POLICY STUDIES ASSOCIATES, INC.

EVALUATION OF THE CADRE RESOURCE NETWORK: ANNUAL REPORT 2014–2015

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Evaluation of the CADRE Resource Network: Annual Report 2014-2015

Overview

The Community Advancing Discovery Research in Education (CADRE) is a network for STEM education researchers funded by the National Science Foundation's (NSF) Discovery Research K-12 program (DR K-12). CADRE connects DR K-12 researchers and developers who are endeavoring to improve education in science, technology, engineering, and mathematics. CADRE helps DR K-12 grantees to share their methods, findings, and products inside the research and development community and with the broader public, including educators.

CADRE has engaged Policy Studies Associates (PSA) to conduct an evaluation intended to inform CADRE implementation and to document CADRE outcomes. The evaluation team provides CADRE with ongoing feedback in the form of timely discussions and memos, as well as annual reports. This is the first annual report of the current CADRE grant, reporting on activities from September 2014 through August 2015.

This report presents findings of CADRE activities in the past year with a special focus on the CADRE Fellows program. The report organization begins with a discussion of the Fellows program, including a program overview, perceptions of Fellows on program strand, communication opportunities, informal mentoring, outcomes, and considerations for improvement. It then turns to brief summaries of other CADRE activities, such as other support for early career researchers and developers and a project video showcase.

Methods

The evaluation methods included data collection in the form of participant surveys, activity observations, reviews of CADRE documents and communication, and ongoing conversations with CADRE leadership. The four participant surveys administered during the evaluation window can be found as appendices to this report.

For the Fellows program, we administered three online surveys to the ten participating Fellows, one after each of three program "strands." Each of these three surveys included scaled and open-ended items, several of which were replicated across the three surveys to allow for comparisons of strands. Each of the three Fellows program surveys had a 100% response rate. The evaluation team conducted in-person observations of the Fellows program two-day kick-off event (November 2014) and two-day culminating event at NSF (May 2015). During these in-person data collection efforts, the team conducted focus group and informal interviews with participating fellows and CADRE staff. The team also observed each Fellows program virtual meeting and webinar.

For a webinar on the CAREER grant program (February 2015), the evaluation team administered an online survey to 66 registrants within a week of the event. Invitations were sent to all registrants for whom CADRE provided PSA with emails, and two follow-up reminders were sent to non-responders. The survey received a 55% response rate, with 36 respondents.

The evaluation team drew primarily on analysis of survey responses and observational data to provide formative evaluation memos and discussions to CADRE leadership. In order to provide useful and timely information to CADRE, the evaluation team administered and reported on each of the 4 surveys—3 Fellows surveys and 1 CAREER webinar survey—within several weeks of program events and strands. Findings were delivered as brief informal documents and through conversations, with a focus on CADRE leadership priorities, actionable findings, and recommendations/considerations for short- and long-term improvement. For the 4 surveys administered, the team also delivered and discussed raw frequency reports that included graphic data displays.

CADRE Fellows Program

Overview of the CADRE Fellows Program

The CADRE Fellows program is a competitive fellowship intended to build the capacities and opportunities of early career researchers and developers affiliated with DR K-12 projects. The program, begun in 2009, employs a cohort model to help fellows learn about DR K-12 work beyond their own projects, network with early career and veteran members of the DR K-12 community, engage in capacity building activities, and gain insights into the NSF and how to embark on a successful career in STEM education R&D. Fellows program activities include in-person and virtual meetings, independent and collaborative assignments, panels of veteran researchers and developers, mentoring opportunities, communication with NSF program officers, and when possible, attendance at the DR K-12 PI Meeting.

This report addresses the activities associated with the 2014-2015 Fellows program cohort. Program candidates submitted applications in September 2014 for a competitive review, which resulted in the acceptance of 10 Fellows into the cohort in October 2014. The Fellows program included the following key activities, all of which were attended by evaluation staff:

- Introductory webinar and two-day in-person kick-off meeting (October – November 2014)
- Career Pathways Strand: Academic career pathway webinar (December 2014) and Non-profit career pathway webinar (January 2015)
- Writing for Publication Strand: Writing for publication webinar (February 2015) and a collaborative assignment on publishing that included a presentation to the group (March 2015)
- Writing a Successful NSF Proposal Strand: Writing proposals webinar (April 2015) and an in-person mock proposal review at the NSF, along with meetings with DR K-12 program officers (May 2015)
- Opportunities for informal mentoring (February – May 2015)

