

# Rise, Teach, Learn - Season 3 Episode 2

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## Supporting Student Research

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We acknowledge and are mindful that CSU Chico stands on lands that were originally occupied by the first people of this area, the Mechoopda, and we recognize their distinctive spiritual relationship with this land and the waters that run through campus. We are humbled that our campus resides upon sacred lands that once sustained the Mechoopda people for centuries.

00:27

Welcome to the Rise, Teach, Learn Podcast. I am Dr. Chiara Ferrari, Director of Faculty Development at Chico State, and we are happy to make this resource available to our campus community and beyond. The podcast is hosted by Dr. Jamie Linn Gunderson and she will engage in timely conversations with faculty, staff, and students and give you a taste of the Chico experience. Subscribe to our podcast and explore the many resources available on our website. Thank you for listening.

00:58

Hello, and welcome to rise teach learn. I am your host Jamie Gunderson. In this episode, we explore impacts and examples of student research. And we will hear from an interdisciplinary team of Deans faculty and lecturers, all of whom are focused on providing authentic research experiences within their teaching practice. So I am here with Sharon Barrios, Kate McCarthy and Nate Millard and I am really excited to have an episode dedicated to supporting student research and in the quest to figure out what all was out there and available for our Wildcat community. I also wanted to look at the impact or the why behind we offer these opportunities. So I invited our guests on today to have a discussion about what's out there, what's available and why we offer it.

01:51

Jamie, in my role as Dean of Undergraduate Education, I'm constantly fixated on how we can help more students be successful in their coursework. Get the degree they want and open up the futures that they're aiming for. And we've discovered that the undergraduate research experience is a really powerful driver of student success. So as of now a student at Chico State can have an authentic research experience in their very first semester, as a first-time freshman, in a general education course. There's a course that Nate developed UNIV 101 that served 250 students last year, last fall, and they did real authentic real-world research, and we're pretty confident that was a high impact practice for them.

02:41

Nate, can you tell us a little bit about that course and maybe give us insight on how you came up with the design.

You know, I think I started with just trying to support student success in general right? I mean it really started with us looking at high impact practices, or what can we do to support all students? Eventually

undergraduate research first emerges as you know, the high impact practice. And especially when we look at equity issues, and we're, you know, we're looking at grad schools and were looking at even our faculty, how do we get, you know, more diversity in our faculty? How do we get more people into grad school? How do we get people into research? But then a lot was about authenticity. Right? How do you in a general education course make sure your students feel like they're doing research and that they see themselves like why they're important in doing the research. And so we developed this course that had students actually researching Student Success and Equity on campus. So they were looking specifically at programs that we offer on campus all that student success does what we learned, especially through COVID, was that we're doing so much, but the students don't always know all that we're doing for them, they don't know everything that's there and so we're trying to find a way to introduce that to them and have them help understand like, what makes someone resilient you know, Why seek help? Why go, go to these programs? You know, why join different things on campus? And in that process of blending that with high impact practice and undergraduate researchers, we want to have students do research on programs on campus about why they're successful, how they're successful. And I think the best thing about that is that students see why they're the best people to do that. They're like, Oh, I understand this is about me. And I'm the best person to do this research. And I think that really makes it authentic. You know, for a first go at it, it felt really, really successful. And it was really amazing to watch some of the students walk out of that with identities as researchers while also really knowing our campus and the support that we offer them. Historically these experiences have been available equally, especially by providing the course-based experiences, there's much more equity in the distribution of having a research experience.

05:00

And embedding the research experience in the course makes it accessible to far more students, and it begins to scaffold those skills and habits of mind that will help make the students successful in a higher level, more concentrated research experience.

05:16

Nate, you mentioned forming these identities as researchers in these early undergraduate programs and then building this pipeline that gets them like inspired, motivated, engaged to do this research in the graduate program. And I serve as the coordinator of the computational literacy across secondary settings program. The class program, as we like to call it. And our students as part of this program are in classrooms, they're studying to be educators, but they are, they're forming these great identities as teacher researchers, and they're starting to dive into literature, examine data within their own classrooms to inform and improve their instruction. And when you mentioned identity formation that hit me really hard because I think not only do we do this in the undergraduate program by providing these experiences, but by continuing to provide these experiences for our students at the graduate level, we're then influencing the field. Right? so like my students are going out to become educators who are knowledgeable about the research process, who use that in their daily actions and interactions with students and I think that that just makes a better educator over all so I would like in that or I would kind of like generalize that. And maybe this is an overgeneralization but anybody who comes with these skills is going to be a better, whatever they are studying to be, overall because they're, they're interested in the research. They know how to do the research. And they can use that research to inform and improve whatever their practice is.

