Making College "Worth It" – Season 3, Episode 5

Student Ownership in Vertically Integrated Undergraduate Research Projects

Nolan Schultheis (00:05):

Welcome to Making College Worth It, the show that examines engaged learning activities that increase the value of college experiences.

Jessie L. Moore (00:12):

In each episode, we share research from Elon University Center for Engaged Learning and our international network of scholars. We explore engaged learning activities that recent college graduates associate with their financial and time commitment to college being worthwhile.

Nolan Schultheis (00:28):

I'm Nolan Schultheis, a third-year student at Elon University studying psychology with an interest in law. I'm the Center for Engaged Learning's podcast producer and a legal profession scholar.

Jessie L. Moore (00:38):

And I'm Jessie Moore, director of Elon's Center for Engaged Learning and a professor of professional writing and rhetoric.

Nolan Schultheis (00:44):

In this episode, we'll talk with Kasey Wozniak about a vertically integrated project course supporting student ownership and undergraduate research at Idaho State University. Let's meet our guest.

Kasey Wozniak (01:00):

So my name is Kasey Wozniak and I am a third-year master's student in the Biological Sciences Department at Idaho State University. I am graduating in May. I am studying, of course, the undergraduate project ownership in the VIP and what course design decisions faculty can make to help foster those students project ownership. I also manage the outreach and community education operations of the Integrated Physiology Lab at ISU. And funny story on how I actually got into this is I finished my undergrad and then I went and worked at a couple jobs specifically going to Peru and doing some research there and then being a state park ranger. And I noticed that the more in- depth jobs that I wanted required, a little bit more education. So the connections that I made as an undergrad and through other individuals, I applied for a master's and they're like, "Oh, you check off all the boxes except for having those benchwork skills." And I was like, "Okay, I'm going to go get those and I'm going to come back." And so I was talking to one of my current advisors.

(02:20):

I was like, "Hey, can I volunteer in the lab to get some of those more bench-like skills?" And she asked me, she goes, "Is that what you want? Is it just the bench skills or is it wanting a master's kind of feeling around of what really I was asking?" And I go, "No, I don't. I want to get into this program." And she's like, "Okay, well, if not, then what do you really want to look at?" And I go, "Well, I really like the non-traditional teaching. I like being more hands-on with teaching and kind of those aha moments of this is really exciting and I really want to do something more with that. And I need these letters after my name." And she goes, "What if I told you that I have an idea of something that you can look at that would be more of your interest and is going to be more beneficial to you?

(03:13):

" And I go, "That sounds great. I didn't know that was an option." So it's always funny of just because you go in and ask and think you want to look at something else, there's another way that you could probably go about it that might be more interesting or more of the skillset that you already have to get there.

Jessie L. Moore (03:32):

I always love hearing those unexpected pathways and also just how folks find their way to the things that they're passionate about and the things that they want to do for their careers. And we're visiting with you today because you have a recent article in the Council for Undergraduate Research Journal, Scholarship and Practice on Undergraduate Research. And before we talk a little bit about that study, could you give our listeners an introduction to the vertically integrated projects model that you were focused on at Idaho State?

Kasey Wozniak (04:04):

Yeah. So I am co-advised and one of my advisors is Devaleena Pradhan, and she is one of the faculty advisors in the VIP or the vertically integrated project course that we are currently studying and looking at. It is called the Gene of Regulatory Networks, and it focuses on understanding the physiological and molecular mechanisms of the phenotypic plasticity in this bidirectional sex changing fish called the bluebanded goby. They really are investigating a lot of topics. And there's a lot of branches that not only questions you can ask, but ways that you can go about it and kind of cross-disciplinary ways that you could ... Microchemistry, physiology, there's a lot that can go into just simply looking at this mechanism. So we liked that there was collaboration and there was multi-faculty involved, different labs, different contexts that we could look at in this VIP course. And what I like is that the vertically integrated project aspect of it is there's undergraduates in different spots in their academic careers.

