

UF Jigsaw Discussions

Teaching Beyond the Podium Podcast

Alexandra Bitton-Bailey

Hello, my name is Alexandra Bitton-Bailey, and welcome to the Teaching Beyond the Podium Podcast Series. This podcast is hosted by the Center for Teaching Excellence at the University of Florida, and our guests share their best tips, strategies, innovations and stories about teaching. Our guest today is Nick Keiser, a biology professor who explores animal behaviors. Nick's passion with insects and diseases started with a fascination about the complex social structures of spiders.

Dr. Nick Keiser

My name is Nick Keiser. I'm an assistant professor in biology here at UF, and my lab studies behavioral disease ecology. We study infectious diseases sort of through the lens of animal behavior. Many of the questions that we ask are things like, how does the behavior of an animal influence the types of parasites that they might interact with? And then once they're infected, how does their behavior influence who they might transmit those pathogens to? And we use all sorts of weird study systems, like spiders and flies and mites and ants to test these questions.

Alexandra Bitton-Bailey

Nick's enthusiasm for spiders is almost contagious. In fact, I never saw spiders in quite the same heroic light as Nick sees them.

Dr. Nick Keiser

I did my PhD at the University of Pittsburgh, where I was studying behavioral ecology, and I studied social spiders. But they're kind of like ants. They're spiders that live in big groups for their whole lives, and they cooperate with each other - on like who makes the web and who captures the prey - it's really cool, like multi-female society. So I was studying like, how do you, how does an individual spider decide what to do? You know, which individual does what task, just having a mixture of different types of individuals make it better for the whole group or worse. About halfway through that, I got really interested infectious diseases because I realized, like mixing different sort of personality types or types of individuals in the group can influence behavior. But of course it can influence disease dynamics as well. So I started UF in 2018 in the

Department of Biology. They were advertising for someone who studies like the ecology and evolution infectious diseases. So I thought, I do that.

Alexandra Bitton-Bailey

Nick is also really passionate about teaching. More importantly, he sees his role as a teacher a little bit like I do. He holds the door open that introduces students to an ever evolving world of scientific discovery. And he does this in part by introducing students to the literature on the subject.

Dr. Nick Keiser

I think that, um, it's one of the most important jobs of science educators now is to get undergrad students to understand that the field that they're studying is this, like, ever evolving field. It's not this, like, set in stone, and that's it. And you're learning something that someone discovered decades or centuries ago. And it's not that it's this like, it's this dialogue and hypotheses are being refuted and fears are getting overturned like all the time. And I think it's a lot more exciting if they know that that's happening right now, and it might actually get them more excited about being a part of that. So if they want to do their own research or get into the field, they know that, you know, we're always like on the forefront of some new cool discovery.

Alexandra Bitton-Bailey

One method that he uses to get students to really see, understand and get excited about current research and literature is to create a historic narrative of all previous research on a topic.

Dr. Nick Keiser

I think it's important to have historical context for anything that we're talking about, which sounds like it's more boring than it actually is. So you can tell someone, okay, this theory was generated in the early sixties, but since then here are some of the big developments that have happened and then this thing happened and it turned the whole field on its head. And then this thing happened and everyone argued about it for a decade, and then this other thing. So you you put in this like story and it seems a little bit more exciting, I think, and then you can leave right up to the present say, like, here are, you know, two or three of the most prominent researchers in that field. They're starting out right now, like here's this person from the University of Florida or this person from University of Georgia and, like, show picture of their face, say this is what their lab studies. So they know that like, Oh, there's someone is doing this right now. That's pretty neat.

Alexandra Bitton-Bailey

Too often, the researchers behind the articles students read, seem almost surreal, like characters that lived long ago and far away. But Nick has found a way to make these first class researchers seem human and help his students connect with them.

Dr. Nick Keiser

So there's a couple ways. Every lecture that I give has a researcher highlight. So if we're talking about someone's research, I'll have a picture of them in the corner and they're highlighted with their name and everything. And I'll say, this is this person who's an expert in this topic. If you're interested in this, you can go look them up. You can send them an E-mail if you want, because they're a live person that's, you know, happy to talk about this type of stuff. Being in a huge university like this is really nice to bring researchers in. So, you know, I invited a researcher from University of Central Florida, Charissa de Bekker, who studies how parasites manipulate the behavior of their hosts. So she came to my class, I teach a class called Behavioral Drivers of Disease, so she came and gave a lecture in the class. So we already talked about her research before, and I said, Oh, by the way, she's gonna be here in, like, two weeks! Ana Longo, who's another professor in the department who studies disease ecology. She came and talked about amphibian diseases, so it's really nice that they can see people like, Oh, they're at my university and they're doing this research.

