Speaker 1: This is the ORISE Featurecast, a special edition of Further Together, the ORAU podcast. Join your host Michael and Jenna for conversations with ORISE 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 Featurecast.

Michael Holtz: Well, it's another Wednesday and it's another fantastic episode of Further Together, the ORAU podcast. My name is Michael Holtz, your host, with my cohost and friend...

Jenna Harpenau: I thought you were going to say your favorite cohost-

Michael Holtz: My favorite cohost.

Jenna Harpenau: And friend. I was like, "I'm your only" and yes, my name is Jenna Harpenau. Thank you.

Michael Holtz: One friend and cohost.

Jenna Harpenau: Yes. I take the job very seriously though.

Michael Holtz: You do, and I appreciate it very much.

Jenna Harpenau: You're welcome.

Michael Holtz: So, welcome.

Jenna Harpenau: Thanks.

Michael Holtz: Hope you're doing well.

Jenna Harpenau: I am.

Michael Holtz: So, I know, again, we say this every episode. We're very excited about this episode's guest.

Jenna Harpenau: It's because everyone's new and it's fresh, and yeah. It's a fun thing to talk about. So I'm excited.

Michael Holtz: But we're genuinely talking to one of the most passionate people, I think, in our organization, Dr. Craig Layman, who is the associate director of workforce development for ORISE and ORAU, and he's exceedingly passionate about what he does. And I always love chatting with him. Dr. Craig Layman, welcome.

Craig Layman: Thank you. Thank you for having me. My pleasure.

Michael Holtz: Glad to have you here. So Craig, tell us a little bit about who you are, how you got here, all of that fantastic stuff. You're also a superstar teacher emeritus at the University of Tennessee.

Jenna Harpenau: Got a lot going on.

Craig Layman: Every time anyone asks me that question, there's a song that always goes through my head, because it kind of defines me and how I've gotten to these places. But it's a song by a gentleman by the name of John Cougar Mellencamp.

Michael Holtz: Yes.

Jenna Harpenau: Mm-hmm (affirmative).

Craig Layman: You've heard of him, right? I'm not showing my age, right? I think he's just called Mellencamp now. But it's called Small Town.

Michael Holtz: Yup.

Craig Layman: Do you know the song?

Jenna Harpenau: Yes, mm-hmm (affirmative).

Michael Holtz: Absolutely.

Craig Layman: Does anybody want to sing the song? I'm not supposed to sing the song, right?

Michael Holtz: Only if you want to.

Jenna Harpenau: I feel like, yeah.

Craig Layman: Small town boy, right? That's who I am. I have a strong agrarian as a root system of growing up, grew up on a farm. Didn't think I would be in this position today to talk to you, but it's certainly my pleasure to be in this position. I have spent my entire professional career in and out of academia in some way. And while we don't award degrees or certificates of completion here at ORAU, we certainly impact higher education, and we impact the lives of thousands of learners across the United States and abroad.

Michael Holtz: Absolutely.

Craig Layman: So, I'm taking that as my continued to link to academia. Prior to my arrival here, I did spend time both in the classroom and as an administrator as well. So again, thank you for having me.

Jenna Harpenau: Yeah.

Michael Holtz: Glad to have you. And again, anytime we have a conversation about workforce development and research participation programs and even K through 12, I always come away excited and having learned something new about the work that we do. We've talked about this a little bit before, workforce development is about 90% of what we do as an organization, and there's so much that's involved in that. I mean, we truly do this sort of almost birth, right-

Craig Layman: Yeah. Right.

Michael Holtz: ... to graduation/faculty process of bringing people along in STEM education and then filling the research pipeline and all of those amazing things that we do. Not to just, say, talk about that, but kind of. We have an important role to play.

Craig Layman: We have such an incredible role to play, and we're privileged each day to be a part of our nation's economic system as it relates to science, technology, engineering and mathematics education.

What's really incredible about what we do as an organization, as a company at Oak Ridge Associated Universities is we have been doing the same thing for 73 years. It always gives me so much pleasure to stand in front of any group that I'll talk to and say, "I'm working for one of the best not-for-profit agencies in America doing the same thing we were chartered to do for the same people that we were charged to do it for." And that's because, and I don't mean to sound overly prideful by saying this, but that's because this organization does it well.

Jenna Harpenau: Yeah.

Michael Holtz: They do.