(05:24):

There's graduate students, both masters and PhD students, as well as a postdoc. They're all working together to answer these questions. And it's really exciting to see how different individuals at different levels in their careers look at these questions, go about these questions. And even in specifically the undergraduates where, is this your first semester at ISU? Is this your first semester in the course? Those might not be the same answers and how they approach and adapt to being in this class varies from students based off of their backgrounds, when they started, what they started, what their interests are. So it was really interested to see how this complexity played into some of these ideas of students being able to take ownership of what they're studying in these lower and upper division undergraduate courses.

Jessie L. Moore (06:20):

It sounds like a really exciting opportunity for everyone involved. And I imagine that there's a lot of community development and near peer mentoring across all of those levels that also comes into play. So I always excited to hear about these types of projects.

Nolan Schultheis (06:38):

So I know you were just mentioning how kind of conglomerate the course is and how unifying it is with all different walks of collegiate careers. But my question for you is, you studied design features of the VIP course to explore which features were important for undergraduate student project ownership. Why is students' project ownership important in vertically integrated projects?

Kasey Wozniak (07:01):

Yeah, so that's a really good question. Some people could think of it as in, well, it takes a lot of money. There's a lot of grant rounding. There's a lot of time that everybody has to put into it, undergraduates, every faculty. And if you're wanting students to have that critical thinking and being able to really understand the material, broaden their academic and professional networks, provide opportunities to really dive into those career paths, you're also increasing their confidence, expanding their image of scientific careers that they could participate in and where they see themselves in the scientific community. All of that's really important for that long-term kind of retention, either in STEM or even outside of STEM, really being able to see how you fit into what you're doing, what your time is actually going towards, and being able to see yourself in that community is really important.

(08:10):

And coming from a faculty standpoint, if you're trying to instill these ideas or feelings and things like that into your students, you want to make sure what you're doing is actually happening. Are we actually making them feel like they're part of the community? They're able to see themselves in that community. Are they being able to build that identity of what their interests are, what their skillsets are? And in order to put those all together, project ownership is really a great way to combine all of these ideas, experiencing failure, persisting through multiple iterations, making relevant discoveries. All of those kind of go into an authentic research experience, and that's what really gives students this recognition of what would easily be defined as project ownership. Of course, there's a little bit more in depth than that, but it's a nice way to package it all up. So as a faculty, if you're putting all this time and effort and resources, you really want to know that you're having these positive effects on your students.

(09:17):

So we wanted to see if these are working and if not, the best feedback is from the students to say, yes, this is working or no, this isn't working, and then being able to pivot from there.

Nolan Schultheis (09:30):

I like the idea that you said you're giving a connection to the project through the students with ownership because as a student, I realize that certain assignments I kind of just get done for the sake of getting done. And that's a general aspect that everyone's going to have within school, but I like the fact that with the VIP setup, it's creating far more of an ownership aspect for the student because they're so intertwined with the work and they feel like they're involved in it to a greater degree. I feel like that part of the reason the ownership feels so much stronger in a course structure like this as opposed to a normal one is that it seems like the material kind of is created as you go due to the discovery nature of the course and most courses today are rigid structure. So I just wanted to say, I like the idea of a looser course structure.

(10:31):

And I also like the idea that you're kind of giving the students the ownership, not only based on their grade, but through the process to reach the result, if that makes sense.

Kasey Wozniak (10:42):

Yeah. And what's nice about you mentioning the structure is sometimes some people flourish with, "I need you to tell me what to do, when to do it, and how to do it. " And of course, sometimes that's either A, not an option or not the career that you go into. So some of it is also, how do you plan and time manage in a course like this? So it also helps teach the students that. And also that you can make a plan and I promise you, it is most likely not going to be what you thought it is going to be. So not being afraid of, "Oh, my plan didn't work, it is going to work." You might just have to pivot or kind of come up with a different plan or how ambitious are you? Oh, is that actually obtainable? And even when you set those high expectations, you have other students that are not only relying on you to get your work done, but you're also relying on the other students so that they can kind of help each other of, "Hey, I noticed we're not getting these done as quickly as we thought we were.