Fellow Characteristics and Purposes

The 2014-2015 Fellows cohort included a variety of early career researchers and developers from the DR K-12 community. Of the 10 Fellows:

- 8 were housed at universities and 2 were at a non-profit
- 6 were doctoral students, 2 were postdoctoral researchers, and 2 were employed in non-academic professional positions
- 6 are focused on math education and 4 on science education
- 7 were female and 3 were male

In the first of three Fellows surveys, administered February 2015 at the culmination of the first strand, we asked Fellows to indicate their primary purposes for joining the Fellows program from a list of 10 options. The 9 respondents to this item tended to choose multiple purposes. Most often they joined to:

- Gain exposure to the NSF community and funding contexts (100%)
- Gain knowledge and skills (100%)
- Network with early career peers (89%)
- Gain exposure to different research perspectives and topics in the broader field of STEM education (89%)

Below, in the section titled outcomes, we discuss the extent to which Fellows reported that the program helped them to carry out these purposes.

Participation levels in program activities were high. All 10 Fellows participated in a key activity in each of strands, as well as for both in-person meetings. Each formal activity (i.e., webinar, meeting, presentation, assignment) had participation of at least 80% of Fellows, and most had 100% participation.

Fellow Perceptions of Program Activities

The Fellows program delivered three strands of activities, each focused on a different professional domain—Career Pathways, Writing for Publication, and Writing Successful NSF Proposals. After each strand, we surveyed Fellows using scaled and open-ended items to elicit their perceptions of the strand's quality and usefulness.

Looking across the three surveys, there is evidence that Fellows thought each strand addressed a needed topic and provided useful information. For each strand, at least 90% of respondents agreed or strongly agreed that the strand activities "addressed a need I have" and "provided information I will likely use in the future." Yet there is room for improvement, as a smaller percentage of Fellows had their needs completely met: on each strand's survey, 20% or fewer respondents strongly agreed that the strand activities "served my purposes on this topic completely."

Overall satisfaction levels were similarly high across the three strands. When asked to report their level of satisfaction for each strand, between 40-60% reported that they were "very satisfied." The Writing Successful NSF Proposals strand received the highest ratings with 60% of Fellows "very satisfied" and 40% "satisfied."

Exhibit 1 presents Fellow perception about the strength of each of the three program strands. The exhibit provides the percent of Fellows who selected "strongly agree" for each of 7 indicators of strength. The exhibit allows the reader to look at the strengths of each strand and to compare strengths across strands.

Exhibit 1
Fellow perceptions on the strength of program strand activities

	Percent of Fellows that "strongly agree" regarding:		
	Strand 1: Careers	Strand 2: Publications	Strand 3: Proposals
Addressed a need I have	40%	50%	60%
Was appropriate in level-of-detail and duration	50	30	40
Was high-quality in content	60	30	60
Provided information that was new to me	50	20	40
Provided information I will likely use in the future	60	40	70
Will likely help me do something different in my professional practice	20	10	50
Served my purposes on this topic completely	20	10	20
Mean percent of "strongly agree"	*43*	*27*	*49*

Source: This item appeared in three Fellows surveys, one after each project strand. The exhibit presents the percent of Fellows who responded at the top category of a four-point scale ranging from "strongly disagree" to "strongly agree." Ten Fellows responded to each of the three surveys.
Exhibit reads: Forty percent of Fellows reported that they "strongly agree" that the Career Pathways Strand activities "addressed a need I have."

Strand 1 – Career Pathways Strand

Overall, Fellows were satisfied with the Career Pathways Strand activities. Nine respondents were either "very satisfied" (50%) or "satisfied" (40%) with the strand as a whole. A survey item asked Fellows to indicate their agreement with statements about the strengths of strand activities. The majority of respondents either "agreed" (A) or "strongly agreed" (SA) on each of the 7 indicators. Two statements received stronger agreement than others, with Fellows saying strand activities:

- "Were high-quality in content" (60% SA)
- "Provided information I will likely use in the future" (60% SA)

These responses, along with open-ended responses to a follow-up question, suggest the content of the Career Pathways strand was useful for Fellows. Strand content was primarily embedded within two webinars with panels of veteran DR K-12 grantees, one webinar focused on academic career pathways and one on non-profit career pathways. Some open-ended responses pointed to career pathways content being useful for specific reasons, such as:

> "When caught up in life and work, these personal questions about career trajectory can be overlooked, but the Career Pathways Strand activities offered a reason and an excuse to question reputed others about their choices and to hear experience-based and real advice from them."
>
> "One major strength about this strand for me was the access to information about non-academic careers. I have learned from my mentor many of the things we covered about academic career pathways, but no one ever informed me about my options regarding non-profit careers."
>
> "It allowed us to ask questions about things that are potentially taken for granted by advisors/other colleagues who are mainly focused on the content of research."