06:53

I know that we think about this in communities of practice often and I think often our, the membership of the community sort of was college before this and realizing that wow, there's a way better community that if you're joining the field as a researcher, then these things of like, revising drafts, or studying late I mean, they become the practices that feel way more legitimate, right? I mean, they're this like, oh, yeah, now I get why I need to do this because this is what real researchers do. This is how you have to do this. It's, it's a harder sell to say, this is what good college students do. Because everyone's like, I don't plan to be here that long and I don't, this is not the identity I care as much about as I do in this field like a teacher, like what you're talking about, that's what I care about. This is what good teachers do. That I get why I need to do these practices.

07:43

You know, we know from research that Nate has done here and that people have done across the country, that sense of belonging is one of the most powerful persistence forces for students. I just love linking that belonging to the community Nate just described right? It's nice to belong to this beautiful campus and it's nice to belong to your friends in your in your peer group, but to belong to a field of study is really exciting, I think, for students who might not have seen that opportunity before.

08:15

Sharon, I want to throw it to you. Can you give us overview on some additional examples of programs that support student research and provide these opportunities?

08:24

Sure. With the Adelante program, it's a Title Five developing Hispanic institution grant funded program, that is kind of a sister program to a Title Three program that inspired Kate McCarthy and I to write the Adelante grant and that's the Chico STEM Connections grant program. So these two programs are very similar in that they are dedicated to offering faculty-mentored student research experiences, and both have a summer research program where we offer students funding for the summer and small amounts of funding to the faculty mentors, to assist students to engage in an in depth research project, related to their own interests, that lead hopefully to not just advancing their academic and research skills, and increasing their interest in research, but also leads to conference presentations, competition, participation, publications, and an interest in going on to graduate school. In addition to Adelante and the Chico STEM connection programs we also offer at the graduate level, the grad equity fellowship program, and this is a program that's been funded by the Graduate Studies Office for over 30 years and it's also partially funded by the Chancellor's Office. And this program offers 10 fellows the opportunity to work with a faculty mentor.

10:01

I wanted to emphasize that Adelante is serving both undergraduate and graduate students. So for those undergraduates, it's helping them get to the finish line and see what's past graduation in a new way. And for graduate students, helping them get past their, any imposter syndrome they might be wrestling with by getting that one-on-one intense mentoring experience with a faculty member. So and it's a win obviously for the faculty as well. First of all, who love this experience of working with students

but also in many cases are advancing their own research agendas by working with these students. So it's just it makes so much sense to bring these practices together. And I think another thing I want to kind of celebrate Chico for is our resourcefulness in grabbing funding when it comes available. So we got federal COVID money to help students re-engage with campus, Sharon and I worked really hard to get some of that money dedicated to undergraduate research. So now we're funding a whole additional set of faculty mentored students. And we're funding a couple cohorts of faculty to develop course-based research experiences to again spread that experience more widely. So I think we're being really entrepreneurial about this whole process. And what's helped is that years ago, we formed a group of faculty who were interested in expanding undergraduate research into this kind of loose collaborative. So we have a, you know, a kind of a team that's interested in this. And we've built a website for the student faculty research collaborative. So we're slowly ramping up a kind of infrastructure that's worthy of all of the great work that's happening in these various programs. I think Chico State is going to become known for this.

12:03

To explore an example of how we might embed authentic research experiences into our coursework. I wanted to bring on a group of faculty from the Cultivating a Culture of Entrepreneurial Mindset and Undergraduate Research, or the CEMUR project. And so I have with me, David Brookes, Hannah Aird, JoAna Brooks, and David Alexander. I wanted to just kind of open it up and have somebody just share an overview of what that project entails.

12:34

The CEMUR project is focused on recruiting faculty and supporting them in redesigning and implementing a course based undergraduate research experience. And we also have added entrepreneurial mindset to our project. Our goal is to recruit faculty who are currently teaching STEM courses to modify their course, to embed authentic research within their course. Faculty can do that over the course of the entire semester or they can modify their course where they add kind of a smaller module that may last three to five weeks within the semester. The research shows what CURE courses provide, it's considered a high impact teaching practice, and it helps make those courses more exciting, more interesting. But also provides students with the opportunity to do research that they may not otherwise get making that opportunity more equitable for students who may not have the opportunity to engage in authentic research.

13:38

Just to applaud JoAna, she actually was instrumental in supporting and writing the grant. It's a five-year NSF grant through the improving undergraduate STEM education program specifically for HSI universities. CURE stands for course-based undergraduate research experience, and then we add an E to the end to represent the entrepreneurial mindset. CUREs have existed for a while but adding the entrepreneurial element or the entrepreneurial mindset was a new piece that we felt would really help some of our first year STEM students find better connections to the science of their learning in class to the outside world and find applications and see themselves creating value through the work that they're doing in their early STEM classes. So some of these STEM classes are kind of the classic Chem 111, Calculus 119, 120, 121, physics 204A, these you know, fairly large first year or so, fundamental STEM courses for many, many of the majors within the College of Engineering, Computer Science and

Construction Management and Natural Sciences, Agriculture. It's pretty amazing how the workforce is shifting, and technology is a driving force behind that. And over and over if you search for what employers are looking for in entry level, graduates from university, it's creativity, creative thinking, leadership, team building, a lot of the things that we used to call soft skills, even in the STEM fields. And so, really focusing on helping to develop the whole student and look at that kind of entrepreneurial focus helps the students develop into critical thinking creative students that look for opportunities, and that's really what kind of drives a lot of technological advances and the economy now and in the future.