(11:49):

Is this something that one of us needs help with or is this something that we both realized is not going to be in the timeframe and do we need to go from there?" So it's really interesting to see those skillsets developing on managing your time and relying on others for a universal project when we know that science isn't linear and it's hard to teach that when you're trying to be in a more structured environment. So taking that structure out also shows that science and answering questions is not a linear path.

Nolan Schultheis (12:22):

Based off of that response, again, as a student in thinking about just the structure of schooling, even working with Jessie, it seems like now within college, there's a big push for career consciousness in any sense of the word, whether that's how you conduct yourself, your work effort, all of the above. And that seems almost identical to what you're saying is that this course is meant to teach not only how to be a better student, but how to be better as an employee and as a collaborator. I mean, you can't come to a scientific conclusion as a single person, right?That's why we have research. That's why we have the steps of the scientific process. And I think that this course and what you just said perfectly exemplifies that a lot of colleges are looking to make better workforce people. They're looking to make that jump earlier on.

(13:19):

And I think the pushes a lot of colleges are doing are very good, especially a program like this.

Kasey Wozniak (13:25):

Yeah. I definitely wish I had something like this when I originally started, because I started as a mechanical engineering student at Purdue and I was like, "Yes, this is what I'm going to do. " I started looking and working in STEM in middle school and about third year in, and I was like, "Is this really what I thought it was going to be? Is this really something that I am passionate about? " And I realized that the concepts of how things work and how things functions are what I was interested in and that the inanimate materials were not as interesting to me and that inside and that building was not what I was thinking. It was more of how do these complex systems work? And that's where I took those ideas and those passions and moved it into biology. So having these courses earlier on to be able to explore them and not be stuck in this, "If I take this, I have to take it for this long with this duration," I think could have been helpful.

(14:34):

Not to say that there's not other options, but it would be interesting to see how these courses, if this has helped other students also have that epiphany later rather than three years in.

Jessie L. Moore (14:51):

Well, and first I have to pause and say, Go Boilermakers as a fellow Purdue person, but also I appreciate the ways that the vertically integrated projects that you're talking about allow for authenticity in the research process that I think that that does have the potential to help get at that messiness earlier in ways that also help students make sense of it and grapple with it and have those conversations about does this align with where I'm really interested in going and if not, what might be next? But I also was hearing, as you were talking, and then Nolan, I think we're spending enough time together that we're thinking along the same lines in some ways, because I was thinking that a lot of what you were saying, Kasey, was resonating also with the National Association of Colleges and Employers Career Readiness Competencies as you were mentioning teamwork, you were mentioning critical thinking, you were mentioning some communication skills, and all of that is coming to play in really rich ways in these VIP projects.

(16:02):

So it's really cool to think about both the way that the project is allowing for authentic interaction with research and also supporting students' career readiness in ways that we may not even have to be explicit about, but that are embedded in the process. You have been studying this and you conducted interviews with undergraduate and faculty participants. What did you learn that you think faculty administrators should know as they think about designing other VIP courses to foster students project ownership?

Kasey Wozniak (16:41):

So I would probably, there's kind of a lot that I, I mean, there's always a lot to consider, especially if you are considering designing a course from scratch. I would say that if they don't have a local science community opportunity for students to present in, because we all know conferences take a lot of time and a lot of resources and sometimes just the legalities of trying to take how many students to conferences and

kind of going through all of that, bringing the conference to you, there's other departments that are presenting. So say if the biology department and the chemistry department both have what the biology department here calls like research roundup is a department specific, but is open to the community, it's open to other departments and students, first year, VIP, CUREs, graduate students, everybody's able to present what they're working on. And so other faculty that may not know either in the department, in the college, across ISU can come and kind of see what everybody's working on.