Informal discussions with Fellows, as well as open ended survey responses, suggest that multiple Fellows were influenced by Strand 1 content to think differently about the types of organizations that could fall on their career paths. In a scaled survey item administered after Strand 1, 90% of Fellows reported that they are interested in academia as a next career step, though 50% also expressed interest in non-profits organizations. Two open-ended responses indicate the interest in non-profits is a new one since taking part in the strand activities.

Fellow responses suggest that a majority of respondents have insufficient access to other sources of information on career pathways. Six of the 10 respondents had "some but too few other sources of information" on career pathways, and one had "no or nearly no" other sources.

When compared with other sources of information on career pathways, the Fellows program fared well. Nearly half of respondents reported that strand activities were "more useful" than similar information from other sources (44%), and the remaining respondents said it was "about the same" (56%). No respondent said the Fellows strand activities were "less useful" than other sources.

Strand 2 – Writing for Publication Strand

Fellow perceptions of the Writing for Publication Strand were strong, though their ratings were slightly lower in ratings compared the other two strands. Overall, all Fellows said they were either "very satisfied" (40%) or "satisfied" (60%) with this strand. Regarding specific indicators of strand strength addressed, all or nearly all Fellows continued to agree or strongly agree with each statement about the strengths of the strand.

Nevertheless, the ratings on indicators of strength were lower than for the other two strands. For 7 of 7 indicators in the survey item, this strand had fewer responses of "strongly agree" (SA) than did the Writing Successful NSF Proposals Strand, and responses follow a similar pattern when compared with the Career Pathways Strand. The indicators that showed the greatest deficit for this strand are:

- "Will likely help me do something different in my professional practice" – four fewer Fellows reported strongly agree than for the Writing Successful NSF Proposals Strand
- "Quality of content" – three fewer Fellows reported strongly agree than for both of the other strands
- "Provided information that was new to me" – three fewer Fellows reported strongly agree than for the Career Pathways Strand

Fellows provided evidence that Writing for Publication is a topic on which they have needs. "Addressed a need I have" had the most "strongly agree" responses of all the 7 indicators of strength. Yet, this topic is also one for which Fellows have insufficient resources. When asked the extent to which they have access to other sources of information on this topic, only 20% of Fellows reported that they had a "satisfactory amount of other sources of information or learning opportunities."

For future planning, it may be worthwhile for CADRE to pre-emptively gather input from Fellows on their specific needs and capacities related to writing for publication, so that the strand activities and content can be tailored more precisely. If possible, it may be advantageous to differentiate support for Fellows, since they come with a broad range of experience and past success in getting published. For instance, one Fellow responded that she/he needed advice on negotiating authorship and priority authors to cite for a particular issue, while another would welcome mentorship on specific publications, saying:

> "I still believe [the strand] was of good quality and potentially useful to others. I simply was not in the position to take advantage of the different possible activities to the fullest extent. While I have authored a few papers, I still need guidance about how to fit my work with other types of journals and methodologies. In this respect, I believe I need guidance from other experts - more like a mentorship than a peer review."

One activity in this strand—the collaborative writing assignment—was regarded as a meaningful experience and area of strength. When prompted to choose the most useful features of the strand, Fellows most frequently chose "the opportunity to do a meaningful exercise" (90%). Another indication that the writing assignment was meaningful is that 80% of Fellows reported that they would continue to work on assignment content <u>after</u> the end of the strand—60% reported they will continue work independently, and 20% will continue collaborative work with another Fellow. In an open-ended response, one Fellow reported making substantial progress on an existing paper and submitted it for publication at the end of the strand.

Note that 70% of Fellows also found "Information from webinar panelists" useful, and this was the second most often selected useful feature of the strand. Several open-ended responses also spoke highly of the webinar with panelists, suggesting this webinar should continue to be a feature of the strand.

<u>Strand 3 – Writing Successful NSF Proposals Strand</u>

The Writing Successful NSF Proposals Strand received the highest reviews of the three strands, both in scaled item and open-ended responses. While Fellows showed strong agreement with several indicators of strand strength, their responses on two indicators in particular suggest

that strand activities may have a lasting positive effect. Seventy percent of the Fellows strongly agreed that the strand "provided information I will likely use in the future." Additionally, half of the Fellows strong agreed that the strand activities "will likely help me do something different in my professional career."

