Buswell, N. T. (2017). Narrative 4: Christopher Davis. In Swimming upstream: Pathways of new engineering faculty at non-R1 institutions (Doctoral dissertation). Pages 136 – 146.

Narrative 4: Christopher Davis

Christopher Davis is an assistant professor at a Master's Institution. At the time of the interview, Christopher had been in his position for two years. After graduate school, Christopher was also considering looking for jobs in industry, but wanted to see if teaching was really what he wanted after he thought it was for so long. In this narrative, he details his pathway to a faculty position, the way he teaches, and the expectations his institution has for tenure.

How I got here

What really got me interested in teaching as a career was in undergrad at [Undergraduate Institution, a Baccalaureate College]. Starting my sophomore year, I got the opportunity to be the student teacher for an introductory lab. It was basically a freshman seminar; we took them through a few basic design experiences. Honestly, I just had more fun doing that than I did working on the high stress projects and other course work.

So, from there I decided I really wanted to be involved in education, but I kind of settled on teaching college students because, I figured anything pre-college level, you always have a good number of students who just don't want to be there, who have no interest in your subject matter. And I figured with college students, you would get a dedicated group of hard working, talented students, who at least value education to some extent.

From there, I worked hard, applied to a bunch of different grad schools because I figured to do the type of teaching I wanted to do, I would need a PhD. And, especially to teach at a top level undergraduate focused place, because they don't produce as much research, it seems like, at least at the time it seemed like, one of the ways that [Undergraduate Institution] distinguished itself was by recruiting these faculty who did their graduate work at top tier institutions. So, I really focused on trying to get in to a top tier grad school. And I was lucky enough that I got into [Master's and PhD University, a Doctoral University: Highest Research Activity] for the MS/PhD program.

For a while, honestly, I considered leaving with my master's and going into industry, rather than continuing on with the, sort of thankless work that is grad school. At first, I was doing it because I really wanted to teach, and I sort of felt that leaving and going to industry – I

Buswell, N. T. (2017). Narrative 4: Christopher Davis. In Swimming upstream: Pathways of new engineering faculty at non-R1 institutions (Doctoral dissertation). Pages 136 – 146.

thought there might be something wrong, something selfish about that. But after a while, I was working so hard on my own research that it really pushed me and shaped me in a lot of different ways; to the point where I thought maybe academia wasn't this magical place where everyone should end up anymore. I ended up staying on and changing my work life balance to more suit where I wanted to be. Actually, after I did that, I think the quality of my work improved, I was happier, my advisor was happier with me. So, it all really worked out.

By the time I got through to the end, I still liked the idea of teaching but I wasn't as married to it as I was out of undergraduate school. So, I actually applied to jobs both in industry and in academia. Also, I knew that I didn't have a ton of publications during my grad program, and I knew that if I did go into teaching, I really didn't want to be the R1 type professor, where I spend all of my time writing grants and was expected to publish all the time, and where the track to tenure would be this awful journey of no sleep and working all the time. And maybe it's not like that at all the R1s, but seeing what the tenure track professors at [Master's and PhD University] went through, – they just didn't sleep.

I ended up applying to PUIs [primarily undergraduate institutions] and institutions that granted master's but no PhDs as well as some of the industry jobs. For the most part, [during my interviews at PUIs], I just [tried] to give honest answers to the different questions that I got. Tried to have some anecdotes and lessons learned from my TA experience ready to go before the interviews, just keeping that sort of thing in mind, so I'd be prepared. One thing that made it much easier for me looking at a PUI, my older sister, she is a professor too, and she had just done the search a year or two before I did for a PUI, so I got a bunch of good advice from her.

One of the things she told me is, with these types of schools, a lot of the applicants, they're mainly looking at an R1, they don't really know what it's like to be at a PUI, to put teaching first, so the main thing you want to get across in any of the interviews is that you know you won't have PhD students, that your primary job function will be teaching, that you are ok with that, and that any sort of research that you propose to do at the institution can be done in the limited amounts of time you have with undergrads. So, don't propose some big multi-million-dollar research program.

And so, I just tried to focus all my answers on that. And I think, for me, given my teaching style, I always felt I was the best, most effective, in things like office hours when I had

Buswell, N. T. (2017). Narrative 4: Christopher Davis. In Swimming upstream: Pathways of new engineering faculty at non-R1 institutions (Doctoral dissertation). Pages 136 – 146.

one-on-ones with students because you really get to know them, get to see their challenges, their struggles, tailor the content to them. And think a lot about – find out about their background, and it makes you rethink a lot of the assumptions you have about what your average student is like. That sort of thing.

I had spent a fair bit of time thinking about that, and it turns out, that's the kind of stuff they eat up at these types of interviews. For me, I could just talk about my TA experiences, and trying to reach a student who is really struggling with the material. And going from that lived experience, I think made me a much more powerful candidate than someone who hasn't had those experiences, or viewed TA-ships primarily as a funding mechanism.

