CADRE Early Career

Insight from DRK-12 CAREER Awardees

This resource contains advice from CAREER awardees in the DRK-12 portfolio about how to develop a competitive proposal and successfully manage a CAREER project based on their experience. Twenty-four DRK-12 CAREER awardees responded to the questions:

- Based on your experience applying for a CAREER award, what advice do you have for early career researchers about developing a successful proposal?
- Based on your experience managing a CAREER award, what advice do you have for early career researchers about successfully managing a project?

The text below captures their responses and offers a wealth of information that can help other early career researchers—both prospective and recent awardees—understand the realities of writing CAREER proposals and managing CAREER awards and how to develop strategies to be successful at both.

Thank you to the following awardees for sharing your experiences and advice: Laura Bofferding, Jennifer Chiu, Michelle Cirillo, Meixia Ding, Maisie Gholson, Gloriana Gonzalez, Amy Hackenberg, Frances Harper, Charles Hohensee, Jessica Hunt, Ji Yeong I, Lama Jaber, Ryan "Seth" Jones, Hosun Kang, Shakhnoza Kayumova, Melissa Luna, Marta Magiera, Eve Manz, Laurea Margulieux, Kelly Lynn Mulvey, David Purpura, Kihyun "Kelly" Ryoo, Colby Tofel-Grehl, Janet Walkoe, and William Zahner.

Developing a Competitive Proposal

Before you begin writing, first ask yourself whether the CAREER program is right for you. On a CAREER project, you are the sole PI; therefore, you are responsible for making all of the decisions. It is important to understand this before you get started. Some researchers prefer collaborating with others over working in, what can sometimes feel like, isolation. Make sure a CAREER award can help you get to where you want to go as a scholar.

It is helpful to think about the CAREER proposal as writing a professional development plan for yourself. Use the proposal to help you formulate and articulate your research trajectory as junior faculty. The proposed research and educational activities should be the type of activities in which early career faculty would engage regardless of whether the project is funded or not. Think about the proposal as an outlet in which you articulate your career path and show how the funding will help you secure your course on that career path. Writing the proposal can helped clarify your overall goals as a researcher and the specific steps and ways you will answer compelling research questions. Think about your project as a structure or a series of studies that build on each other towards your larger goal and outline the structure before you start with the writing. Take time to incubate your ideas, draft timelines, read the literature, and contemplate who you want to become as a scholar and who you want to serve through this project.

Preparing to Submit a CAREER Proposal
Once you decide to apply for a CAREER award, there are things you can do to make your proposal more competitive.

Consider a Pilot Study
Conducting a pilot study can help convince reviewers that you are ready to carry out your proposed study and that you have at least a beginning framework for doing so. Pilot tests are important because they allow you to be specific in the proposal and indicate why the idea is a viable investment. If you're not sure how or whether your idea is going to work, then it's likely the review committee won't be sure either. You can apply for smaller grants and gather evidence from those projects to expand your ideas. Many universities have small grants to provide you with resources to run a pilot study that can lead to larger grants. Take advantage of these opportunities.

In addition, you are presenting an idea to reviewers who may have heard of related research (or even your own prior research). To avoid them questioning the novelty of your work, create a clear argument, perhaps illustrated through a visual aid, for how your work builds new knowledge. Build on your prior work to position yourself as an expert in this area and identify the innovative aspects of your proposal in relation to work in your field.

Serve as a Reviewer for NSF
Serving on a panel provides you with a great opportunity and learn about how the review process works, to see what kinds of proposals get funded, and to better understand the meaning and significance of intellectual merit and broader impacts. These are important elements of the proposal that can tip your submission into the funded or not funded category. Seek out opportunities to review for NSF well in advance of submitting your CAREER proposal; this is the best opportunity to learn more about the proposal process. Serving as a reviewer will give you invaluable knowledge about what happens at a review panel which would then allow you to attend to things in your proposal that you may not otherwise have considered. The experience can be a game-changer, as it will help you learn what to do and what not to do. If interested, email your CV/resume to a program director and [volunteer to be a](#) [reviewer](#), letting them know about the work you've done in your area of expertise.