Strand 3 activities included delivery of proposal-related content through veteran panelists, as well as exercises that had Fellows engage with real proposals, discuss their own proposal ideas, conduct an in-person mock proposal review, and meet with NSF DR K-12 program officers. When asked which of 5 learning opportunities were most useful in this strand, Fellows most often chose:

- "Participating in the mock review" (90%)
- "Reading real proposals" (70%)
- "Talking with NSF program officers" (70%)

One Fellow explained the usefulness of the mock proposal review process, saying:

> "I think that the main strength of the Writing Proposals Strand was the mock proposal panel review, not only because it taught us a lot about the actual NSF review process but also because it gave us the opportunity to read existing proposals and to critically analyze and discuss them with one another. This type of "forced" critical thinking and discussion platform was a valuable and unique experience."

Even though this strand received high marks, several Fellows had ideas of how to make it better, such as by having Fellows review unfunded proposals to see how they compare with better ones and by having Fellows develop proposal outlines that could be discussed with NSF program officers. Two Fellows recommended additional preparation prior to the mock review, saying:

> "The mock review was really valuable. I like how we had to struggle with how to talk about the merits of the proposals. I think a little more scaffolding along that process could have made the experience richer. By "scaffolding", I mean, engaging in some smaller tasks around naming merits/weaknesses before engaging in the review itself."

> "In the future, I feel like it might be helpful if the fellows discuss the broad impacts and intellectual merits before we have to be put on the spot in front of the program officer. I think it would make some of the fellows, like me, a little bit more comfortable with the situation."

Communication, Collaboration, and Networking among Fellows

Responses to one item in the final Fellows survey provides suggestive evidence that the program is establishing a sustainable network of Fellows. When asked whether they anticipate collaborating or communicating with other Fellows after the program ends, 100% of Fellows responded affirmatively. In a follow-up open-ended item, we asked Fellows to describe the purposes for which they expect to collaborate and communicate with other Fellows in the future. Responses pointed to a variety of substantive interactions, such as collaborative development of a publication or proposal, peer review of draft publications, co-presentation at conferences, career advice, and resource sharing. To illustrate, below is a sample of specific purposes Fellows described for future interaction:

"I already set up a time to send my paper to another Fellow for feedback this summer."

"I will likely ask one of the graduate students for some specific advice about a research idea that I have. This student has a stronger background in the area than I do."

"I'm organizing a session for AERA 2016 that [FELLOW NAME] will be a contributor to; it is related to designing for teacher learning in the context of NGSS."

"[FELLOW NAME] and I also intend to be in touch about faculty positions moving forward, as we will both be on the market this coming fall."

Communication among Fellows increased over the course of the Fellowship, both as part of formal Fellow program activities and outside of program activities. The Fellows program included opportunities for formal and informal collaboration, most notably a collaborative assignment on Writing for Publication. These opportunities, in theory, contribute to the development of lasting Fellow relationships and networking. One way these relationships can be measured is by the number of Fellows who communicate with other Fellows outside of program activities (e.g., on their own time and for their own purposes). The increase in communication can be seen in the following:

- No Fellow knew each other prior to the Fellow program.
- After Strand 1, in February 2015, 50% of Fellows had communicated with another Fellow outside of the program.
- After Strand 3, in June 2015, 90% had communicated with another Fellow outside of the program, half with multiple Fellows.

The final survey administered after Strand 3 provides some insight into how Fellows communicate. Email (89%) and in-person meetings such as at conferences (56%) were means of communication used by the most Fellows (9 responded to this item), with telephone, social media, and online shared work space each used by 22% of responding Fellows.

Looking across the three Fellow survey administrations, the purposes for communication among Fellows shifted somewhat. The leading purpose for communication during Strand 2, which included the collaborative assignment, was "for a Fellows program assignment." Whereas during Strand 3, the leading purpose for communication was "to get feedback on my idea or document." During all three strands, two or more Fellows communicated for "social" reasons, providing some evidence that the Fellows program was contributing to deeper cohort relationships that transcend professional concerns.

While communication among Fellows increased and was built into the program structure, observations and open-ended Fellow responses suggest that some Fellows would welcome additional opportunities to communicate during program activities. The evaluation team observed that webinars sometimes lacked robust discussion on the part of Fellows, despite CADRE's provision of opportunities for discussion. It is possible that dialogue is hamstrung by resilient factors (e.g., Fellows are short on time and long on other concerns), but CADRE may want to explore strategies to elicit discussion and community-building during virtual meetings and webinars.