Craig Layman: And part of that is our staff. Our team that we have here is an incredibly bright... some are very brilliant, to be perfectly honest with you, team of subject matter experts that certainly understand what they're doing. We're comprised of scientist, of engineers, of educators, both K through 12 and post secondary education, as well. Business people, brilliant business people that understand how to make a business decision. Even though we're not-for-profit, we still have to make business decisions.

Michael Holtz: Absolutely.

Craig Layman: Veterans, former military people. We've just got such an empowered staff, that it's easy to implement and execute our mission. Now, it's not really what you [crosstalk 00:06:17] you kind of asked about that. I have to talk about the staff, right? Because they're so good. But you ask about our mission, what we do. Workforce development is such a broad term, right? Completely related to economic development. I mentioned earlier that our mission is to positively impact the workforce for all of our sponsors. And I also gave a hint, I said 73 years we've been doing the same thing for some of the same people. Well, what does that mean? And who are these people? Right?

The Department of Energy, our federal government really is what I'm saying, the Department of Energy being one of our main sponsors. But other agencies across the executive branch are our sponsors, as well. And so, when we say workforce development, we are engaged with ensuring that the Department of Energy and the other agencies have a scientific and engineering technical workforce that's primarily research-based that will serve their needs for not only today, but for future generations to come.

And you ask, "Well, why is that important?" Right? I don't mean to soft-sell this. In fact, hopefully the inflection of my voice won't come off that I'm soft-selling. Our nation's economic independence relies on this. So when you think about innovation through the centuries, and I'm going to give a very simplistic example here, because I'm not sure who your target audience is. Maybe it's K to 12 or [crosstalk 00:07:58], or just anybody, right?

Jenna Harpenau: Anybody who loves to learn.

Michael Holtz: We live in a world of micro-targeting, so literally every episode of the podcast that we do is probably tailored a little bit to a different audience, because we've talked about everything from nuclear safety culture, to Renee Powell who was last year's extreme classroom make-over winner. On some level, it's any and everybody, but in this case, it's probably going to be people that are interested in workforce development and maybe a little K-12 and people who just want to know what the heck our organization does.

Craig Layman: Well, you know, with our primary focus being STEM workforce development, and STEM majors, and STEM disciplines being so incredibly important, I'll set up my example by saying this. When you look at innovation through the years, sometimes it's hard to see innovation, right? Sometimes, it's hard to see the growth of what one might consider innovation.

Now, thousands of years ago when we began creating tools to help with shifting cultures, at the time, for more hunter-type cultures to gathering-type cultures and we start creating tools. That's a part of innovation. We didn't think of it as STEM-based innovation, because our educational systems weren't modernized and developed to the way that they are today. But when you think about the pace of STEM-based innovation today, and the fact that we must continue to cultivate and build those that can not only keep pace with what we're doing in industry, academia and in other places, but we've got to be thinking 15, 20, 30 years in advance as to how we're going to shape the pace of that innovation.

Our role is to ensure that those agencies and that industry and that our nation has the workforce that can keep pace with the speed of, really, change. We live in an unprecedented time of speed of change.

Michael Holtz: Definitely.

Craig Layman: It's almost hard to understand the rate of which things are changing and how we have to keep up with this rate.

Michael Holtz: So how do we do that? How is it that we're able to look at 10, 20, 30 years down the road to ensure that that workforce is [crosstalk 00:10:40]

Craig Layman: Thanks for asking that question. That's really good. And you don't have a list of questions in front of you. We didn't plan this in advance.

Michael Holtz: We didn't plan this.

Craig Layman: So one of the reasons why I wanted to set up the fact that our workforce is so good, was everyone's workforce. Machines can't program themselves, theories can't be supported, research papers, manuscripts aren't authored individually, right? Their author is teams and groups. When you look at what we're trying to do, and you look at how we're trying to do it, it begins at the grassroots level. It begins, K through 12. It begins exposure to concepts. It begins with that understanding with the teachers that give so much of their time, not just nine months out of the year, 10 months out of the year, and then they take off for two to three months in the summertime, but they're giving so much of their time 12 months a year. I would over-exaggerate by saying 24 hours a day, seven days a week. I'm sure they feel that way, right? Because they're so impassioned about what they're doing with these learners. But it begins there.

It begins with things that we're doing with our K through 12 activities, our teacher workshops and our summer camps. We're passionate, as you know, about teaching teachers, about exposing teachers to the latest technologies and tools that will make their classrooms successful. So the teachers will have something in their toolbox to pull out to ignite that STEM spark that we all know that's out there for these young learners. So I truly believe it begins K through five, not just six through eight, or nine through 12 high school. I think it begins K through five.