Alexandra Bitton-Bailey

So how does Nick maximize student time and exposure to new articles, research and each other?

Dr. Nick Keiser

The jigsaw method is a way of sort of breaking up your classroom into subgroups and then breaking up the work that they're doing into little pieces. So each group is focusing on a separate piece, and no one student or no one group of students has the ability to learn everything without having to interact with their peers first. So this was originally developed by Elliot Aronson, in like the early seventies, as way of - he was working in Austin, Texas, and like, recently desegregated schools. So this was his method for sort of integrating all the students to working together, which is something they weren't used to doing. So he like forced them like - you can't learn this content without having to rely on your peers. Dr. Emily Sessa in biology uses this method, and I had told her, you know, my experiences of like - I'm trying to get my students to read these papers and I assign it to them. And then we show up in class and I say, Okay, everyone did the assigned reading and they'll say, Yeah, I say, Okay, let's chat about it. What are your thoughts? And it's just like crickets. No one has anything to say about it like it was this

really interesting paper, like what do you have to say? But to them it's like they already knew the answers, so it wasn't exciting to like discuss it.

Alexandra Bitton-Bailey

Nick has some really valuable recommendations about when it is most effective and how to best implement it.

Dr. Nick Keiser

So what we do now is I'll assign different papers to different groups of students, and then they each meet up and they talk about their paper. And then each of those groups after maybe a 5 or 10 or 15 minute period is broken up and the whole class get shuffled. So you make new groups, and these new groups each contain a person from one of those original groups. So then they all talk about the paper that they read and they teach everyone else. Okay, so the paper that we read had to do with this animal and this phenomenon. And oftentimes the other papers have, like, you know, totally different direction. So they're all learning these like totally different things. And at the end, we have one person from each group present on a paper that they weren't originally assigned to. So you get these like, the first groups are discussing, they all read the same thing. The second set of groups are totally independent of each other. So they're discussing the thing that they read to each other. And then and then you have these, like new experts that present to the whole class what they just learned.

Alexandra Bitton-Bailey

The jigsaw method works best when students come prepared to the class and conversation.

Dr. Nick Keiser

So I'll assign the readings and each group is only sent their own papers so they don't get to like cheat and read the other ones. Because I go to each group before we mix them up and say, you know, what was the take home from your paper? Is everyone comfortable with that? Like are you ready to - because every single person becomes the expert for their next group. So even if you didn't understand something, you can learn from each of your peers in that first group, where everyone read the same paper.

Alexandra Bitton-Bailey

Is this jigsaw method really effective? Do students like it? And are they really learning as they make their way through those articles?

Dr. Nick Keiser

You get the response right away because, like immediately the first time we did this method, people were talking immediately, people had questions. They were like arguing with each other. So it's really nice to do this with topics in the field where there's actually like contentious debate because you can see that these students who know, you know, probably had no idea about this debate before are arriving at the same debate points that is, like happening in the field independently. Just because they read a paper that said one thing and their peers read a paper that said another thing and they're like, Wait, no, but mine had evidence for this. The other people say but they have evidence for this like they get to naturally sort of generate this debate, which is super cool, and it just it- Yeah, the responses have been super positive.

Alexandra Bitton-Bailey

Jigsaws work best with articles that are connected but still quite different.

Dr. Nick Keiser

I think it would work best for topics where you where you have sort of an umbrella topic, but there are sort of sub-concepts within that, that you know are interconnected. So they're related to each other but they're sort of subtly different. So then you can assign groups papers that are under the same sort of field or some field. But they're not just saying the same things so you don't want to show, you know, you don't want each one to read a paper about how you know predator behavior, just using three or four different species of predators because it's all basically the same concept. You wanted to be something totally different. So I often assigned students you know, one group is going to get a paper that supports this one hypothesis. Another group is going to get a paper that refutes that hypothesis, and then a third group will get a paper that sort of says, Well, it actually depends on the context. So then they're all saying, You know, they find out that theories aren't set in stone, and sometimes they could be overturned, and it can be context dependent, and it's, I think, it's it's a nice way to introduce sort of like nuance into their understanding of scientific concepts.

Alexandra Bitton-Bailey

Nick explained that there is a little bit of prep work necessary for a successful jigsaw, but overall, it's not too challenging to plan and yields amazing results.

Dr. Nick Keiser

It's not super difficult. You have to be very prepared because they're gonna come to you with questions on each one of those papers. So you have to be prepared ahead of time to know, you know, individually all the details of each of those papers, but also how they're connected. But don't give away in advance what the - sort of the story is because at the end, after everyone's presented, the new experts have presented, I write up on the board and I say, Okay, so someone needs to write the take home message from this paper, the second paper, the third paper and then we all decide together, like what the take home message is like, what makes these three papers related to each other?