Fellows pointed to the need for more opportunities for communication as early as the first survey following Strand 1. For example, respondents provided open-ended comments such as:

> "I just wish there was some more time to interact with the other fellows."
>
> "I believe I would benefit from more collaboration/feedback from the other Fellows (which is what we will be doing soon with our writing) and from more time in interaction with just the Fellows (so, time processing together outside of the webinars). It doesn't yet feel like a community to me."

After Strand 2 and working on a collaborative assignment, Fellow responses highlighted an appreciation for working with each other. One could interpret the comments as grounds for increasing opportunities for Fellows to communicate or collaborate. Fellows said:

> "It would be great, perhaps impossible, but great if we could spend more time working with other fellows."
>
> "I wish the collaboration with other Fellows would last for a longer amount of time."
>
> "That was fun to see (Fellows) present and get to talk a bit more amongst ourselves."

These sentiments were continued by several Fellows when we asked in the final survey after Strand 3 for recommendations on how to improve the Fellows program. Several responses focused on additional time to meet and additional opportunities to work collaboratively:

> "Since I think relationship building is very important to the success of the group, maybe having more activities where the Fellows are paired up would be beneficial. This is already done with the writing activity, but perhaps it could also be done for the proposal part."
>
> "I might start with some fellow partnership activities (like the writing one) earlier on. This seemed to establish some great rapport within our group, and it made me feel more connected to the program."
>
> "I think more activities where fellows are paired up (or in small teams) to work on projects outside of meeting times/conference calls would be good. Nothing too time-consuming, but something to get us working together."

Looking forward, several Fellows suggested specific ways to support networking, such as: organizing informal "meet-ups" for Fellows and program alumni to connect at major conferences, create a listserve for Fellows and alumni, increasing the opportunities for Fellows to present to the group as in the Critical Friends session, using alumni as Fellow mentors.

Informal Mentoring for Fellows

During the course of the 2014-2015 Fellows cohort, informal mentoring grew as a strategy that CADRE could use to support early career researchers and developers in the DR K-12 program. It continues to be an area in which CADRE is honing an approach and developing resources, including a July 2015 brief on the elements of mentoring. CADRE offered Fellows an opportunity to link with an informal mentor.

Early in the Fellows program, Fellows indicated varying levels of interest in informal mentoring arranged by CADRE, and a subset of Fellows had informal mentoring by the end of the program. In the first Fellows survey in February 2015, 60% reported they were "very

interested" in informal mentoring. No Fellow ruled it out, though 40% said they were "interested, but need to know more". By the final Fellows survey, 50% of Fellows had engaged with an informal mentor or planned to shortly.

When asked in the final survey why they did not engage with an informal mentor, Fellows most often reported that they had a "lack of time" (43%). Open-ended responses in surveys after both Strand 1 and Strand 3 identified this and other challenges to mentoring, such as:

- Competing priorities and demands on time
- Uncertainty of how to proceed
- Fear that the payoff will not justify the time investment
- Satisfaction with current mentoring

Two respondents pointed to the need for clear guidance of the mentoring relationship and processes:

> "I am always interested in learning more and making better connections, but I fear the awkward blind-date-style conversation/email exchange to figure out if anything will come out of the pairing. Maybe a structured way of doing this would alleviate my fear?"

> "While I think it would be fantastic to have a mentor, I am not sure I would know what kinds of questions to ask at this stage or how to make the most use out of a mentor relationship."

CADRE may want to consider how to add structure and guidance to mentees up front to alleviate uncertainty of what the mentorship might look like and how to proceed. CADRE may consider providing Fellows with examples of possible purposes for mentorship, types of relationships and activities, and questions mentees might want to ask mentors. Fellows may also welcome short illustrations of past mentoring relationships that went well or testament quotes from Fellows who had an informal mentor.

Outcomes and Comparisons with Other Sources

In the final Fellows survey, administered after the third program strand, the evaluation team asked Fellows to report the extent to which the Fellows program was beneficial to their growth as an early career researcher and developer. On a four-point scale, all 10 Fellows reported benefits in the top two response categories, with 70% finding the program "very beneficial" to their growth and 30% "moderately beneficial".

In the June 2015 final Fellows survey, we followed up on a Strand 1 survey item that asked Fellows to identify their purposes for joining the Fellows program. The June 2015 survey asked the extent to which the program helped with the same 10 purposes. Exhibit 2 presents the percent of Fellows who responded that the Fellows program helped them to a "great extent" on each of the 10 purposes. The top three areas in which the program helped are:

- "Network with early career peers" (100% to a great extent)
- "Prepare to propose for future funding" (90%)

- "Gain exposure to the NSF community and funding contexts" (80%)

Note that two of the top purposes for joining the Fellows program were also purposes on which the program helped most. "Gain exposure to the NSF community and funding contexts" and "Network with early career peers" were tied for the first and second most frequently selected purposes for joining the program.