Prepare for the Long Haul
Developing a highly competitive CAREER proposal requires considerable time and a lot of work, so awardees recommend beginning the process early – at least six months to one year prior to the submission deadline. (Adjust this timeline as needed based on your professional and personal commitments, your work style, etc.) Commit to working on your proposal regularly and with enough anticipation to think through the details of the project. Make sure to schedule time in your calendar to work on your proposal as if you were teaching a class. With a due date in July, make the CAREER proposal a high priority for your time during the spring semester, if not earlier. The earlier you complete your draft, the more time you have for multiple rounds of feedback and any necessary revisions.

Follow Your Passion and Curiosity
The problem you are researching should be a question that you are really passionate about and that you know well in terms of the literature. It's important to demonstrate both how you are qualified to do the work and how you will grow in specific ways by doing it. It can also be helpful to pick something to study that transcends your field or domain—that can cut across fields. The goal of the CAREER program is to

aide in the professional development of early career scholars, so don't sacrifice your passion; make sure the award aligns with where you want to go.

Use Your Resources

Start with a one-page summary of what you wish to do and articulate potential research questions that you are interested in exploring. Preparing this document will help you to get clear on your ideas as well as help you generate questions. As you work through developing your proposal, you can keep returning to the document to strengthen your ideas.

NSF Program Directors

Engage with NSF. Reach out to a program director in the program you think might be most appropriate for your project and request a meeting to discuss your idea. Share your one-pager with the program director early in the project design/writing process and ask for feedback about how you are structuring your proposal. NSF is interested in cultivating the next generation of scholars. A brief conversation early on can impact on the direction of your proposal and help you avoid errors that can delay the development process.

You can email to set up a phone meeting with a program director. In addition, program directors often attend research conferences and make themselves available to meet with prospective awardees. Sign up for a slot to meet with them in person. If you live close to NSF in Alexandria, VA, or are visiting the area, you could set up a meeting at the office.

Critical Friends

As your idea begins to form in your mind, start talking to others (colleagues, mentors, peers, friends) about what makes your project idea novel, transformative, groundbreaking, etc. The more you talk about it, the more your idea will start to take shape, and you will get feedback about what makes it exciting and compelling to others. You can start by sharing your one-pager, then enlist a few people to read your proposal drafts as you write and listen to their feedback about how they are understanding your argument. If possible, try to find some readers who understand enough about the work you are proposing that they can give detailed feedback about theory, methods, and outcomes. It's important to have readers who are in the same field of study as you as well as different fields of study to offer feedback on the clarity of your proposal and insight into its unique contributions. Feedback will also help you think about the overall scope of the work you are proposing. The review panel will be comprised of experts in fields related to the proposal, but not necessarily experts in the specific area addressed, so it's important to know how to write for your audience. No matter how exciting this work will be to you, your proposal needs to spark this excitement in reviewers. They will need to have a clear understanding of what it is that you will be doing, how you will be doing it, and why it is important. They will also need to believe that what you are proposing can be accomplished within the timeframe of the award.

Many busy scholars, particularly senior scholars, do not have time to read your full proposal. However, there are people who may be willing to offer feedback, for example, during lunch or a coffee break at a conference. It's helpful and wise to identify what about their work resonates with you or has caused you to seek them out. There can be value in brief conversations about your ideas; they can challenge you to think more deeply or reveal something you may not have considered. They may suggest a paper or a body of work that you should read or an alternative approach based on their own experience.

In addition to getting feedback from colleagues, it can be helpful to engage practitioner partners, including district leaders, in conceptualizing the project and the plan for carrying out the work. They can give you a sense of what feels useful and doable from their perspective. This can result in greater buy-in so that if your CAREER grant is awarded, partners are better prepared to provide support and communicate the importance of the project to other stakeholders. Similarly, build in time to discuss your ideas with members of your proposed advisory board; their insight can be invaluable for constructing a proposal that clearly conveys your ideas to reviewers and integrates research and educational goals.

