

DELIA VALLES: The first question that was posted is for Dr. Garcia. Would you please speak more about the idea of distinguishing evaluation efforts versus research components?

ANTONIO GARCIA: The evaluator has a specific role. They need to look at the project. What was the project aiming to do? What were the sections of the project in terms of the timeline that needed to be completed?

The evaluator focuses on those metrics. For example, if a course is being redone, was the course redone and did they meet all the objectives? The evaluators set quality measures to look at: What did you say you were going to do? And then: Was it done in the way that it was supposed to be done? They set quality measures to evaluate what was done in the project.

The research component needs to be separate from the evaluation. It needs to focus on the intellectual question being addressed in the research. The researcher(s) in the research component will design and execute the research to address the questions being asked or that the hypothesis is tested; collect data; develop/design models that come out of the research; and produce and publish papers as a result of that work.

By keeping those two things separate and keeping them with separate people, I think you get good project management and you also understand the impact of the work.

DELIA VALLES: Thank you, Dr. Garcia. There's another question for both of you. Could you give us some advice about how to proceed when a submitted proposal has been rejected?

ANTONIO GARCIA: I compare it to baseball. If you are a 300 hitter, you're going to miss seven out of 10 times. I wish I was a 300 hitter at proposals. When you write a proposal and you're really excited about it and all of a sudden you get a rejection, it's really hard to understand what they're asking; what the critique is about. I think that is the case where it's been hard.

One case, for example, we were completely rejected on a proposal. I think it was the Alliance for Graduate Education and the Professoriate, the NSF AGEF many years ago. I was first dejected by the status of the proposal and then we read the reviews, but this was an unusual case. We decided that everyone was really wrong. All the reviewers and the panel were wrong. And so we decided to rewrite it and state why it was not correctly posed. The way the project was being explained was not posed.

Now, we were actually successful in doing that, but that was very unusual. Normally the best way I have gone about that is I've been rejected on another proposal, the National Science Foundation Bridge to the Doctorate several times because we had a number of years of those grants, and then we would carefully read the reviews and see what was missing.

And, for example, we had a piece that was missing where students were not getting enough direction on how to form their careers. We decided to find a person that was willing to do seminars with our students and talk about how their science could have more impact in society. We added that component into the proposal and reworked some of the minor things. So, we found one major thing, and the other ones we thought were minor and then resubmitted that.

And that seemed to have been the key stumbling block because many times proposals and reviewers will focus on many things, but there's one or two things that are really, really critical to why the proposal was rejected. Sorting that part out in that case was important. There is no easy science. It's more of an art to figuring out what to do when your proposal is rejected. But realize even good writers are going to be rejected maybe eight or nine times out of 10, easily. Probably at least seven times out of 10. I'll leave it up to Dr. Cover to add to that.

MATTHEW COVER: That was a great throw. I don't have much to add. Been rejected from grants a number of times. Yeah, this was my first successful NSF grant. And it's interesting in that it's the first education grant that I worked on. I remember talking with my wife after getting another rejection from my disciplinary research. And she said, well, how do you spend time? You're reading about pedagogy. You're thinking about education. Maybe you should consider doing research in that area. You're spending so much of your time as a teacher. And so sometimes it does take a redirection of your focus. You do feel like you're up against a wall.

DELIA VALLES: Dr. Cover, there are several questions about the surveys that you administer in your grant. Is there any way that you could share the surveys that you administer to the students who transfer to a different major? Can you also share the faculty survey? Have you published surveys to understand why students leave STEM careers? What about the instrument used to ask the faculty on the teaching practices?

MATTHEW COVER: We did draw upon a lot of information as we were in our data collection phase and as we were identifying our problem and reflecting both as an institution and as a STEM program within that institution.

I'd be happy to share what I have access to. Some of the data was generated institutionally; some of that data was generated by some previous programs. If you want to email me, I can try to respond since people have individual questions and requests.

My advice is, even at this stage, even if you're thinking about submitting a proposal this fall, granted we are in really challenging times right now, but the surveys and data collection efforts, they don't have to be huge. Even bringing in a few dozen faculty and getting responses to a few questions, asking them about their teaching, asking about the student experience, that can be really valuable data to help you set up the problem statement that you're trying to address.

I would say reach out to others on campus-- I'm sure most institutions have some kind of surveys they're doing on student attitudes. On the one hand, don't feel like you have to reinvent the wheel. There's probably a lot of good information out there. On the other hand, if you feel like there is an area where you're lacking information, even a really informal reaching out to colleagues could be helpful.

And I think ultimately, I also saw a question about faculty potential. Like openness versus resistance to taking part in some of the faculty development that we're working on. I think this goes hand in hand. We were aware from the start that these challenges that we're trying to address, amongst teaching practices and introductory classes, it reflects a very ingrained culture.

We tend to teach the way we were taught. These ways of teaching have persisted for decades and decades. And to try to change that is a huge undertaking.