I ended up getting an offer from [Current Institution, a Master's University] and looking at it, I still wanted to teach and give teaching a try. I think it was that combination of factors that led me to accept the position at [Current Institution], both still wanting to teach while recognizing that going into industry wouldn't be a bad choice either, just not my first choice, and kind of wanting to get away from the culture [of the area where I went to grad school] a little bit.

My preparations for teaching

I did have support in the sense that my advisors and committee members were always happy to take me on as TA and give me opportunities to help design some course material, that sort of thing. And I've heard there are some advisors who are kind of hostile to that idea, because they want their students to go out, and go to an R1 and do great things research-wise.

I will say the flip side is coming from a place like [Master's and PhD University] where a lot of people will either – most of the people who go into academia go into R1s and a lot of people also go to really high-power jobs in industry, research labs for computer companies. They didn't have a lot of knowledge of what it meant to be a PUI. So, a lot of times the best advice they could give me was to say, "well one of my former students I think is teaching at that type of institution now, here's their email, you should ask this question to them."

I guess it's kind of supportive in the sense that, I would be supportive of a student who came to me said they were really interested in writing poetry professionally. I'm all for it, I just don't have any expertise that could be of use.

Buswell, N. T. (2017). Narrative 4: Christopher Davis. In Swimming upstream: Pathways of new engineering faculty at non-R1 institutions (Doctoral dissertation). Pages 136 – 146.

I would TA where I could, and for the most part, that was a lot of fun, and you always had some great students. It was always kind of a mixed bag, but it was still enjoyable, so I still signed up to do it. I [also] took some courses from one of the professors there in pedagogy and teaching engineering for fun during various quarters during my PhD. For fun and also potential professional interest. I did some workshops on how to teach, that sort of thing.

If I could go back to change it, I would think having a master's track that emphasizes engineering education would be a breadth area, or we could take courses in that. Because I felt, some of the breadth courses I took, they were definitely interesting, but after a certain point, stuff that I really didn't have that much interest in, may be good to know, but I was kind of just looking at what course requirements I still hadn't met, and go on ratemyprofessors to figure out how I could satisfy those with the least number of hours. I think I would definitely change that.

Also make it so that some of the classes that focused on some of the softer skills like communications and leadership and that sort of thing, counted towards credits you need for a master's or PhD. And I actually was able to successfully petition to get a leadership class I took in the business school to count towards generic PhD sort of technical units under the argument that in order to do my research within the context of my research group, I have to work with ten other PhD students, and PhDs aren't the easiest people to work with or get them to do what you want. So, this is a huge thing for me to be able to do what I need to do effectively.

I think part of the reason why I still found teaching to be fun in grad school [is because] my research in engineering is very much stuff that you can do alone. Either in your office, not talking to anyone, or from your apartment, working from your laptop. And with teaching, there is a social aspect of it, and a connectedness aspect.

My early days as a professor and what I am doing now

It [was] a culture shock going from having a lot of teaching experience at [Master's and PhD University] to [Current Institution]. At [Master's and PhD University], the culture – well pretty much all the engineering classes are recorded and offered to remote students at the same time that they are offered to on-campus students. Because of that, the class sections tend to be – you know, your slide deck for lectures, you want them to be very complete, with all the bullet points written out, and then you scatter in a few different practice problems throughout there, but

Buswell, N. T. (2017). Narrative 4: Christopher Davis. In Swimming upstream: Pathways of new engineering faculty at non-R1 institutions (Doctoral dissertation). Pages 136 – 146.

you sort of have your lectures in this self-contained thing, and the students just open up the lecture notes, download them from online, go through them with you.

And a lot of students don't even show up to class physically, they just watch the video later at their own convenience. And I think in part, because of that, teaching there, you do a lot less to sort of shop around and move your students around. You just assume: all right, you're an adult, here's the material, here are my office hours, show up when you need to, and that's that.

My first quarter at [Current Institution], I tried very much to replicate that approach. I tried to have these big monolithic slide decks that had all this information that they could read at their leisure and just follow along. The students hated it. The feedback was they wanted a lot less slide decks and a lot more me working out problems on the board, defining concepts verbally. Because I think that caused them to write it down in their notebooks a lot more. And you do get more out of it when you write it down. For me, a big culture shock, with a lot of these digital design and computer engineering classes, from my undergrad and [graduate school], there had always been labs assigned to have us implement some of the concepts, but we never got in class lab time for that. It was in addition to homework and exams and sort of the culture was, yeah, of course you're going to spend a lot of time working on this class, there is a lot to learn. Whereas, I ran into, especially with some of these sophomore level students at [Current Institution], if they couldn't finish the lab in the allotted in class time, telling them that anything they didn't finish, they had to go home and do, was a shock to them.

