

➤ ***Dr. Streveler: Welcome to the Research Briefs Podcast.***

I'm your host, Ruth Streveler, coming to you from the School of Engineering Education at Purdue University.

The goal of Research Briefs is to expand the boundaries of engineering education research. In these podcasts we'll speak to researchers about new theories, new methods, and new findings in engineering education research.

Our guest today on Research Briefs is Dr. Julie Martin, an Associate Professor of Engineering Education at the Ohio State University. Julie is a well-respected researcher in engineering education and also recently finished a two-year rotation as a program officer at the National Science Foundation.

We're asking Julie to join us twice; once to discuss her research and once to discuss being at the National Science Foundation which we will refer to as NSF. The episode today focuses on her time as an NSF program officer.

Julie, it's a pleasure to have you, welcome as a guest on Research Briefs.

❖ **Dr. Julie Martin: Thanks, this is going to be fun.**

➤ ***Today we want to focus on your time as a program officer at NSF. But some of the listeners may not even be familiar with what NSF does, what program officers do, so we were going to start with that. First of all, could you tell us***

a little bit about what the National Science Foundation is?

❖ Yes. The National Science Foundation provides over a quarter of the federally funded budget for basic research. They have a budget of about \$8.3 billion in this fiscal year. So, NSF makes awards for basic research at about 12,000 per year. And as a program officer, I was in charge of handling the gold-standard peer review process that NSF runs for proposals that come in. And that involved receiving proposals, getting peer reviewers for the proposals, running panels, being in charge of that process. Making funding decisions and also working on new funding opportunities so like writing program descriptions and solicitations.

The other really interesting thing that NSF program officers get to do is they get to work within the foundation to set research priorities for the fiscal year or future fiscal years, and work with other government agencies and interagency groups.

➤ *And this is located in a beautiful building in Washington, DC, or the outskirts of...*

❖ Yes, they just opened a new building a couple of years ago in Alexandria, Virginia.

➤ *So, when we say that you worked there, there are people who work there permanently and then we said that you rotated, it was two years, am I right about that?*

❖ Yes. So, I did a two-year rotation which is when NSF will essentially borrow you from your academic institution. They're actually calling it being 'on loan' to NSF. So, I still retained my faculty position and I was working at NSF, and in my case, it was for two years. And there's about 40% of the scientific staff are rotators and the other 60% are permanent federal employees.

➤ *And so, the idea of having people rotate in, I believe, is so that as you are reviewing these funding proposals you have people from the faculty who are researchers who are in the community able to judge who should review what the funding decisions are, and they want to have this fresh blood coming in so that people come in and out. And I believe you can be a rotator from anywhere like a year to four years, is that right?*

❖ Yes, you can do a minimum of a year and a maximum of four.

➤ *So, obviously this is a really key position. And that's one of the reasons we want to chat with you about it because you're receiving the proposals to the solicitations and as you were speaking about that I also wondered, people new to this might not even know what a solicitation is. So, might you say what a solicitation is?*

❖ A solicitation, or a program description, is what NSF advertises that it has funding available in a particular area. And if you're interested in looking at what funding opportunities are available the best place to go is to

NSF.gov, to the website and there's a funding tab that you can look at the describes all of the currently available funding mechanisms.

➤ *And so that will tell you things like the kinds of research areas, what should be in the proposal, the funding limits, right? We will fund up to \$X hundred thousand dollars for this many years.*

❖ **Mm-hmm. It has all the parameters that you would need to write a proposal. So, who is allowed to be PI, who can be a qualifying institution, the amount, all the details about what should go into the proposal, and if there's a due date it will have that, which is one of the critical pieces of information.**

➤ *Yes, yes. So, kind of going back to what you said program officers do, maybe we could unpack each one of those a little bit again to give people the ability to have a picture of it. So, there's this solicitation which sometimes you get to write?*

❖ **I got to write a solicitation when I was at NSF, yes. And so, that's one of the things that I think was really fun and exciting about being a program office was because I felt like I got to shape the field, not only by the decisions that I made of what I funded, but in what funding opportunities I helped create.**

➤ *Yes, that is incredibly exciting, incredibly exciting.*

So then, you have the solicitation that perhaps you write or perhaps you inherit. The proposals come in but before they come in people are asking you questions, right?