Other Resources
Before you begin writing your proposal, read the complete solicitations for the [CAREER program](#) and the funding project to which you are applying (several times) and all related documentation from NSF on the CAREER program and proposal development (e.g., [Proposal & Award Policies & Procedures Guide (PAPPG)](#)). It is essential to understand the purpose of the award and what the requirements are. Attend the NSF CAREER program webinar, as well as any CAREER workshops at your institution and any other proposal development support they offer. Search the NSF website for projects funded through the CAREER program that have a similar focus as yours and read the abstracts. You may try to set up conversations with the PIs of those projects.

If you can, get a model CAREER proposal to learn from. New proposers should reach out to people who have received CAREER awards and ask whether they would be willing to share their successful proposals or different proposal components (narrative, budget, data management plan, etc.). Many CAREER awardees have found that most people want to help others succeed, so reaching out to the community matters.

Other helpful resources include: Ping Li and Karen Marrongelle's book *[Having Success with NSF: A Practical Guide](#)* and articles such as "[Posing Fundable Questions in Mathematics and Science Education](#)" by Karen King, Robert Ochsendorf, Gregg Solomon, and Finbarr Sloane.

Developing Your Proposal
Having a clearly developed objective for the project is crucial. If you can articulate that goal and connect it to all aspects of the proposal, including the rationale for the project, the education plan, and the research plan, it can help reviewers see that you are focused and prepared to manage the project. Like any NSF proposal, the conceptual framing of the problem, your approach to investigating or addressing the problem, the questions, the methods, and the products all need to be tied together in a tight argument and all the pieces must fit together.

Situate your study within the context of a timely and important societal problem that researchers outside your field could easily understand. In addition to this, the CAREER program is designed to fund the development of the PI. So, a successful proposal needs to describe how the project will support your development across five years. Create an argument for your project and how the project will support you to develop a program of research that contributes to particular communities and areas of knowledge. Develop a clear vision of your work, think about the long term and short-term objectives, be specific in describing and justifying your work, and, most of all, give yourself sufficient time for writing a compelling story about the work you are proposing.

Since the CAREER program seeks to support early career faculty, both research and education aspects of the proposal are essential. Plan your contributions as both a researcher and an educator. Make an innovative education plan a prominent feature of your proposal. Integrate your education plan into your research plan, and base your education plan on prior research (i.e., present a literature review on which your education plan is based).

Begin with your overall project goals (both research and educational). Then construct a workplan and budget to match the research and educational goals of the project. Think through all the details of your action plan. Pay close attention to the scope of your project; it should allow for work that is ambitious and innovative but also feasible. Be sure that you have the support you need to conduct the work (e.g., graduate and undergraduate student support, postdocs, course reductions, evaluator salary). Work on your budget at the same time you are thinking about the proposed activities to get a sense of what's realistic. Be clear about your methods and analysis so that you can show you have thought through each element of your project. Also, be clear on how the project builds on prior work and would provide compelling and useful insight. Start planning early and expect to need to reconceptualize parts of the project and the scope along the way.

There is a balance between exhibiting expertise in your area of study and being able to articulate how you can extend this work over a five-year project. Both articulating how your proposed program of work is new, but also grounding your work in prior productivity, are key elements of the proposal. It is also important to convince the review panel that you can carry out the work you propose in the five-year timeframe. A clear plan, and details about each phase of your work, are essential. Additionally, since some of the work you will be doing is new and you may not yet have sufficient expertise, having relevant expertise on your advisory board is essential. Be strategic with the selection of your advisory board, and make sure they have varying expertise. Assemble an advisory board to support you in making the many decisions that will need to be made throughout the life of the award. Know how each member's expertise will be utilized in the project and at what point(s), and budget accordingly for in-person meetings and phone or virtual consultations.