I think it begins with identifying and training passionate teachers. I'm not so sure how much you can train passion into a teacher, right? Maybe somebody can can argue with me or debate with me on that one. But I think teachers are very much needed. If you're not going to train passion into the teachers, probably not possible, you train them how to teach STEM. You give them the tools to teach STEM, and that's something that we're incredibly passionate about here, as well.

The summer camps for kids is something that we do, and we do a lot of them, especially during the summer, and then off the summer too. Other events that we're going to do for the kids, such as Tennessee Science Bowl or National Science Bowl, or any of the other type of events that we do, those are the ways to begin this process. And then we hope this process carries over when they get to post secondary education, as well. And that's really where we need to retain them through the pipeline to not see the leakage from undergraduate to graduate school onto their postdoctoral studies, if there's going to be postdoctoral studies, or just simply out into the workforce in general.

I guess I'll pause there to say, it begins with well-qualified, passionate staff and learners that want to take that extra step, that want to engage in that next level discovery that this nation will need, and really the world will need, in the future.

Michael Holtz: What I think is amazing about what our K through 12 staff does, you can see how passionate they are.

Jenna Harpenau: Absolutely.

Michael Holtz: And I believe passion ignites passion, right?

Jenna Harpenau: It does.

Michael Holtz: It's like lighting a candle with another candle, right? Our folks are so passionate about teaching other teachers, and even other students, other teachers can't help but get fired up by that.

Jenna Harpenau: And I also think that we have been lucky. The teachers that take our courses during the summer, I feel like the majority of them have that spark for learning, and they want to be here. And there's a reason here, and they're already... If you talk to them after the first day, they're already thinking of ways they can go back and implement what they've learned in the first four hours of their class, how they're going to take it back and how much their students are going to love it. So, I think we're lucky because we get more contact with those passionate teachers that you were talking about. I feel like we see them maybe a lot more than others.

Michael Holtz: Absolutely.

Jenna Harpenau: And we're around them a lot more, which is cool. Their passion also rubs off on us when we get to talk to them and interview them about their classes, and how they plan to use what they learned, and how they feel about their students. It just kind of comes full circle.

Craig Layman: You know, let me say something better [inaudible 00:00:15:42], if you'll allow me. And as our staff in general... But I really just want to illustrate their creativity. I'll do that by telling this small little story. Well, I'm not sure when this podcast is going to air, but I will say that we are in October. Right? And where we're around the Halloween timeframe. Well, one of our staff members, not K through 12, but on our research participation side, her name's Sarah Beth. So she came up with this idea to host a Halloween decorating cube party. Right? And so, she came to me with this idea. I thought it was a wonderful idea. It's one of the ways that we can be, to borrow a cliche, one that we know well, further together, and that we can empower our employees and make our workplace a little bit better. But she came up with this idea.

And so, the staff started decorating their offices. There's cubes, and if you haven't had a chance to walk around on the second floor, we would invite you to do that. If you are so badged to enter our building.

Jenna Harpenau: Appropriate. Absolutely.

Craig Layman: Yes, you need those. That would help. So people started decorating their cubes in their offices. Two days ago, I walked past the space where the K through 12 staff sit. Three or four were there decorating their offices, and I walked up to them and I said, "I knew it was the only amount of time before your creativity and your competitive spirit emerged. And I knew everyone else was in trouble." And I think that really illustrates the... Jennifer Tyrrell and Kayla [Canaria 00:17:31] and Chris Nelson and Pam [Moo 00:17:34] and Karen, and then all the team. And I'm sorry if I missed anyone, but all the team that personified that passion that goes into their job every single day, because day in, day out, with K through 12, their mission is to better... to help someone else's life, whether that's a child or that's a teacher that's going to impact that child one of these days.

And it's truly an honor to get to work with this team and to watch them work, as well. And so with that said, I'll also say that statement can also be said about our research participation staff.

Michael Holtz: Definitely.

Craig Layman: Because they clock in every day and they help administer... Well, they help recruit, identify talent for the federal agencies. They help administer appointments, and administer professional development, and evaluate the programs. And they put a lot of effort into the learning objectives and the mentoring aspects of these programs. And every single day, they are impacting someone's life. And that person gets to participate in a research experience. They get to learn about the latest technologies, and the latest research areas, and the latest areas of innovation that this world is engaged in. Not just this nation, but this world.