(17:57):

And that was a big thing that a lot of the students really grabbed onto. As we've been diving deeper, we were able to separate some of these ideas into the semesters that the students were also talking about this. And we're seeing these ideas even start from the first semester of students noticing not only the vertical structure and the flexibility, but even the first year students, the research poster really helped them be able to transition into the course easier. The graduate students were able to help them by just being like, "Oh, I've gone through this before. Here's a way that I can help you. " The undergraduate students were able to be like, "Hey, I've been in this course. Here's what I wish that I would've known coming in. " And then the poster took all of that, summarized the whole ... Because we all know that posters, it's like abstract and then poster and then paper in terms of summarizing the project.

(18:55):

So the poster's a great way that incoming students can really get an idea of what's going on, where everybody's at, but they can also still contribute because they're learning the intros, they're learning the math, they can still contribute that. It gives a artistic outlet for some of them to be able to be like, "Oh, this would be really cool if you put this here or this kind of picture." And it helps bring everybody together and you can present a poster kind of whenever. And this VIP, it was like the first or second semester, and one of the main cryostat machines went down and they're like, "What do we do? " And they're like, "Well, of course we could read. We could always read." And then they're like, "Well, the faculty says, well, we have this research Roundup. Do you guys want to make a poster?" And the students were like, "Yeah, let's do it."

(19:44):

And then every research roundup, they make a poster and the new incoming students get to help with the one that's the overall course. And then as it progresses and students are getting their own kind of branching out of the course, but still within the VIP, then they get to add their poster to it. So now instead of one poster coming out of the VIP, you have one about the VIP. And then next to it is a student that was in the VIP saying, "Look at the project that I'm taking from this and being able to expand on. " So from semester one until on really giving them the opportunity to present their work. And we all like recognition. We all like to know what I'm doing, people are interested in. Of course, I'm interested in it, but does anybody else care what I'm doing?

(20:29):

And so to see other faculty and other peers really being interested in what the students are doing really also gave them that, again, that sense of community and being like, "Oh, what I'm doing is interesting to other people and other people also really like it. " And then of course, from a moving up into deans and things like that, they can kind of help summarize like, "Hey, NSF, what are you doing? What am I doing?" And they can say, "Hey, look, at this research Roundup, I found that A, B, C, and D are doing all of these things." So it also helps higher up that have to do different kinds of reporting, being able to walk through, interact with the students more, interact with the faculty more, and then see what's going on firsthand in all of these different colleges and different departments. And then the students get to interact with, they see the name and they see a dean and they're like, "I don't know what that means." And they get to interact more with those individuals.

(21:30):

And then when they show interests, they're like, "Wow, it must be really cool if the dean of the college is coming over and talking to me about my poster." And of course still takes a little bit of time, but faculty,

lining up the posters in the hall that other people can see in between classes. And it doesn't have to be super big. You can start small in the department and then work your way up to these poster presentations. And because there was that flexibility in that class, it wasn't a, "Well, now what do we do for these extra weeks that the machine gets fixed?" It was able to be this jumping off point in that flexibility that the course had that the faculty kind of went into of, okay, we'll plan the first couple weeks to see where we're at, what we need to do, and then able to pivot from there so that when something like this happens, we have those opportunities to continue the course.

(22:33):

And it is a skillset that the students get to then learn how to talk about science to others as well. So you're still getting some of these other career readiness in the sense of, I get to learn how to do this, but also this needs to be fixed and this is going to take time. Let's not just read and read and read. Let's do something else that can also be productive as well.

Nolan Schultheis (22:57):

I was going to say the answer to that question also seemed to have some elements of ownership involved in it. I know you were saying the ability of students to create posters is very broad. You don't really need to have a specific research question in mind to even be able to make a poster. So I liked, for instance, the example you said where there was the poster for the original project and then there was the auxiliary poster from the other student who decided to make something off of that. And I think the research gives way, especially to ownership, obviously, right? I mean, you have to research and that's your own research, but it creates that real personal connection where it's like, "Hey, I did this, I accomplished this, look at this. " And then I also think that that helps with this program as well because then it motivates other students to want to get involved and to want to help others and so on.