❖ **Yes, so a big part of a program officer's job is to interact with the public about the available funding opportunities. And so, when I was a program officer, I spent a lot of time interacting with perspective principal investigators, or PIs. Talking to them about their ideas, answering their questions, or perhaps giving advice. And that was one of the other really fun things about being a program officer.**

➤ *And so, because there's \$8 billion that NSF is awarding this year, that \$8 billion comes from the U.S. taxpayer, correct?*

❖ **Yes.**

➤ *And so, I know from interacting with NSF that there's this real urge to be fair.*

❖ **Absolutely.**

➤ *And to be able to give everybody equal opportunities, and to serve underserved populations, and therefore as you're talking to people, I'm sure that's something you really want to keep in mind as well, being fair and consistent.*

❖ **Yeah, absolutely. In fact, when I was there, I developed a kind of template for what I said to everybody who contacted me with a request for a meeting or a phone call. I put the exact same language back into an email to folks to let them know what I needed ahead of time to be prepared for the meeting and what I need them to do ahead of time to be prepared for the meeting.**

And then everybody got approximately the same amount of time and that was just one of the really fun things about being a program officer was the opportunity to hear about other people's ideas.

➤ *So, the proposals come in and then they need to be reviewed by a panel of people, right?*

❖ **Right.**

➤ *And you are in charge of putting the panels together?*

➤ **Yes. So, we look at what comes in, figure out what kind of expertise we would need on a peer review panel. And I would then contact folks to find out if they were available to come to NSF to spend a day-and-a-half, or two days with me and other panelists discussing a batch of proposals. And there were also, you know, considerations to make in thinking about who was going to be on the panel other than the sort of technical, or the research expertise, I always made it a priority to include new people in the process so it wasn't just the same group of people essentially in the field making the**

funding decisions for the field. So, I always tried to include people who were either new to academia or had not been to an NSF panel before. And, you know, also was then thinking about the composition of the panel in terms of diversity of thought, diversity of background, the institution types that they were coming from, and a lot of other kinds of considerations like that.

➤ *Now, obviously, because you're well-respected in the community, and our community is not that big, there are people that you know. So, how does NSF deal with having you know different folks, and how close is too close, and all of that?*

❖ So, NSF has really strict, what they call Conflict of Interest, or COI policy. Everything in the government has an acronym. So, the conflict of interest rules prevented me from even looking at a proposal for somebody who was working at my same institution, or with whom I had collaborated with in the last so many years, as well as anybody that I had a personal relationship with.

That was a bit of a challenge I think because we are such a small community. But on the other hand, I think that typically the people that get these kinds of positions do have a big professional network, and a strong professional network. So, it's a challenge but it's not a problem because there's always somebody else in the division or somewhere else across the foundation that can handle that proposal for me.

And so, in my case when something came in that I had a conflict with I identified another program officer who could handle the proposal and who could actually step into the panel for the discussion of it while I stepped out. And then that person would then handle all of the funding decisions related to that.

➤ *So, for the people who haven't been part of panels, again, these folks usually come to NSF and are together in a room, usually, right? But not always?*

❖ Yes. So, the in-person panels I think are, in my opinion, the most effective way to do a peer review. Because it is difficult for folks to travel, we also tried to offer a virtual option. And so, sometimes I did have some people that were joining virtually and there were some programs at NSF that have gone to all virtual panels where it's all done from the comfort of your own office or living room.

I personally think that everybody gets a lot of out of it for people to actually come together. And that has been my personal experience as a panelist before I was a program officer and also watching this happen as a program officer that it's a great way to develop your own professional network to go and be on a panel and meet other people that you may know already and can get to know better, or might not have ever met before.

I also think the best reason to be on a panel is because it helps you to

learn to write better proposals.