Exhibit 2
Fellow perceptions on the extent to which the Fellows program helped them

	Percent of Fellows reporting the program helped to a "great extent":
Network with early career peers	100%
Prepare to propose for funding	90
Gain exposure to the NSF community and funding contexts	80
Learn about different work contexts and career tracks	70
Bolster my credentials or career prospects	70
Gain knowledge and skills	60
Practice professional tasks in supportive environment	60
Gain feedback on my current work	40
Gain exposure to different research perspectives and topics in the broader filed of STEM education	40
Network with veteran researchers and developers	30

Source: This item appeared in the Fellows survey administered after Strand 3 – Writing Successful NSF Proposals.
Exhibit reads: One hundred percent of Fellows reported that the Fellows program helped them "network with early career peers" to a "great extent."

The final Fellows survey collected evidence that Fellows believed the program would have a positive effect on their current or future career prospects. All 10 respondents said that the program "will make me more attractive or recognizable within the NSF community," and none said that the program will have no noticeable effect. Furthermore, Fellows reported that they had

already experienced positive effects: 60% said the program "has given me additional visibility or recognition within my institution," and 30% said it "has already contributed to additional professional opportunities."

Responses across the three Fellow surveys suggest that the Fellows program is filling a gap in resources that Fellows' need and that its activities compare favorably with other sources of information. For each of the three strand topics, at least 70% of Fellows reported that they have either "no other sources" or "some but too few other sources" of information and learning opportunities on the topic. When prompted to compare the Fellows program with other sources of information on the each of the three strand topics, at least 40% of Fellows said the Fellows program was "more useful than other sources" and no Fellow said it was "less useful."

Overarching Considerations for Fellows Program Improvement

Above under the discussion of Fellows program strands, this report provides strand-specific considerations for building upon the existing strengths of the Fellows program. Here, we provide several crosscutting considerations that have broader implications for Fellows program approach and strategies. These recommended considerations overlap some and would likely be intertwined when operationalized.

Ascertain Fellow capacities and needs for each strand topic

The 2014-2015 Fellows cohort came with a wide variety of experiences, expertise, and needs related to the Fellows strand topics. In some cases, Fellows had prior experience or success on a topic (e.g., publishing, a discipline-specific issue, work in a non-profit organization) and could be drawn on as a resource for other Fellows. Some Fellows also pointed to specific needs they had hoped to have addressed in the strand, such as how to negotiate authorship for a collaborative paper, the preparation of a CV, and how to align their work with leading journals. Understanding Fellow capacities and needs might help CADRE design opportunities for targeted assistance and maximize the human resources within the cohort. One respondent had an idea of how to improve this understanding, saying:

> "In this case, I have ideas about the process that I would love to share with other fellows. For future, it might be nice to take stock, perhaps, of folks who have particular expertise/experience with some of the career topics we cover and utilize those folks in some small-group workshopping, or something to this effect. Sharing what I know and brainstorming writing processes with others would have been really beneficial for me."

Learning about Fellow capacities and needs may not require a substantial effort or program change. For instance, in an open-ended discussion at the outset of each strand, program leaders could have each Fellow describe their 1) past experience on the topic, 2) related questions and challenges, and 3) what they hope to get out of the strand. Fellows might also describe what they may be able to offer to other Fellows on the topic. During the course of a strand, an opportunity may arise to ask Fellows if they have any unique needs on the topic. And at the strand culmination, Fellows might reflect with the group on what they learned and may do differently in their practice.

Increase opportunities for Fellow collaboration

As described in the above section on Fellow communication and collaboration, Fellows deeply valued their collaborative work and several wanted additional opportunities to work together. Collaborative activities have several possible benefits for Fellows: increased relationship building, increased Fellow-to-Fellow learning, and deeper engagement with program-related content. Currently the Fellows program has one formal collaborative activity, the Writing for Publication assignment. CADRE may want to explore adding another collaborative exercise to the program regimen, even if it is modest in scope and burden. For example, Fellows could form teams to review and discuss a couple DR K-12 proposals earlier in the program window.

> "Since I think relationship building is very important to the success of the group, maybe having more activities where the Fellows are paired up would be beneficial. This is already done with the writing activity, but perhaps it could also be done for the proposal part. The Fellows could work together to discuss their thoughts on the proposal before the NSF meeting or perhaps the evening before the mock review."

