Yeah, it's fantastic.

Kayla: The Albuquerque program accepts students, high school students, arising 10, 11, 12th graders, also STEM teachers. From the Western United States, I won't list all the States, but if you look at Texas and you draw a line up to the Eastern side of the Dakotas, there's a nice line, and all States west of that line are eligible to apply.

Jenna: Okay, great.

Michael: That's awesome. So lots of opportunities. And if you live in the Western United States, theoretically you could apply for both of them.

Jennifer: Absolutely. You could apply to both programs. You will not be able to attend both programs. But should you be selected for both, you get to pick whether you want to travel to Maryland or travel to New Mexico. The other thing for people to consider if they are thinking that they would like to apply are the dates. The Aberdeen program will take place in the end of July. And the Albuquerque program takes place in early June. So it might just depend on what your summer plans are.

Michael: Right. And this is a residential program, so students and teachers are on campus. They're onsite for a couple of weeks.

Jennifer: Yeah. This is my favorite thing to talk to students and teachers about whenever they are hearing about these programs because they'll look at you and go, what does it cost? Well it costs $0. Everything is provided by DTRA. Students and teachers come to the university for two weeks. We feed them. We lodge them, we take them to do really awesome activities and we give them this great scientific research experience while they're there. For middle school students, it's a one week program. But for high school students and teachers, they're with us for two weeks and we take care of everything for them. We try to make sure that it is a best in class experience.

Jenna: That's fantastic.

Michael: Is transportation covered in that as well?

Jennifer: Absolutely. We will fly them from their home to the location where they've been selected. We'll even pay their parents mileage to get them to the airport. We really want there to be zero barriers for the students to be able to attend because we don't want anyone to say, I was unable to have that experience because I didn't have transportation or I didn't have money. This should be open to anybody who is interested in STEM.

Jenna: That's great. You talked a little bit about what the students get out of it. You're hoping to really get that interest in the STEM subjects, and then hopefully carry them through the pipeline and hopefully get a career, join a career in a STEM field. Talk to us a little bit about what the teachers get out of it. What do they leave this two weeks with.

Jennifer: For the teachers, they are receiving a research experience in a lab. For many high school teachers, they have never had a research experience of any type and if they have, it may have been a long time ago and it may have been only in their university. So what we are hoping to do is give teachers experience onsite in a research lab. In Aberdeen, they work one on one or two on one with DOD scientists on Aberdeen Proving Ground. In Albuquerque, they'll be working one on one or two on one in Los Alamos National Lab.

Either way, you're in a world class research environment working side by side with a brilliant scientist, but not just with a scientist, but also with an entire research team. And so, aside from the research experience, which honestly gives the teacher a little bit of street cred with their students, looking at what I was able to work on this summer, they're also being exposed to all the different types of STEM careers that are out there so they can bring that back to their students. So it's not just, oh, I'm interested in research, I need to go get a PhD. That there are all different levels of education and all different skill sets that are working on research projects. So we want teachers to have that knowledge so that they can encourage our next generation of STEM professionals that they don't all need to be following the same path.

In addition to all of that knowledge that they're gaining, the teachers are also working through developing a lesson plan that can integrate this hands on current research into their classroom, so that their students will also be exposed to that type of research. Teachers go home with a giant research poster that they developed while they were with us that they can hang on their wall. And so now, the students in their classrooms are seeing a real research poster, which is just like what's being developed by all of these professionals across the country, across the world. And so, students' curiosity is sparked. And even if those students are not able to attend our program, we're reaching even more students across the country. Teachers are truly our force multiplier in this effort.

Jenna: I imagine networking too is a huge thing. You get all of these teachers together who have all of these amazing ideas and, all of a sudden, ideas start flowing, and it probably just multiplies.

Kayla: Absolutely. And there's more networking just from the teacher to teacher. So yes, we have these teachers who are together, but our teachers have such a great experience that they've actually created their own Facebook page where they're all interacting with each other. So teachers, they've never even met each other. Teachers who participated in 2015 are now connected to teachers who participate in 2019, and they're posting resources and asking questions and getting contact information for some scientists. Hey, do you have a contact of a person who can talk to my students about this?

But then, there's also the connection that they're making professionally with the scientists. There are teachers who have participated who are still connected to their mentors and other people in the research group. And they're continuing to develop activities in their classroom in conjunction with these mentors that continues to affect their students, hundreds of students each year.

Jenna: That's invaluable.

Michael: Amazing, really. And in addition to the teachers who go to work in the lab setting, you have what you call resident teachers. And I know of one in particular because I spent a lot of time talking to Janie, who was a participant teacher seven summers ago I think. And now, she's a resident teacher, has been for years. She's been a resident teacher at both programs. But that experience not only changed her classroom, it's changed her school.

Jenna: We did a podcast with them.

Michael: Yeah, we interviewed them-

Jenna: If any listeners are interested, go back a few podcasts and they've got a really great story.

Michael: They really do. But that's the kind of force multiplier you're talking about.

Jennifer: Absolutely. And the reach of these programs is farther than we even know at this point because we don't know about everybody's story and what they've changed at their school. We're working on a followup survey right now, so we're going to get some data and have a little bit more information about exactly how effective these programs are at doing the types of things that you're talking about. So we're able to see immediate effects and we're able to follow specific students who tell us that now they're at this university pursuing this degree. Sometimes, we hear from a student who says, I'm still in touch with my mentor who has been advising me on my future STEM path. And those are the exact types of connections that we really want to make.