Jessie L. Moore (23:53):

It's a really tangible example that adaptable to other contexts of supporting students and going public with their work, of meeting students where they are so that they have entry points. And then as they are advancing within the research community that they're then advancing in the tasks that they're taking on. But I also love the ways that what you're describing with the dean coming through and students starting to recognize, oh, the dean is interested in this. So maybe this does have even more value, but that's also reinforcing a relationship rich environment for the campus community and the STEM community of just building value in networking and community around this activity, which also has huge benefits. So what a great example to share with other campuses as something that is scalable that you can implement in small or extended ways. So thank you for that. I really appreciate it.

Nolan Schultheis (24:55):

Based on your research, what tips would you share with students who are involved in vertically integrated projects?

Kasey Wozniak (25:02):

So what I really like and what would be a great tip is you can join whenever. So if it's not like the first semester/the first year of college is crazy, and that is totally fair, depending on your prep work, depending on are you moving? There's so many factors. And so as we've been pushing, this happens really late in their career path, yes, but that also doesn't mean that you need to have 20 years of experience and be 15 years old. We are aware that there is a balance here. And sometimes that getting that first semester or year footing into how does college work, that's okay. And I like that the VIP is something that you can join and then do I want to take one semester? Do I want to continue in it? Do I want to go the entire four or five years, however, long in undergrad?

(26:04):

Do I want to take it for maybe two years and then try something else? I would say it's worth a try either way. It doesn't have to be in your first semester. It could also still be in your last semester, but it's something that I would recommend trying. It's one class, depending on how they have it structured, there's some variation, but give it a try. There's nothing saying that if you don't like it, you have to stick with it. You have those electives. Use it as one of those electives and it's not going to push you so far or almost at all off of your career path that you have really anything to lose by trying it. And a lot of them can also be multidisciplinary. So if you maybe don't have one in your specific department or topic, see if there's another one that you can maybe look at a different department that is similar.

(27:00):

So of course, microbiology, endocrinology and chemistry, and those kind of overlap together. And some of the ecology and geology, if there's not one in your specific department, there may be one in another department and see if maybe you can get into that one to be able to try it out. But I would definitely say, give it a chance because there's an opportunity to explore what you're interested in. It also lets you know whether higher education is something that if later you do have to go into, if it's something that you're interested in at all. And it also provides a great skillset that, okay, I use this pipette once in this one class and then I will never use it again. Oh, wait, I do need this now. Do I remember how to use it? It gives you more of that, okay, I do know how to use it.

(27:53):

I do know how to use it well, and it kind of gets a little bit more ingrained in there. And employers can find value in research for so many different reasons. Speaking of employers like the networking that's involved in those posters and things like that could be helpful for resources, mentoring, insight. Maybe they mentioned something, you're like, "Oh, I didn't realize that was something that I'd have to consider." And that might be a turning point for you to be like, "Oh, this isn't actually what I think is what it is. " And it could just be from taking that VIP class. And there's other students in there that are also going through or have gone through the same thing. So you can have that more peer and peer mentoring of, I can relate because I'm going through the same thing at the same time where sometimes depending on postdoc or how long those years are in between, yes, I've been there, but what has changed since the last time I've been there.

(28:50):

So also being able to talk to peers and get a better insight is really helpful. And the relationships that you make are really going to be helpful, not only from a collaboration, from a support stance as well. Sometimes in those entry classes that I have to take a psychology or I have to take an intro bio, it takes a minute to realize who the cohort is that is going to continue along with you. So if you can make some of those connections a little bit earlier, it's going to be helpful in that support going forward and creating a larger support group of those students that have been in the same courses that are taking the same classes as you, that are really going to be helpful, not only through college, but after as well.

Jessie L. Moore (29:42):

I appreciate all the benefits that you've highlighted and also the reminder that there's space to explore and that this is a good opportunity for some exploration around career interests, life interests, community building relationships, et cetera. It's really been exciting to learn about both the VIP that you've been involved with and your research about it. Is there anything else that you would like to share with our listeners about your research?