Be Persistent
Your proposal may not be successful on the first or even second attempt; however, you have three opportunities to apply. Don't get discouraged if you don't get an award the first time (most CAREER awardees don't)! Developing a good proposal takes a lot of time, and it is important to understand that 'failure' is an inevitable part of the path to success. Don't give up easily. You usually will get incredibly helpful feedback from the review panel; this feedback should drive your next attempt. Consider the feedback carefully and then try again. You can't receive a CAREER award if you don't try!

Managing a CAREER Project

CAREER projects are not like other NSF projects with co-PIs; you are it! This opportunity exists to help advance your career, but it may come with its own challenges, especially if this is your first grant. It requires you to hire and train people simultaneously while managing the project, both of which require a lot of your time in addition to management and mentorship skills. There is a lot of planning and implementation involved, which requires meetings and then punctual follow-up on all the different parts and with people to be sure they are working synchronously towards the desired end result. This places a lot of responsibility on you as the PI to be sure everything happens in a timely fashion. See this as an opportunity to learn about all of the areas involved in managing a project, such as establishing a

positive relationship with your research participants, mentoring graduate students, managing the budget, etc.

Have Project Management Systems in Place

Know going in that managing the project will be a big part of your work. It's never too early to start thinking about the logistics of partnerships, recruiting support staff, and ordering necessary equipment. Spend time at the start of the project developing systems that will help you stay organized and that utilize the resources and infrastructure at your institution. Set clear, manageable timelines and regularly check in at each stage to be sure the project is progressing on schedule. Keep spreadsheets, to-do lists, technical references, and instructions for best practices for handling data and other logistics handy and up to date. Know that you are the 'hub' in terms of communication for the project. Develop a work plan for how specific members of your team can/will be utilized and work together toward the overall goals for the project. Develop and put into place consistent routines and structure for items like meetings and reporting/dissemination mechanisms such as the development of presentations and papers.

During the first year, spend time developing systems for data management. Develop a routine for transferring, saving and storing data files whenever data is collected, and be consistent with this routine. For example, build log sheets in Google Docs to help you and your team keep track of your data. Every classroom observation and interview should be logged in by the appropriate team member. Develop a file naming conventions list so that data gets catalogued in a systematic and strategic way. You will likely thank yourself later for doing this!

Keep clear documentation of all the small and large changes you make along the way in your thinking and implementation of your studies. This will help you later when you go back to your data and try to remember what happened.

Assemble a Strong Team

Build a responsible, capable, committed, and empowered research team to help implement the project. It is helpful to assemble a team with various areas of expertise and to assign tasks based on students' strengths. It can take time to learn to be a mentor and manager of graduate and/or undergraduate research assistants. Planning upfront how to manage human resources is a good use of your time and energy. Develop an 'onboarding' process for research assistants to quickly familiarize them with the goals of their position (e.g., expectations, procedures, logistics of accessing shared information and spaces). Consider delegating some of the project management responsibilities, not just research-related tasks, particularly if you have a postdoc on your team. Ongoing communications through regular team meetings and individual progress reports are key.

Within these routines and structures should be a respect for team members' input and expertise, such that people feel supported to share ideas, learn from each other, and create innovative products. Mentor your students and learn with them about educational research. You are responsible for creating a supportive community, and you can lead with your example.

Foster Relationships with Partners and Participants

Be communicative with partners that are involved with your project (e.g., keeping in close contact with collaborating teachers, offering updates, and refining expectations and plans responsively in light of emergent needs and events). Make sure that you are cultivating relationships with your participants in

such a way that they feel connected to the project. This can help minimize attrition. Your study is not going to have great results if you lose your participants partway through the project.