- *Yes, yes, yes. It's like being on a search committee and then trying to be hired somewhere. It's like having that other perspective really helps you realize how you're presenting yourself.*

- ❖ **The first few times I was on a panel I didn't really necessarily know what to expect. And I think I had done well over 20 by the time that I got to NSF as a program officer, and what I felt like it helped me do was to imagine what the conversation around the table in that room would be like for my proposal. And it helped me write better proposals because I could imagine, "Okay, there's going to be somebody down at the end that's going to say something like this," and so I need to make sure that that person gets my message. And there's going to be somebody maybe over here on the side of the table that's going to really get it and really understand it and I also need to write to that person.**

It's often really sort of walking a tight rope to figure out the best way to write a persuasive proposal to folks that maybe don't know anything about your topic but are well-educated in the field and other people that have a really deep knowledge of your topic, or your theoretical framework, or your method.

- *Right, right. And knowing too that everybody has their own bias about how something should be done and their pet frameworks, and if you don't use it, they're going to be, "Well, why didn't you cite this person?" Yeah, yeah.*

So, the panel happens. The proposals are reviewed. And what do the panelists give you then and what do you do with it next?

- ❖ So, each panelist is asked to write a review of the proposal that focuses on the 'intellectual merit' and the 'broader impacts' which are two NSF words or phrases that are the metrics by which NSF judges proposals.

So, panelists are asked to come to the panel with a written review ready and a rating. The ratings go from poor to excellent. And what's really interesting is to see how different panelists may rate a particular proposal, and then come together and discuss that. And sometimes they reach consensus and sometimes they don't.

What the end result of a proposal going to panel is that it typically comes back with at least three reviews; that's required by NSF. And usually also a panel summary about what the discussion was in the room. As program officers at NSF we advise panelists that what they were doing was giving us advice and so we took their expert advice into consideration.

And then there was sort of a whole other realm of things that the panelists didn't necessarily know about that went into those decisions. And some of that was about what the budget was and how much money we had, and some of it was about trying to diversify the portfolio with respect to topics, or methods, or geographical regions, or PI

characteristics.

So, as a program officer, I would take that advice from the panel and then try to make the best funding decisions that I could because it's everybody's money; it's taxpayers' money.

➤ *Right, right, right. And then for the ones that you decide that you would really like to fund, there probably are some that you can't?*

❖ There's always a lot that we can't. And I think the overall funding rate at NSF is like 15 or 20%. It's tough competition. Either way though, I would come back from the panels with the panel's advice and then I would develop what's called the recommendation and write an internal document called a review analysis for every proposal. So, whether I was going to recommend that it be funded or that it not be funded. And that's just a document that the PI never sees but is justifying my decision to the other folks at NSF.

So, I would have to justify my recommendation to my Division Director who was my boss. And then once they signed off on it, it would go to the Divisions of Grants and Agreements at NSF and those are the folks that actually make the award.

➤ *And the PIs do see the reviews from the reviewers and the panel summary, right?*

- ❖ They see the reviews and the panel summary verbatim. They never see the review analysis. Right.

- *Right, so that part is internal. And then there's that happy day when you see, "Hey!"*

- ❖ Hopefully, yes. And usually I would hear about it either way.

- *Yes, yes. "Why didn't you fund this?" (tearfully) Yes.*

- ❖ And part of my job too was helping folks who got decisions that they weren't happy about understand what went into the decision in terms of what happened at the panel and how they could prioritize changing things to think about a resubmission.

- *Mm-hmm, mm-hmm. And then after the proposal is funded you still interact with some of the awardees, right?*

- ❖ Yes, I had a portfolio of about 250 projects at any one time. So, I was actively managing those, continuing to talk to the PIs, seeing them at conferences and awardees meetings, and the touchpoint that I would have with every PI of a funded project is when they write their annual report. I would read those comments if needed and approve them.

- *Or not.*

❖ **Trying to stay positive.**

➤ *Yes, yes. No, I mean usually you do, but I know that it isn't just because somebody submits something doesn't necessarily mean that it's approved.*

❖ **That's true. Eventually it did need to be approved so that it didn't hold up other actions at NSF. So, yeah, the goal was to get them to an approval.**

➤ *Right, right. So, clearly, this is just a really important position, being a program officer that you are not only shaping the kind of research and deciding about it, but really having this ongoing conversation with the researchers about the kinds of things they're doing.*

So, when did you decide that you wanted to be a program officer? And how does one get a position like that? And how did you get this position?