15:45

That's great and I think our audience would really benefit from a couple of examples. So David, and Hannah, I was hoping you could share a little bit about your experiences, adapting your courses to make sure that you are providing those authentic research opportunities for undergraduate students.

16:05

So 65% of children entering private school today will ultimately end up working in completely new jobs that don't exist. You know, this problem, you know, maybe was quantified by the World Economic Forum in 2016. But this idea has been around for the last 20 years and it's been tremendously influential on how I've approached teaching physics. So I'm a professor teaching physics 204A and it's been sort of the primary driver of how I designed my course over the last 10-15 years is this concern that it doesn't really matter how much physics they know coming out, it's far more important that they have the ability to learn and that they have the, the exposure to the practices of research scientists so that they can engage those practices when they are, you know, participating in a real job in the real world. Right. And, and so, you know, the CURE-E project was just a natural fit for me because I'm already very focused on embedding science practices into every aspect of my physics course. And this is just an opportunity to take it a little bit further in the sense of coming up with this authentic research project that span multiple weeks of the semester rather than just, you know, individual classes by themselves.

17:39

So, David, I know that your project is centered on real world, right? Students have an opportunity to like explore something or think about something that's actually applicable to their everyday environment, which I think is super cool. And I am interested to know the student reactions to the CURE and CURE-E course model.

18:00

The students were very excited when I produce this project to them. And so I posed it as a mystery and the project is about, about rolling resistance in bicycles. So I'm an amateur racing cyclist. And if you know anything about cycling it goes through these fads where people do strange things because they think it makes them go faster. And one of the sort of recent fads of the last five to seven years has been this idea of lowering your tire pressure to improve rolling resistance. And so I pose this as a kind of a mystery because this completely contradicts basic physics. If you lower tire pressure, you're basically going to increase your rubber hysteresis and the primary driver of rolling resistance is rubber hysteresis so how is it possible that you can lower tire pressure and reduce rolling resistance, so that poses a sort of mystery and they got all excited, engaged, and started going onto the internet by themselves and

sending me messages, posting YouTube videos, and so on and so forth. So they got super excited about it.

19:10

In my class, when the students come to me for petrology class, it's usually the first time they've ever come across research projects in their academic career as juniors and usually at the beginning of the class, they're a little bit nervous about it and all daunted by the whole idea. It seems a bit overwhelming. How can they possibly do real research in the discipline that they're in? They don't know anything yet. And by the end of the class, I have been present, I've had them in the past present to the College of Natural Sciences poster sessions, they actually have to stand up there and talk about their research. And this year, we're hoping to present to the Forest Service instead. So they'll actually be kind of presenting the research that they have done to other people outside the classroom. And it really gives them confidence and by the end of the class, I usually see a number of the students talking to me or to other colleagues within the department about research opportunities within people's labs. And research is shown to be, as JoAna said, a high impact practice, right. So one of the, the ideal situations is if you can work one on one or in small groups, the faculty member, one of the major goals of CURE and CURE-E projects is that, you know, many people many students don't know to do that. They don't know if that's even an option that could be available. And there's also too many students per faculty member to make that possible to have all students work on research projects. So the nice thing about CURE or a CURE-E project is that integrating it into the classroom really allows students from other backgrounds potentially who don't have that institutional knowledge or kind of academic know how to actually pursue these opportunities that are available to them.

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That's really great to hear. And so for faculty who are interested in learning more about the CURE or CURE-E course models, and maybe want to get involved in embedding authentic research experiences in their own teaching practice, where might one send them to get started?

21:13

So this unit project has a website which has, has a lot of great information, not only just to talk about the CURE model and post resources on what that means. We have a page that kind of talks about their different courses. And then we also have a page on the entrepreneur mindset. So there's lots of great resources. And then there's other resources if you go to CUREnet that that is also a really great resource for the CURE model as well.

21:48

And there you have it, folks. Today we explored impacts and examples of embedding authentic research opportunities within the student experience. And I encourage you to check out the resources on the student faculty research collaborative, CEMUR, and CUREnet websites. I'd like to extend a special thank you to our guests and a small reminder that you can access previous episodes of Rise Teach Learn as well as all the resources associated with this and other episodes through our FDEV podcast webpage. A big thank you to you for listening and until next time, we got this, Wildcats!