They thought, wow, we have all this stuff to do outside of class already. A lab should be contained in lab time. And I think in general, especially compared to [Undergraduate Institution], you spend so much time working on your classes that, there weren't that many extracurricular groups, and there weren't that many people who participated in them, because in the rare event you did have free time, you just wanted to relax and hang out with friends. Whereas at [Current Institution], I think they are used to having a little less official work but – we have these amazing extracurricular programs, where outside of class the students will – we have all the different racing teams, we have a huge student oriented cube-sat program, all sorts of different competitions. Human powered vehicles, robotics clubs, underwater autonomous vehicles club that competes nationally. It's interesting because [Current Institution] is a big agriculture school, so we have teams that build tractors for tractor pulls, and compete nationally.

Buswell, N. T. (2017). Narrative 4: Christopher Davis. In Swimming upstream: Pathways of new engineering faculty at non-R1 institutions (Doctoral dissertation). Pages 136 – 146.

I think going from – especially an undergrad where your learning was very much inside the classroom and you learned a ton through structured learning, then going through grad school where you spend all your time working on your PhD research, and that's your learning, then going to a place like [Current Institution], where there was sort of some push back from the students of "why do I have to spend all this time learning these concepts, doing this required course?" that was a difficult culture shock for me too. Now that being said, when I got to the final project at [Current Institution], I tried to make them open ended, and these students get really into it. They use their outside skills, they'll bring in outside components, they'll make custom enclosures for whatever digital device their building, do a lot of machining, bring all these skills together and really go far and do a lot of impressive work in that sense. I think that is one place where they have an edge because they do all this extracurricular stuff and develop all these skills, when you give them an open-ended project and inspire them to go further, they'll work really hard. But when you are trying to teach them the concepts, you have to frame it just right, otherwise it can be a little bit like pulling teeth.

[In the summer course I am teaching] for each class period they have some assigned reading that they are supposed to do, and at the beginning of the class I try to do about 30 minutes of, basically just recapping some of the key points from the reading and giving them a chance to ask questions. Then, after that I give them another half an hour to 45 minutes to work in groups on some of the optional practice problems just to make sure they are spending some time doing that, and can ask me questions if they need to. And then the rest of the class, I have dedicated to them working on the lab. So, since we are doing this class over summer in a five-week format, I see them – class periods are four hours long, three times a week. During a normal quarter, it's normally one lab per week. During the summer I have them try to do two labs per week, so they definitely have plenty to do in that class time. I'd say after about the first hour, or hour and a half, they are just working on their labs and asking me questions when they run into trouble.

And when they ask me questions on the lab, I try – and I guess this partially depends on the student – but I try to ask them leading questions that will get them to their own answer. [For example, if a student says to me]: "The system I am trying to build is exhibiting this weird behavior" I'll try to walk them through the process, and say "ok, what module in your design do

Buswell, N. T. (2017). Narrative 4: Christopher Davis. In Swimming upstream: Pathways of new engineering faculty at non-R1 institutions (Doctoral dissertation). Pages 136 – 146.

you think might be causing this weird behavior? Based off that can you develop some sort of hypothesis for what might be going wrong? What signals would you want to look at in your simulation to test your hypothesis? Either prove it true or prove it false." That sort of thing. And I say it really depends on the students because, some of the more advanced students, if they run into some weird simulation error they've never seen before, I can just walk them through the error message once, tell them what they need to fix, and they'll learn from that and won't ask me again. But there are other students where if I do that for that, what they'll learn is that they can just get the answer from me, so every time they run into even a minor road block, they'll immediately ask me for help. So, I definitely try to push back harder on that second group of students to make sure that they actually learn something, learn a generalizable concept from the questions they ask me, and try to get them to be more selective about when do they ask me a question, versus when do they spend another ten to fifteen minutes trying to figure it out, versus when do they ask their peers for help.

I guess that's how I really try to shape my classes, shape my lectures, I try to use as many real-life examples as I can, use a lot of analogies, well explain concepts of equivalent domains that they might be more familiar with.

In my lectures, I try to make them interactive, keep the students engaged, get them working with their peers as much as possible. I'd say the biggest motivational thing – I always try to keep my final projects open ended to some extent. Give them somewhat of a domain to work in, to prevent the thing where they have so many choices that they have no idea what they want to do.