❖ **You know, I was trying to think about to a time when I didn't want to be a program officer, I know it was at least 10 years before I applied. And it was probably after having been on a couple of NSF panels and seeing what they did and just seeing how exciting it is to be at NSF either as a panelist or a program officer.**

I went to NSF one time, on a panel, and ended up visiting with a few program officers while I was there. And I have this story that I've actually not really shared with folks, but your listeners will get it. I met

with this one program officer and took her business card from her desk when I left. And I don't even remember who it was or even what division it was in. But I took her business card and I went home and that's when I think I really decided I wanted to do this.

And I had either read a book or saw a show or something about vision boards, envisioning goals, and things like that. So, I typed out my name and printed it, cut it out and pasted it on that business card so that it looked like a business card that said, "Julie P. Martin, Ph.D., NSF Program Officer." And I taped that in a journal, and I had it, put it in the front corner of that journal like I said probably for 10 years before.

And then every time I went to NSF I would learn more about what happened behind the scenes as well as what panelists would see. I would talk to program officers. I think it was at least the people who were in the position that I had, which was as the program director for engineering education in the Engineering Education and Centers Division which was in the Engineering Directorate. So, I knew Elliot Douglas, Donna Riley, Alan Cheville, and Sue Kemnitzer, and the folks who were in that position before me and would talk to them about it, let them know that I was interested in it, hear their perspectives about what was good and not so good about the job. And so, I felt like I had maybe as much of a handle on what that would entail as I could before I got there.

And then of course, you get there and they pull the curtain back and you see everything that you weren't allowed to see before. But I felt like I

kind of knew what I was getting into.

➤ *So, you were envisioning it and being clear you wanted to do it, and then just being in touch and then finding out as much as you could. And then what's the step of like actually getting the position?*

❖ So, I think what's good about the rotator position in terms of if there are folks who think they might want to do it at some point is that those jobs come open every few years. So, the rotators are there from one to four years, so at least every four years those jobs turnover. And by talking to people who are currently rotators you might be able to glean approximately how long they want to stay.

I had let a few people know that I was interested and when the time came that I wanted to apply. And I also had signed up for the weekly NSF emails that you can go to the NSF website and sign up for. Those weekly emails have the job opportunities and then all the funding opportunities and lots of other things. So, I would kind of keep track of that and so even though at the time I was looking at these it might be still a few years away from the time I thought I might apply, I would collect those job postings and just look and see what was acquired. And it's a pretty standard set of things that are required for each one.

So, I did that for several years so I kind of felt like I understood what would be expected and I could think about how to package my experience in a way that would be attractive for that. And then when I

heard that the rotator before me was going to be leaving, I kept an eye out for the actual position announcement and applied as soon as it came out.

➤ *I think in our earlier conversation you said that as you're leaving part of your job is to find a replacement. Kind of recruit a replacement?*

❖ They actually told me that my responsibility was to find somebody awesome to take my place. So, I think I did a pretty good job of that. It really is part of the culture there that as a rotator you're expected to help recruit somebody to take your place.

➤ *Right, right. And so, that's another good strategy of telling people you're interested so as they're thinking of the universe of people they might speak to, you come up in their mind.*

❖ Right. 'Cause when I left, I had a list of people that I wanted to contact that I thought would be awesome. And for some people it was the right time in their life and their career, and some of them applied. And then others, it wasn't. But I wanted to let them know that I thought that they would be great at that job and to keep it in mind for another time.

➤ *Since you mentioned it being the right time for them, obviously moving to D.C. for one to four years is a big deal. What's some sense of how people could judge when the time might be right for them?*

- ❖ You know, it's a really, really exciting opportunity and it also can be really challenging personally. So, for me, I knew that the right time was going to be after I tenure, and I don't have children but some people that have children have to think about what grades they're going to be in and how they're going to handle that.

So, in my situation my husband stayed in South Carolina and I basically traveled back and forth. Other people have done all kinds of different things. Some people have taken their families with them. Some people have had sort of alternating trips back and forth with their families. And so, I think that it not only has to be the right time professionally, but it really has to be the right time personally.