As you're thinking about crafting your problem, you also need to be thinking realistically, what do we hope to accomplish? I think this goes back to bringing in a diverse team, making sure you're talking to folks as you're developing your grant. Especially if it's going to be either involving faculty or involving your students, you want to have almost some pilot testing of your ideas before you go and submit it to NSF. You want to make sure the ideas you're thinking about are amenable to at least a few individuals from the participants that you hope to bring in.

We knew from the start that getting faculty to change their teaching is hard. Everyone has a big list of reasons why it can be difficult to make changes with our workloads, with class sizes. All of these things are challenges. But, again, being realistic about how much change you can expect and making sure you're not trying to over promise. Don't promise the world. I think NSF and granting agencies recognize that change is difficult, especially cultural change and institutional change.

Starting small, bringing in those people you hope to work with very early on in the grant development process, and really asking them, like if you want to do a faculty development program, asking your faculty, what would it take? What do you need? What sort of support? Is it more time? Is it more resources? Is it getting connected to experts? What is really going to be most useful in your context?

DELIA VALLES: Dr. Cover brought up a great point about scientists. We are not trained in pedagogy and social theory. As a junior faculty, can you provide us the path that you took to get more acquainted with this idea so you can apply to the NSF? How best to go about it? Particularly, when departments within your institution do not have much collaboration, such as between the College of Education and College of Sciences.

MATTHEW COVER: Yeah, it's a challenge. I can just try to answer. I'd be happy for Dr. Garcia to weigh in as well because I'm sure he is familiar with this, too. Two things: 1) I think forming a team and trying to establish those relationships and collaboration is worth doing. Even if those collaborations within your institution aren't part of your culture, I think starting on an individual basis can be a good place to start. Are there folks you know you can reach out to and develop a relationship with as individuals, and then gradually talk about possible professional collaborations? 2) I spent a lot of my "spare time" reading about pedagogy, reading about teaching practices, trying to bridge that gap between my disciplinary training and the research and theory and education and the social sciences.

I would say there's so much out there. We don't want to be ignorant of the research that's out there and available. On the other hand, we don't have to become experts. They don't have to go and get a second PhD or a second doctorate or a second graduate degree in that field. Setting aside maybe a few afternoons or days-- and as scientists we know how to do background literature reviews. Print out five papers and go see how they speak to you. See if there are ideas that you can incorporate into your STEM fields. It requires some work. It doesn't require a whole other graduate degree.

ANTONIO GARCIA: I had this difficulty in my most recent proposal that we were successfully funded. Right when I was being hired, I was told the Chancellor's Office says you're going to write this proposal; so this is two or three months before I switched from my previous institution to New Mexico State. I thought, OK, this is daunting. And I was given an initial team to work with, but I quickly evaluated to be successful. There was a gap here, and as Dr. Cover mentioned, I saw that there was an opportunity in this particular grant proposal of my understanding of industry, and that was key to this proposal. One of the selections was partnering with industry. So I thought, OK, I have industry background. I worked with industry. I kind of know what kinds of things we can do. NMSU has got great industry connections, so this is something to build on.

But I reached out to several of the colleagues. Some of them within the College of Engineering, some outside the college who I knew had some expertise. I got them interested in the idea of helping on that side of the pedagogy, but neither of us really were experts in it. We had to educate ourselves a little bit about adult learning. However, we could see the impact that it could have and how industry would be very good partners to try to change curriculum. Curriculum was something I understood well, while the pedagogical aspects are not something that I specialize in.

I go back to my presentation, you take an impact, something you think will have broad impact or important societal impact, and then look at the intellectual advancement that you could do in one particular proposal or one particular project. Then you clearly state, at least we clearly stated to the reviewers, what we knew we could contribute and what parts of it are really not within our purview. And we designed the project not to be research, but about pedagogy. That took several months to figure out how not to frame the project because we aren't experts in that area.

To use the literature, as Dr. Cover mentioned, to our advantage, say, look, there are experts out of here. They say this is important, but we can define it. We understand it, but we don't see it currently in our curriculum, so we want to start incorporating it. That was our strategy. Having a great interdisciplinary group is always important in these projects, as well as a great evaluator.

DELIA VALLES: There's one more thing here for Dr. Garcia. If you could please quickly elaborate on the difference between a research question and evaluative question.

ANTONIO GARCIA: A research question should be based on the framework of what the data you're going to collect. In our particular case, for example, we're going to collect data on how students perceive themselves very early on; as how they form their identity of engineering, by conducting a series of steps where they're actually doing activities and working with industry. We have survey instruments asking that question. How do students reframe themselves? When do they start creating an identity around them as engineers?

The evaluator for the project doesn't ask that kind of question. Evaluators says things to the nature of, did this project get 100 students to conduct this activity? Did they use the instruments that they said they were going to? Was the data analyzed? Was it presented to the advisory board? And was there action taken based on this information to plan the next phase of the project?

I think that's the way to separate these things. A research question is really about the intellectual part. The evaluation is looking at: Did the plan you implemented actually do what you said you were going to do?