There may be reason to include collaborative exercises early in the program. First, establishing relationships early on gives them time to flourish during the program period. Second, collaborative activities early in the program period may build off of rapport in the in-person kick-off meeting. They may also harness the excitement Fellows have when the program is just beginning.

Test strategies to elicit Fellow dialogue

As mentioned in the section on Fellow communication and collaboration, Fellow dialogue during webinars and meetings could be more robust. This was surprising because the in-person kick-off meeting involved a great deal of conversation among Fellows. While subsequent virtual program activities included time for discussion and questioning, program leaders may want to explore strategies that could sustain a cohort culture of dialogue.

> "I'm not sure what I would improve. Perhaps having more dialogue. I know that there is the dialogue/question box [during webinars], but that doesn't feel the same to me as people talking."

One approach would be to establish a norm of having Fellows share what they find interesting or challenging, such as through a reflection at the tail end of a webinar. Another approach might have a rotating cast of Fellows lead discussion or portions of webinars and meetings. During webinars, Fellows might read pre-selected questions for panelists.

> "I like the idea of the fellows having some time to reflect on what speakers had to say during a webinar at the end. Perhaps a prompting question or two would help get the ball rolling."

The program could include relatively unstructured calls, as opposed to formal webinars, in which Fellows can direct some of the agenda or raise issues large or small. The purpose of these calls would be to promote community building and to crowdsource targeted guidance on Fellow needs, as opposed to a purpose of delivering pre-determined content.

> "I believe I would benefit from more collaboration/feedback from the other Fellows (which is what we will be doing soon with our writing) and from more time in interaction with just the Fellows (so, time processing together outside of the webinars). It doesn't yet feel like a community to me."

Support to Early Career Researchers and Developers

CADRE has supported early career researchers primarily through two activities: 1) the CAREER grant program webinar and 2) development of resources to support mentoring.

CAREER Grant Program Webinar

In February 2015, CADRE hosted a webinar to inform early career researcher and developers about the NSF's CAREER grant program. The webinar was moderated by a DR K-12 program officer who was previously a CAREER grantee herself, and it included three panelists who were current or past CAREER grantees. CADRE and the presenters provided guidance on applying for the grant and developing a proposal for interesting work. They discussed their own experiences and benefits related to the grant, and they spent a third of the webinar answering participant questions.

The evaluation team administered an online survey to all 66 webinar registrants within a couple weeks of the webinar. Using email addresses provided by CADRE, the team sent email invitations with unique survey links, as well as two follow-up reminders for non-responders. The survey received a 55% response rate with 36 respondents. Webinar participants included individuals from within an outside of the DR K-12 community, based on a review of participant organizational titles and respondents' open-ended responses.

In short, survey results suggest that the CAREER webinar was well-designed and well-delivered, and that it met the needs of participants. Also, the webinar appeared to meet a need that is not fully served by other existing sources of information. The presentations by the CAREER grantees were a reported strength of the webinar. Below we present selected findings from the survey.

Overall satisfaction and engagement provide evidence of webinar strengths. Asked about their level of engagement during the webinar, a large majority of respondents reported being engaged for most or all of the webinar (83%). All but one of 36 respondents reported being either "satisfied" (50%) or "very satisfied" (47%).

When asked to indicate agreement with each of 7 indicators of webinar strength, respondents provided positive reviews of the webinar. At least 76% of respondents agreed or strongly agreed the webinar helped on each of the 7 indicators. For example, 100% of respondents either agreed (62%) or strongly agreed (38%) that the webinar provided information they "will likely use in the future." Nearly half (47%) strongly agreed that the webinar "was appropriate in level-of-detail and duration," which received the largest proportion of "strongly agree" responses. Respondents were least likely to "strongly agree" that the webinar "served my purposes on this topic completely" (24%) or "will likely help me do something different in my professional practice" (24%), though these indicators set a high bar for strength given that this was a one-time virtual event lasting approximately one hour.

Open-ended responses were nearly exclusively positive, with the words "useful" and "informative" appearing in many of the responses. Open-ended responses also suggest that a

strength of the webinar was found in the personal "insights" and "examples" shared by panelists who were CAREER grantees. For example,

> "It was extremely informative and provided real examples of primary investigators writing CAREER Grants."
>
> "The presentations and Q&A with CAREER grantees (i.e. early-career faculty) were especially valuable--providing me with insight about things that new faculty who are applying for CAREER grants may need help with in our own institution."