- *When people see that they have that window of a year, or two, or three, or four to actually be able to do this.*

- ❖ Right

- *So, you spoke about this a little bit, but maybe you could expand upon it a little bit, the exciting things and challenging things of being a program officer. What do you want to start with?*

- ❖ I'll start with the exciting things. The exciting things were that I really felt like I was shaping the field by the funding decisions that I was making.

I was really excited to grow the field by working with perspective PIs. And I, in particular, had two programs that I worked on; the CAREER program and the Research Initiation in Engineering Formation, or RIEF Program that particularly I think was working with PIs that may not have had funding before or might not have had much funding.

So, I really enjoyed days that I blocked off part of the day to have, what I called office hours, you know, to interact with PIs about their ideas or about how their current projects were going. Running the review panels was also, it was tiring, but it was also a lot of fun because I got to see people from the community; they came to D.C.

I think one of the really most interesting things about working at NSF, is I talk about NSF having magic and you just sort of don't know when and where that magic is going to happen. So, I knew that I would have really cool and interesting opportunities working as a program officer and I also knew I couldn't predict what those were.

In my case, I think one of the coolest things that I was able to do was, because I happened to be the person who was in that position at the time that the White House Office of Science and Technology Policy, OSTP, was writing the federal five-year strategic plan for STEM education, I got to be part of an interagency working group working with folks from 15 or 20 other federal agencies to write the strategic plan for STEM Ed for the government. And my contributions were listed as a co-author on that. And that's the kind of thing that I didn't necessarily

know was going to happen on my watch or that I would be one of the people that would get pulled into that. But it was a really fun thing, and certainly a lot of work, and also just really eye-opening.

➤ *Yes, yes. So challenges.*

❖ **Challenging things.** So, first is there's lots of parts of the job that are just tedious. So, you know, exciting as reading annual reports sound it's not always as exciting.

And then I think there were just folks that have submitted a proposal to NSF before know about Fastlane which is the online system for proposal submission; I don't know anybody that likes Fastlane. And what most people probably don't know is that there's also a similar but equally clunky system that often also goes down a lot called eJacket which is what the program officers use when a PI turns something in in Fastlane it shows up in this online platform called eJacket.

So, there's those kinds of things like dealing with the clunky technology that we have to deal with and the fact that there are like 15 different platforms that we had to use; one for travel, one for proposal processing, another one for writing a solicitation, all that kind of stuff. So, that's tedious and just frustrating. So, I think that those are the things that stand out as being challenging.

The other piece of it that maybe folks don't talk about as much is that

depending on what your family situation is, and where you are physically, and where they are physically at the time, it can be really difficult to relocate and to be traveling a lot. Some people have to travel a lot for that job anyway, much less trips home. And there's a real emotional toll that that can take. And one of the reasons that I decided to stay for two years and not stay for three or more is just because of that; 'cause that was as much as I could do.

➤ *Now, one of the things I think we didn't mention earlier that brought up as a question, are you able to continue your own research and advise your own students while you're in this position? And if you can, is that an extra challenge as well?*

❖ Yes, so technically yes. In fact, NSF gives you a certain number of days per year; it can be approved for up to 50 days per year to work on your own research. What I think happens in practice more often is I felt like most of the time I had two jobs; so, I felt like I had the NSF job and the faculty position.

And while NSF specifically prohibits you from being on committees and other kinds of things like that with the department, I still had one grad student and obviously wanted to provide the same high-level of mentoring for them as I had. I had known that I was going to NSF, or that I was going to apply to go, and so I had let some students graduate and not taken on new students.

But really in terms of the research it kind of feels like you have two jobs 'cause even though you get some time to go home to your home institution and do that research. The whole time that I was home working on that the NSF business still had to happen.

➤ *So, for people that are thinking about being an officer someday, how might they go about that?*

❖ I mentioned signing up for the weekly emails. I think that's a great strategy just to keep an eye out for what's coming open, what the different job descriptions are, what the options could be. I think being a panelist is a great way to get a better sense for what program officers do *and* learn about how to write better proposals. So, I don't see a downside to that.