And they're learning from some of the most outstanding, brightest, best researchers, scientists, principle investigators at DOE's national laboratories and the other federal agencies' laboratories. They're learning from them. They're applying practical concepts and knowledge that they were taught at university, and they're doing it in an experiential setting with a hands-on atmosphere that allows them to think creatively and thoroughly about their projects. And they're solving wicked problems, right? They're exposed to wicked problems, and they are solving some of the biggest questions, energy-related questions, and national defense-related questions, and food and drug and safety questions that this nation and that the world are exposed to.

Our staff play a key critical role in that. And they see it every day, and they clock in every day, knowing that they make a difference for that next generation. That's going to make a difference for us.

Jenna Harpenau: Mm-hmm (affirmative). So, that actually brings up a really good point, when you were describing what participants actually get to do. If someone doesn't know what that looks like, what programs are we managing? What does that mean? So, you know, someone in undergraduate or postgraduate, what do they get to do? What is the experience like for somebody that is thinking about applying for this kind of a program?

Craig Layman: You know, that is a great question. We will host and place nearly 10,000 research experience across hundreds of hosting facilities annually.

Jenna Harpenau: That's insane.

Michael Holtz: Sorry, say that number again.

Craig Layman: 10,000. It is an insane number, right? And so, that's why people need to know where to go to find these. So I'm going to shamelessly say, "You need to go to zintellect.com. That's zintellect or intellect with a Z .com, where to find your perfect opportunity.

Michael Holtz: Yeah.

Craig Layman: So what does that really mean? So again, let's go back to the executive branch of the federal government. And we think about all these different federal agencies from DOE to the Centers of Disease Control, to the Food and Drug Administration, to USDA, to the Department of Defense, FBI, all of these different areas have a specific mission that's unique to that federal agency. So those 10,000 research opportunities are linked to those mission areas.

So when you think about the Department of Energy, well, they've got a couple of different mission areas, right? But certainly, energy security and energy innovation for the US, and really the world, is one of those. National security, many people don't know, is one of DOE's major mission space area. So, if you're interested in energy research... and that could cross a variety of different disciplines. You could be a computer programmer, computer scientist, material scientist, a biologist, an engineer. Any of these areas, if it's for DOE, especially engineering and the physical sciences, are areas that are key to their mission space and to their research areas and what they're trying to accomplish for the federal government.

So each of these different agencies has a unique mission. It's our job to identify the next generation of scientists and engineers for these unique missions. And we're part of that workforce development component for these unique agencies. So, we have a team of recruiters, we have a team of scientists that understand the science, and educators that understand the pedagogy behind the learning experience, and recruiters and business people that understand how to operate the programs and recruit the scientists. We pull all that together, it's a bit of a bumblebee trying to fly, but boy, it certainly works. And it's worked for us for 73 years.

Michael Holtz: And then, right? So we place these 10,000 people, but we track them. And what I love about this, what I guess Aaron Burns, some of those folks do, right? They go back five, 10 years after these folks have had these research participation experiences, to see what they're doing.

Jenna Harpenau: Where are they ended up.

Michael Holtz: And 96% of them, right, in the case of Oak Ridge National Lab, are still in the STEM fields, right? They're still doing science, which is what we hoped would happen.

Craig Layman: Yeah. And 95% in the case of the Food and Drug Administration. And 88% in the case of CDC, and 85% with Department of Defense programs. So we're starting to see the data normalize, and we're starting to say, "Hey, if you're in an ORISE program, here's what this means beyond the time period that you're appointed, and that you're researching, and that you're learning." Yeah, you're right, Jenna.

You know, as scientists, we often say we're going to support something with our data, rather than we're going to prove something. Right? And so yeah, we're saying, "Hey, we're... " We're leaning closer to saying, "We can support the fact that these programs are working, and they're working at a scale that's different than other programs." And I'm going to say, in this case, different as being more impactful. Impactful to the learners' experience, impactful to future collaborations at the hosting facilities.

Hopefully, you will have some future applicants listening to this podcast, but foundations and grants. We're starting to see that if you have an ORISE appointment, an ORAU appointment, then you have a better chance-

Jenna Harpenau: Oh, that's a good nugget.

Craig Layman: ... of earning grants through foundations, through the federal government and private sector, then maybe someone who didn't get an appointment.

Jenna Harpenau: Yeah. That's great.

Michael Holtz: Because that grant offering institution knows that you had a quality experience in your quality...