When asked to identify the most useful component of the webinar, 50% of respondents chose "presentations by CAREER grantee." Fewer respondents reported the most useful components to be "presentation by an NSF program officer" (29%) and "question and answer session with NSF and CAREER grantees" (18%). All videos were archived and are viewable on the Video Showcase website.

The CAREER grants webinar appears to fill a need among early career researchers and developers in the STEM education community. Most respondents (65%) reported that they had either "no" or "some but too few" other sources of information on the CAREER grant program, suggesting that this topic is indeed an area of need for the target audience. About half of respondents said that the CAREER webinar was "more useful than other sources" of information (52%), and only 2 respondents said it was "less useful than other sources" (7%).

Survey respondents did not offer much that could inform recommendations, though there were a couple small issues to consider for future CAREER webinars. Several responses suggest that CADRE:

- Ensure that webinar invitations and promotional information make clear the target audience, anticipated content and purposes, and the K-12 education focus
- Continue to have presenters include examples of their own experiences in proposing for and carrying out CAREER grants
- Provide examples of successful CAREER grant proposals
- Extend the time allowed for questions and answers

<u>Resources to Support Mentoring</u>

In addition to facilitating informal mentoring within the Fellows program, CADRE has developed resources to support the mentoring of early career researchers and developers throughout the DR K-12 program. These resources are available on the CADRE website.

Most recently, CADRE has published a July 2015 brief entitled "Mentoring for the Postdoctoral/Early Career Researcher: Key Elements and Broader Impacts." This document, which draws on literature to describe problems and potential solutions in mentoring, provides guidance that can be used by resource networks and project leaders to improve mentoring efforts. The evaluation team will be interested in evidence of its use and influence.

CADRE's early career webpage also provides other resources. It has developed a podcast and video series of a DR K-12 mentor and former mentee (both of whom are successful grant recipients), who discuss mentorship strategies and outcomes through a lens of their own

interaction. Other resources include a sample postdoctoral mentoring plan relevant for DR K-12 proposals, links to active CAREER grant projects, and archives of CAREER grant program webinars. The webpage also includes a brief that explores early career R&D issues by drawing on surveys of early career and veteran researchers. It is titled "Brief on Early Career Researchers and Developers in the DR K-12 Program: Needs, Supports, and Recommendations."

2015 NSF Teaching and Learning Video Showcase

In May 2015, CADRE and six other NSF resource centers collaborated to host the 2015 NSF Teaching and Learning Video Showcase. The Video Showcase was an interactive online week-long event intended to showcase NSF EHR-funded work and recognize promising projects. Over 100 projects contributed a brief video (<3 minutes) to share their work. Forty of the participating projects were funded by the DR K-12 program. Event participants and visitors were asked to view, discuss, and vote on project videos. The event also involved designated facilitators to promote online dialogue and vote on their favorite videos. Recognition awards were given for three categories: Presenters' Choice, Facilitators' Choice, and Public Choice.

Participation in this inaugural event was substantial. CADRE, along with the other resource centers, advertised the event through newsletters, websites, and word-of-mouth within their EHR networks. This contributed to over 20,000 unique visitors from 137 countries participating. Over 15,000 visitors submitted votes on the videos for Public Choice recognition awards. Online dialogue was also noteworthy, with nearly 2,000 comments posted. An informal review of comments shows that presenters, facilitators, and public commenters interacted through back-and-forth posting. In addition to comments of thanks and compliment, many comments raised substantive issues or extended video content.

CADRE promotion of the Video Showcase within the DR K-12 network appears to have paid dividends. About 37% of the submitted videos were for DR K-12 projects, with the other videos coming from projects spread among the grant programs supported by the 6 other resource networks. A substantial number of recognition awards also went to DR K-12 projects. Of the 21 that received "recognition" awards, 9 were DR K-12 projects (43%).

Looking Forward

In the upcoming year of September 2015 through August 2016, the evaluation will be tailored to address CADRE priorities and work plans, though we expect to evaluate several key service components. The evaluation team will evaluate the Fellows program implementation with the 2015-2016 cohort, most likely involving similar surveys as used with the 2014-2015 cohort. The evaluation plans to observe and administer a participant survey for the summer 2016 PI Meeting. As CADRE continues a focus on the support and mentoring of early career researchers in developers across the DR K-12 program, the evaluation team will look for ways to collect evidence on this priority. CADRE and the evaluation team will engage in evaluation planning discussions prior to the beginning of the grant year 2015-2016, revising or validating the plans expressed in this contract's scope of work.