And then thing that I mentioned about just talking with people at NSF. I think most rotators are very happy to share their experiences and what it's been like for them, and how they're making it work. There are obviously things that they can't tell you but letting them know that you're interested I think is a good strategy.

➤ *So, I always end the podcast with people giving advice. And the advice I'd like to ask you about is probably to be honest what everybody was hoping to hear from the very beginning, which is what advice do you have for writing a competitive grant proposal? And, particularly, since Research Briefs tries to nudge people to think about new ways of doing things and new*

frameworks, a lot of times folks are hesitant to adopt that because they feel that that would will look odd to people and they have a lower percentage of chance of getting funded for something maybe a little far out than something that's tried and true.

So, what advice would you have in general? And is there anything specific for people trying new things about how do I sell this? How do I try to get funding for these kinds of research projects?

❖ **Yes, I can definitely speak to that. What comes to mind is sort of two different pieces.**

The first piece I'll talk about is interactions with program officers around your idea. So, I think it's really important to talk to program officers by phone or in person. Program officers will say things verbally that they can't or won't put in writing. And so, what I tell folks is that when they're talking to a program officer their number one job is not to talk but to listen. And, you know, even the types of question that the program officer asks can help point you in the right direction.

When I was at NSF I asked folks to send me a one-page summary of their research that addresses two review criteria; the intellectual merit and the broader impact. Because until somebody can articulate that to me, I don't really have any basis, as a program officer, to talk about their idea and how it might be reviewed.

I think the other piece of it is, it's really important to be prepared to tell the program officer what kind of feedback you need or what kind of feedback you're seeking. Because I would get some emails that would say, "Here's a one-page summary and I want feedback." About what? So, it's really difficult. So, one of the things that I developed pretty quickly after arriving at NSF was to ask people to send me a one-page summary and send me three burning questions.

And I knew that if I knew what their questions were ahead of time and I knew where their concerns or what kind of feedback they wanted that I could pretty easily prepare for the meeting and be prepared to answer those questions. So, I think those are important things when you're communicating with the program officer. And when you're doing these new and innovative kinds of things that can be particularly important to communicate with them.

The other piece is really about strategies for writing the proposal itself. And there's two things that I saw work really well consistently regardless of the topic or whatever the proposal was about.

So, the first piece of advice I would give about that is to be transparent about the research design decisions that you make. And when I say, "transparent about them," I mean even the things you decided not to do because there's always that person on the panel that says, "Well, I would have done it this way, and I don't know why they would've done it like that." Well if you provide some transparency that says, "We realize we

could've done X, Y, and Z, but we chose X because." That's sort of all it takes. Acknowledging that you made a decision against doing something in favor of something else, and why that was the case, why you felt that was the right decision because then the panel can disagree with the decision you make but they can't say you're not aware of it or you didn't know enough. And sometimes if they disagree with that specific decision that's less of an issue than thinking that you just didn't know to think of it a different way.

The other piece, and this I think is particularly again important if you're doing something like you're talking about that's really new and innovative and that's to provide a contingency plan. I think anybody that's ever gotten a project funded or maybe started out with a proposal for what you're going to do for your Ph.D., you realize it's not going to go the way that you think it's going to go. And just some acknowledgement of that is helpful and particularly if it's something new and different that might not work. Just acknowledging, "This might not work and here's how we're going to approach making a new decision that's best for the project if this thing doesn't pan out."

And that then can eliminate a lot of arguments about, "Well this isn't going to work, or how do they know, or I'm not convinced." Because at least if the panelists feel like you have a plan for how you're going to deal with it that's a really good way to move forward.

➤ *Julie, you have given us some really fabulous advice. And I am sure people*

will feel better about the next proposals they write. So, thank you very much for being a guest and we look forward to hearing about your research in our next episode.

Research Briefs is produced by the School of Engineering Education at Purdue.

- *Thank you to Patrick Vogt for composing our theme music. The transcript of this podcast can be found by Googling “Purdue Engineering Education Podcast.” And please check out my blog, RuthStreveler.Wordpress.com.*