Manage Your Own Productivity
Balancing project work with your other responsibilities as junior faculty is a challenge. Consider scheduling time to sit down every week and go through a specific set of administrative questions in order to track your progress, keep on top of administrative concerns, and plan your schedule for the following week. If you are still figuring out how to budget your time and navigate academia (and this can take a long time!), be systematic and intentional about how you're spending your time. Improving your productivity and focus is critical. One helpful resource is the book *The 5AM Club: Own Your Morning. Elevate Your Life* by Robin Sharma. This book, as well as others like it, will help you to think about how you spend your time and how to productively work on the things that really matter to your success in your career, like your research.

A challenging aspect of a CAREER award is that, with such a long span of time of five years for the grant, there will likely be numerous rounds of data collection. It can sometimes be challenging to find time to analyze all the data while already having to think ahead to collecting the next round of data. This can be a struggle, but building in enough course releases and research assistants can help.

Don't forget about disseminating your research. Make time to write on a regular basis. With a DRK-12 CAREER award, in particular, it is easy to find that you are spending most of your time out in schools or developing your product. NSF is interested in the product itself, but the dissemination of research that provides evidence of its effectiveness is equally important. PIs tend to be ambitious in planning dissemination activities; make sure you prioritize so that those activities can be done with quality.

Consult with Your Mentors
When navigating the post-award logistics, it can be beneficial to reach out to colleagues and support staff to help answer questions and manage the logistics of the award. After receiving the grant, consider setting up meetings with early and mid-career researchers at your institution and ask them questions about, for example, what programs and organizational systems they used, which administrative tasks they did themselves and which others did, and what they have figured out that they wished they knew earlier. These conversations can inform your own management plan. Ask advice from colleagues about their best practices for data management and storage. For some issues, you may need to bring in new experts beyond your immediate team. Your collaborators and colleagues want to see you succeed. It's important to tap their expertise when needed.

Take advantage of your mentors on your advisory board as well. Conversations with advisors can be tremendously helpful, especially when you encounter a difficult problem. Because advisors tend to be quite busy, spend time planning how to use their time and expertise strategically before you reach out to them, whether during in-person advisory board meetings or one-on-one or small group consultations. Spend significant time planning for your meetings so that you do not waste anyone's time. The rewards of this kind of planning and engagement with senior scholars are many.

Be Flexible
After you receive the award, be prepared that things will not go 100 percent as planned. Don't be afraid that your proposed plan may change. For example, you might need more time than initially planned to accomplish some tasks and may need to adjust accordingly. It is important to build in extra time for

unexpected challenges, both in terms of data acquisition (e.g., teacher turnover, travel delays) as well as data preparation and analyses.

Anticipate challenges as best you can and plan for alternative paths ahead of time. It helps if this planning is collaborative, so that you, your team, and your partners are building an image of the work together. Engaging in various planning activities, like creating timelines and holding brainstorming sessions, can help scope out the work, as well as build a collective vision. Having these back-up plans in place will hopefully make it easier for you to pivot relatively quickly when circumstances change. Share the alternative plans with your advisory board to seek their advice. Remember that there are senior colleagues around you who will be able to provide innovative solutions. Communicate with your program director about upcoming changes and potential solutions. They understand that changes to a proposed plan are sometimes needed, and they are there to help. Program directors are an invaluable resource for helping to come up with creative solutions to challenges. In the process, document the challenges and ongoing effort in seeking solutions to share with NSF in your annual report.

Expect challenges, but don't let them overwhelm you; keep the big picture in mind. Even if you are a planner by nature, it's important to learn how to exercise flexibility in working with partners and your project team. Every day presents a new challenge in managing the project: recruitment is slower than planned; assessments take longer than expected; schools have unexpected days off for additional teacher training. Communication with your team will help mitigate some of the problems. It might also be helpful to focus on the factors that are within your control and work with program directors on the factors that aren't. Managing the factors within your control can help decrease stress and free up time and energy to think strategically about how to address the bigger challenges. Perhaps the best advice is to plan, keep the big picture in focus, and be ready to modify your plans as needed.