Michael: That's awesome. So let me put this all in a larger context because we didn't talk about who you guys are for ORISE and ORAU, but y'all are part of the K through 12 STEM education staff here at ORAU and ORISE. Basically, what I'm saying is JSTI isn't the only thing you do. It's a part of a much larger picture of really building the STEM workforce, STEM interest from kindergarten on up.

Jennifer: Absolutely. We have a suite of programs, of competitions, of resources for students starting in kindergarten all the way through undergraduate years. And additionally, we're trying to provide support for teachers who are teaching K through 12 programs. All of our resources are available on the ORISE website and that oraustem.com. So we've got two different locations where teachers can go and find things that they're interested in, things that can be useful in helping them. Teachers who are local to Oak Ridge, we have even more things going on for them because we have that suite of summer professional development that happens every year in June. So while we've got these wide reaching programs like JSTI, we also have a lot to offer to local teachers as well.

Michael: And it's amazing and it's all free. And it's all free.

Jennifer: And it's all free. That's the best part. We talk to teachers who say, oh, the price is right.

Jenna: Yeah.

Michael: Right.

Kayla: Yeah, and our comment to that is, yeah, we're former teachers. We know.

Jenna: Yeah.

Kayla: We speak your language.

Jenna: Yeah, yeah.

Michael: That's great. Going back to JSTI for just a second, what kinds of topics, I know they're a little bit all over the map in terms of what kinds of STEM topics and issues the students and teachers might be working on during their two weeks in the program.

Jennifer: Yeah, they vary each year based on the mentor's availability. So we're actively recruiting mentors now to participate in our programs this summer, and we have some mentors who are recurring who come to us year after year, but we have topics that range from environmental water quality to antibiotic discovery to rocketry. And the middle school students are getting to work on things like... well, we have 3D printing for high school students as well. And we've got 3D printing for middle school students, raspberry pie.

We've got a forensic chemistry group that the middle school students participate in. The projects that the teachers work on are much more closely linked to the researchers current research. So they are so far over our heads that it's difficult for us always to name specific topics that the teachers are working on, but there are areas that are very related to biology, chemistry and physics, engineering, we have some great materials science projects. Though again, those key keywords, if we started trying to say all the words that they put in the titles of those, we would mispronounce them.

Kayla: If people are interested, they can go to the website and see the former projects, not just the student projects, but also the teacher projects are listed with descriptions of what they studied and worked on for those two weeks.

Jenna: Cool.

Michael: And that's the JSTI website, right?

Kayla: That's the JSTI website. There are two separate websites. Each program has its own respective website and those projects are listed on each of the program's websites.

Michael: Fantastic.

Jennifer: Orise.orau.gov/jsti and orise.orau.gov/jsti-abq.

Jenna: Nice.

Michael: There you go. Excellent. I know the applications are now open, so teachers and students should apply. Is there anything else that you want to make sure we say about JSTI before we wrap things up?

Kayla: Yeah, I think it's important to talk about the application just slightly. It's in a platform called Zintellect, and students will go in and create a profile and answer some pretty basic application questions. But a large piece of the student application is the teacher recommendation.

Michael: Okay.

Kayla: So if you're a teacher who is thinking about students who might be good to apply to the program, start thinking about early on, what you might put in your recommendation letter for those students.

Jenna: Great.

Jennifer: Think about the things that will set that student apart from hundreds of other students who may apply.

Michael: Okay.

Kayla: Oh, you know what? The other thing we didn't mention, which is worth mentioning, that's important, for the teacher program, while the teachers are doing the research and creating a poster and they're going to give a presentation and, like Jennifer talked about, write a lesson plan, the teachers will also be given a stipend for their participation. So for their two weeks of participation, teachers will receive a $1,500 stipend as well, which I think is important to mention for teachers.

Jenna: Yeah.

Michael: So I'm a teacher, I get a free trip [crosstalk 00:17:23]. great experience. And then, I get paid on top of it.

Jenna: Yeah.

Kayla: Yep.

Jennifer: I think it's also worth mentioning that while you're having this great experience, you have absolutely no responsibility for the students who are in the program.

Kayla: Every teacher's dream.

Jennifer: So we're talking about these things like they're together-

Michael: It's all you if you're a teacher. It's basically focused on your experience. You don't have to focus on making certainly one else's experience [crosstalk 00:17:50].

Jennifer: You are a participant in the program and it is all about you, and you should not even think about those students. It's Janie's or some other resident teacher's [crosstalk 00:18:01]-

Michael: That's why you have resident teachers.

Jennifer: ... responsibility to tell those students to quit whatever tomfoolery they're doing.

Jenna: That's great.

Michael: Because they're chaperone, let's be real. They're chaperones.

Jennifer: Exactly, those resident teachers are chaperones so that the teachers who come to participate and get the research experience can focus on it. So I want to make sure it's clear they're not getting a stipend to watch any kids.

Michael: You get to work on your project.

Jenna: Yeah.

Jennifer: Exactly.

Michael: I love it. Well, Jennifer Tyrell and Kayla Kenario, thank you so much for joining us today.

Jennifer: It has been our pleasure.

Kayla: Yes, thank you for having us.

Speaker 2: Thank you for listening to the ORISE featurecast. To learn more about the Oak Ridge Institute for Science and Education, visit orise.orau.gov or find us on Facebook, Twitter, and Instagram at ORISE Connect.