What tenure looks like here

So, teaching is evaluated a couple ways. First, at the end of the quarter, they hand out surveys to the students, both numerical questions and then free-response questions. And in order to get tenure, you generally have to have scores that are higher than the departmental average. I think that works out to say somewhere around four out of five, for a lot of different measures. Which after my first quarter, and especially as I go back and teach classes multiple times, doesn't seem like it's that difficult to do. Although it does bring up an interesting question for me. Because every time you introduce new material, every time you try to experiment with new

Buswell, N. T. (2017). Narrative 4: Christopher Davis. In Swimming upstream: Pathways of new engineering faculty at non-R1 institutions (Doctoral dissertation). Pages 136 – 146.

techniques, you can risk frustrating students, which can cause your evaluations to sink, so I get a little frustrated that I kind of have this impression, that once I get a class to that four level, I could not change it between now and tenure, and that would do good things for me in terms of tenure considerations, whereas, if I kept trying to change it, make it more relevant, make it more impactful, I may have more variations in the scores, or make some mistakes, and that could hurt me. Which to me it just seems like a bad incentive structure.

On the other hand, in addition to those scores, every year that you're probationary, basically, until you get tenure, one of your classes is observed by your department chair, and the people on your tenure committee, and they write up a report based off of what they see. So, I guess that's an area where if you're really pushing the envelope, they'll get a chance to see that, see what you're doing, and the portfolios we turn in, part of the teaching activities, you can write about all the different things you're doing, mention any publications that you have related to your teaching. And one big section in that is you're required to pick out a handful of representative comments, both positive and negative, from your evaluations and address them. So, you do get a chance – if you get low teaching evaluations, and half the comments are "well, I felt like he expected too much from us and I much prefer a class where everything is very straightforward, step-by-step, everything has an easy solution that you can find in the book" which I have actually gotten comments like that before. Then you can say, "look, that may be what they want, but they get more out of the class when you force them to do critical thinking, so I'm planning on continuing with this practice, and I'll try to do more framing at the beginning of the course to tell them why I am doing this, but it's not a bad thing that I am doing this."

I would say one of the really nice things about [Current Institution] that isn't universally true across PUIs is that for my professional development, I can count educational research. That means – it works out great because anything I do to improve in my classroom, if I can get some measures of the effect, and you know as an engineer, I figure if I am going to do something, I should have a reason for doing it. If I can get that out to a conference, I can sort of kill two birds with one stone. And have research that feeds into my teaching, and teaching that feeds into my research, rather than kind of having them be two completely different things.

To the extent that I still do technical research, for a lot of it, I am advising master's students, so it still, very much for me, falls into this area of teaching, because I can give them an

Buswell, N. T. (2017). Narrative 4: Christopher Davis. In Swimming upstream: Pathways of new engineering faculty at non-R1 institutions (Doctoral dissertation). Pages 136 – 146.

interesting digital design project, that they're interested in, and grow them as students, as engineers, as part of the research. Whereas, I had always kind of felt in grad school that my research work and my teaching work, they were two orthogonal things.

Right now, I'm trying to pursue a collaborative NSF grant. Between that and trying to develop my courses and also trying to write some papers based off of those, and trying to do some of the service and really trying to modernize some of the design curriculum, and navigate some of those departmental politics, I don't really have a ton of time to read all the papers I need to get a huge technical research program going. And even if I could, outside of having master's students and some volunteer undergrad students, I don't have the hours to actually do the research.

I think in a couple of years, I'll definitely want to start getting back into that some, or spending summers working in industry just to make sure that I stay current in the field. But the way I see it, coming in [Current Institution], I have a unique opportunity to have an outsider's perspective, having seen how subjects are taught elsewhere, also having some knowledge of the state of art, or at least a state of the art a year or two ago of the field, and really developing new tech electives around that, pushing to change the curriculum, that sort of thing. If I didn't start doing that right away, I might start to forget or become too engrossed in the way that [Current Institution] does things and start to suffer from "not-invented-here" syndrome, and lose some of the good that I could offer the institution and the students in that domain.

The flip side is that means that I don't have funding to offer students paid summer opportunities, but a lot of our students are interested in going into industry, so they are spending their summers at internships. The other thing is, I came here because I really want to be an excellent teacher, and I feel like, from what I've experienced, a lot of that is at the undergrad level. Sure, you have to teach them some concepts, but getting students in the right frame of mind, getting students motivated to do this.

So even if, by the time I get tenure, let's say I can't get back to the technical research until I get tenure, even if I am teaching them material that might be six years away from the bleeding edge, I would much rather have them go out with the capabilities to quickly learn what they need to know at any job that they would start up at and have a passion for engineering, and be good at that part of teaching. Because I figure I can always update the technical stuff as

Buswell, N. T. (2017). Narrative 4: Christopher Davis. In Swimming upstream: Pathways of new engineering faculty at non-R1 institutions (Doctoral dissertation). Pages 136 – 146.

needed, or buy a new textbook that has it in it, read through, learn pretty quickly. But if I don't have that fundamentals of the ability to teach and get students excited about learning, who cares what technical stuff you are trying to teach them.