Craig Layman: And you're walking away from that research-based experience. For the most part, people are walking away, not only practically applying knowledge that they learned outside the classroom, but they're producing scholarly works that impact their field of science, whether they're publishing, or presenting, or creating posters, or reviewing manuscripts, they're producing works that are later to be cited. And so, they're producing those works. They're going into whatever final vocation, job that they will be in after their appointment with us. They're continuing to collaborate with that hosting facility, whether it's DOE, CDC, or FDA, whomever that may be, and then they're earning grants at a level that would be really attractive to someone that's, say, a postdoc applying or trying discern, "Do I want the ORISE research experience, or do I want to take a postdoc experience somewhere else?" I'm going to shamelessly plug ORISE and say, "Look at us because of what's happened in the past."

Jenna Harpenau: Yeah.

Michael Holtz: And the thing that we can certainly say about the ORISE experience is, you're going to do the research, you're going to do the publication, you're... You know, you're not going to just be sitting in someone's office-

Jenna Harpenau: Getting a coffee.

Michael Holtz: ... filing old papers and getting them coffee. Right? You're going to be at the bench doing the work.

Jenna Harpenau: Yep.

Michael Holtz: If I were science-minded, that would be the dream.

Jenna Harpenau: That's the dream. Yeah.

Craig Layman: Yeah, you're absolutely correct. That's the dream. There's a level of independence that one will gain during these appointments, but at the same time, we're starting to move towards multidisciplinary teams across so many different disciplines, with so many different trains of thought, diversity of thought within those teams in that structure that's built at these national laboratories and these other research centers, that just makes for such a positive environment and experience. You walk away, not only learning something new, publishing and creating scholarly works, but you walk away understanding more about disciplines that you didn't know about, then you would have without this experience.

Jenna Harpenau: And making those connections. I mean, those are invaluable connections that you're making, with the top tier scientists around the world, that... There's really not many other places that offer you that availability to be that close, and work side-by-side with people of that caliber. So...

Craig Layman: I'm not sure I can say it any better than that. So what I'll do is, I'll reemphasize the fact that when you're here, networking is a key component of each of these appointments. And that's networking with peers. It could be other students, it could be other post-docs that's networking with your mentoring team, or your team, that's networking with other administrators at the laboratory, or at conferences and other events that you're going to be exposed to. But I think the key thing to take away is networking. It is a part of the experience that is very invaluable and it makes it an ORISE, an OREU experience.

Michael Holtz: Speaking about NEC networking, one of my favorite kind of experiences hearing about that was when Beau Cumberland and I were in Athens, Georgia talking to participants at the FDA, and international students who are working with the guys who wrote the textbook that they were reading back home. And to them, these guys are rock stars, right? And they're working in their labs, and they're thrilled to death to be there because they're doing amazing work that they wouldn't have had the opportunity to do otherwise.

Craig Layman: Oh, I couldn't agree more. I'm a bit of a, if I can say, you can edit this, I guess, science nerd when it comes to these things. I think we use the term rock star incorrectly. This is not someone out on stage, but it should be a different type of... the stage should be the laboratory because the amount of innovation that they're pushing out of these national labs and these research centers, that end up... and this is what a lot of people don't know, that maybe the general public don't know, that's transferred... That innovation is transferred into our everyday life in some form or fashion, is to me where the real rock stars are earning their money day in, day out.

Jenna Harpenau: Yep.

Michael Holtz: Absolutely. We could seriously-

Jenna Harpenau: All day.

Michael Holtz: ... talk about this all day.

Craig Layman: Well we should.

Michael Holtz: But we hope there are people sitting in their cars or at home kind listening to this, kind of hoping we wrap up. Craig, we will have you back-

Jenna Harpenau: Yeah, for a part two.

Michael Holtz: ... more conversation. Absolutely.

Jenna Harpenau: Yep.

Michael Holtz: Is there anything you want to say right now before we close things up?

Craig Layman: Well, I would be happy to come back anytime you will invite me. It's been my pleasure to be here. I'll look forward to talking to you two in the future.

Jenna Harpenau: And once again, if you are someone listening that is interested in looking at the various positions that we might have, we need you to go visit our Zintellect website, correct?

Craig Layman: Please do. So zintellect.com.

Jenna Harpenau: Yep.

Michael Holtz: Intellect with a Z.

Jenna Harpenau: There you go.

Michael Holtz: Dot com.

Jenna Harpenau: All right.

Michael Holtz: Thank you, Craig.

Jenna Harpenau: Thanks.

Craig Layman: You're welcome. Thank you.

Speaker 1: 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 @ORISEconnect.