Kasey Wozniak (30:10):

I am really glad that as we've been creating these courses, you always create and create, create. And it's nice that we are now taking a step back and being like, okay, our time and energy or resources are going into it. How is it working? They've been around long enough that we can now see what's going on and what are the benefits. And these courses started out at Purdue and specifically that they were working with the

communities and the students weren't able to stay in the course very long. And they're like, okay, well, as soon as we really get going, we're getting new students and we're starting over again. So the longevity of these courses is really helpful for not only the students, but the community and the faculty and the schools. The longevity of the course is really important for so many reasons. And you can really deep dive into some of these ideas more so because of that longgevity and that these courses can be taken into the community.

(31:16):

So again, engineering, is there a project in the community that needs to be worked on? Can we take this VIP, take it to the community, help the community, and not only bettering the community, but is this providing a stepping stone for students into the local job market of, I worked on this project as a VIP student, now they got those connections. I can then just step out of school into the community and be able to start work. And even if it is something where I want to explore more, so maybe the local job market is not where I'm focusing, the skillsets are still something that you can take with you. And the community can also benefit from having these projects, working with these students and kind of building that relationship between the community and the university, as well as just science and the community or science and people that may feel like they're outside of the scientific community.

(32:18):

So even though we've been talking about this one and there's a lot of other ones that people have talked about that are staying within the university sense, that doesn't mean that VIPs haven't or can't be taken outside of the university to the community level, to the state level and things like that. And really being able to bridge that gap between the public and other individuals and the scientific community to really build that relationship and be able to see how industry and academics and community and everybody is all intertwined.

Jessie L. Moore (32:57):

Such a great reminder about the origins of VIPs and also their potential to bridge the campus and community and to really engage with community good as well. So thank you for the conversation today. We've really enjoyed it and we appreciate you taking time to visit with us. So Nolan, what stood out to you as we were talking with Kasey about the vertically integrated project?

Nolan Schultheis (33:25):

I think the biggest theme that stood out to me was career readiness. Throughout multiple questions we asked her, it seemed like there was an emerging theme of wanting to prepare students for what they're going to meet when they leave college. And that's a structured work environment where collaboration is expected and people share ideas. And the traditional schooling that we go through prior to college doesn't really allow for that. Maybe it does now, at least it didn't when I went through it. So it's nice to see that there's steps being made to try and prepare, just create more career preparedness for students in college at the moment, because it seems that the workforce right now is in a interesting place and we need to do everything we can to prepare being thrust into it.

Jessie L. Moore (34:17):

I was hearing those echoes too, and although she didn't name the National Association of Colleges and Employers Career Ready Competencies, she was certainly naming them in other ways, thinking about teamwork and communication and critical thinking in the way that all of that is embedded in this project. And we can link to those competencies, the NACE competencies in the episode notes for this episode. But it was fun to hear just the ways that those were authentically emerging in this project that was so focused on a community around research and involving not only undergraduates, but graduate students, postdocs, faculty, et cetera. And I think that would be the other thing that I would call out is that this is an awesome example of a relationship-rich educational environment, that it is really striving to foster community within

this specific vertically integrated project, but also with others in the university ecosystem that would have a shared interest in the work.

Nolan Schultheis (35:27):

I also like the idea of the permanence the VIP project gives to student work. When I think about work I've done throughout the years of school and/or college, I generally assume that it's lost to a cloud save somewhere in the bottom of a garbage bin somewhere for printed assignments. But with a course like this, student work done in the past is actually used and then researched or collaborated with on the current research they're doing within the class, which I think really helps give the student a sense of value behind their work and might even actually motivate them to put out a better product.

Jessie L. Moore (36:16):

Once again, I'm Jessie Moore.

Nolan Schultheis (36:18):

And I'm Nolan Schultheis. Thank you for joining us for Making College Worth It from Elon University Center for Engaged Learning. To

Jessie L. Moore (36:25):

Learn more about undergraduate research, see your show notes and other resources at www.CenterForEngagedLearning.org. Subscribe to our show wherever you listen to podcasts for more strategies on making college worth it.