Alexandra Bitton-Bailey

The jigsaw is so impactful that the students in Nick's class actually wrote their appreciation and loads of positive feedback in their course evaluation, and Nick was extremely excited about that.

Dr. Nick Keiser

They mentioned it in my course reviews, which was great. So it's like one of the things like, what did you find positive about this class? They said that implementing this was an easier way to read papers, as opposed to just everyone like going home and reading a paper on their own and then sort of being independent of each other. So they actually liked that it was more engaged, and it sort of gets people up and active because you're moving around the class and talking with new people, and I use a random number generator to assign people to their own groups, so you're not just interacting with the same people over and over, so it seems pretty positive.

Alexandra Bitton-Bailey

Jigsaws are not a method you can use every day. Instead, Nick recommends using four jigsaws a semester that are interwoven with one another.

Dr. Nick Keiser

I did it four times throughout the semester, and then at the end of the semester after we did our final jigsaw meeting, we went back and talked about each of the previous ones, so we would say, OK, this was - here was the overarching concept for Jigsaw number four, Remember like two months ago, we did Jigsaw one? What was the overarching concept of that? And we go back and sort of like, reconstruct all of them and then you have this, like, overarching idea of, like, why did I assign these four jigsaws like, how are they related to each other? So they're really building up this, like pyramid of concepts. And then they realized, like, how not only were the concepts in each of those jigsaws related, but how are they related to each other in this like larger scale.

Alexandra Bitton-Bailey

I was really curious about how Nick developed his student groups.

Dr. Nick Keiser

This class had 18 students, and it varies depending on, you know, if you have people that are absent that day, it varies, so basically, we would try to break up the classroom like spatially and say, OK, the new Group 1 is gonna meet over here in this corner. So I need one person from that group, and they come in. One person from that group, and they come over. One person from that group, and then if they're uneven, you can have two people from one group if need be. But we never ended up with a group that didn't have at least one representative from each of the originals. So depending on your on your class size, you can have any number of groups.

Alexandra Bitton-Bailey

Just spending an hour with Nick- his enthusiasm, his excitement, made me almost want to shift gears and study spider diseases, but I think I'll stick to teaching. And I'll let Nick share some of his memorable classroom moments with jigsaws.

Dr. Nick Keiser

I think we did a jigsaw discussion on this concept in disease ecology called the dilution effect. And this is like one of the most contentious topics in modern disease ecology, where people debate this idea that one side of the argument argues that biodiversity protects humans from infectious diseases. Another side of the argument argues, well, maybe that's not the case. Having more animals around might actually increase your likelihood of getting infectious diseases. And then sort of a third subset that has come out after that more recently, just says well, it's probably context dependent, it depends on all sorts of things. So I had once a group of students read a paper that showed evidence that increasing biodiversity decreases human risk of getting Lyme disease. There's another paper that showed the exact opposite effect. And then a third group read

this paper that said, well, it probably could be both depending on like the scale you're looking at or the system you're interested in. And they did this in like - I didn't let them know ahead of time that this is not just a concept. It's like a debate that's still happening. It is not set in stone by any means, but they started arguing with each other. Like when one of the experts would say, Okay, our papers showed this, someone raised their hand and said, Well, that doesn't make any sense it should be this other way. And then they started developing, like the same concepts on the same argument that are happening in the field independently. It was great.

Alexandra Bitton-Bailey

Nick offers some great quick tips for getting started with jigsaws.

Dr. Nick Keiser

I would say find areas of research or concepts that are actively moving. I mean, I think this would also work for sort of classic pieces of the literature, just as a fun way to get students engaged with it. But I think it's more fun with sort of modern research. Um, find things that are interconnected so you know that there's an overarching concept bridging them all together. But they each have their own sort of independent pieces that are interesting in their own right, and then just try it out.

Alexandra Bitton-Bailey

Meeting with Nick made it clear that what he loves best about teaching is translating that excitement to others.

Dr. Nick Keiser

One of my favorite things is getting students engaged in the field that we're studying, whether that's just in talking about, you know, current topics or current debates in the field. But also, like, I always bring my students to my lab once a semester so they get to see, like what a lab that studies these kinds of, like, what does it look like? Who's working inside it? That sort of thing, to actually see. And then I've had people say like, Oh, you have undergraduates that work in your lab? I'd like to do get some research experience. So they get this connection between, like what they're learning in the classroom and what they're seeing in a laboratory, and then some of them, actually, have worked in my lab, and, uh, it's awesome. So they get this like classroom concepts and then hands-on experience and then hopefully, you know, maybe some of them go into science and the future. Who knows? But either way they have this like foundation, which I think is pretty cool.

Alexandra Bitton-Bailey

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