Board 194: A Community-Driven Process for Developing NSF Review Panelists

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A Community-Driven Process for Developing NSF Review Panelists

Abstract

Peer review of grant proposals is critical to the National Science Foundation (NSF) funding process for STEM disciplinary and education research. Despite this, scholars receive little training in effective and constructive review of proposals beyond definitions of review criteria and an overview of strategies to avoid bias and communicate clearly. Senior researchers often find that their reviewing skills improve and develop over time, but variations in reviewer starting points can have a negative impact on the value of reviews for their intended audiences of program officers, who make funding recommendations, and principal investigators, who drive the research or want to improve their proposals. Building on the journal review component of the Engineering Education Research Peer Review Training (EER PERT) project, which is designed to develop EER scholars' peer review skills through mentored reviewing experiences, this paper describes a program designed to provide professional development for proposal reviewing and provides initial evaluation results.

Key words: Peer review, professional development, grant proposal review

Introduction

It can be both thrilling and scary to receive an invitation to review on a National Science Foundation (NSF) panel. Conventional wisdom is that it is good for us; we know we will learn about the differences between good and bad proposals, and developing a relationship with a program officer or two can't be a bad thing. And then what? Logging into Fastlane and figuring out the process for submitting a proposal review is one part, and tutorials can help with that. Constructing a review that shows our understanding of the field, reflects an understanding of the proposed work, and provides useful feedback to both the principal investigator (PI) and the program officer is another part. If this were a journal article or conference paper review, these steps would complete the task. For an NSF panel, participating in the panel discussion, presenting and defending a review, and crafting panel summaries require additional skills. Participation in an NSF panel has benefits both in learning about the current state-of-the-art and in the opportunities to grow professional networks and build a stronger community of engineering education researchers and practitioners.

The professional development process described in this paper was implemented over the course of four months in 2022 and brought together former program officers and mentees from a variety of institutional and professional contexts to construct a set of proposal reviews and participate in panels discussing proposals. While this development extends to any NSF disciplinary research area, the focus was on engineering education research, specifically funding calls relevant to the field and likely to be of benefit to junior researchers in the field.

This paper describes some context for the creation of this professional development activity, the process for recruiting and selecting participants, key training points, the structure of the training groups, and general evaluation results.

Background & Purpose

The engineering education research (EER) Peer Reviewer Training (PERT) program has trained multiple cohorts to provide high quality reviews of articles submitted to the *Journal of Engineering Education*. The approach brings together triads, groups of a mentor and two mentees, to collaboratively construct a review. Triads review three manuscripts, with the mentor taking the lead on the first manuscript and each mentee taking the lead on another. Triads are formed based on similar methodological expertise (e.g., quantitative vs. qualitative) and time zones (to increase the chances of finding potential meeting times). Cohorts of five to eight triads begin at the same time with an orientation and discussion about approaches, but may finish at very different times depending on scheduling and availability of submitted articles that match the expertise of the triads. Most triads finish within six months. All of these experiences reinforce individual ties to a broader community of researchers, who contribute to the community through multiple forms of peer review as well as their individual scholarship. More detailed description of the processes as well as related research questions and synthesis can be found in [1] - [6].

The proposal reviewing process incorporates the practice of forming small groups, collaborative creation of reviews, and joint training. A key difference between the proposal review and manuscript review experiences is the culminating experience of a mock panel review session for proposal reviewing, wherein participants take on typical panel roles of lead discussant, scribe for note taking, and prepared reviewer. To facilitate forming full panels, quads were used rather than triads, consisting of a mentor and three mentees. Quad mentors were all former program officers in engineering education from the NSF Divisions of Undergraduate Education or Engineering Education & Centers. Each quad wrote reviews of three proposals out of the six to be discussed in the mock panel review.

The six proposals used in this training were previously funded and all work funded through the award has been completed. Although some were anonymized, the nature and quality of the work meant it was not difficult to find information about the PIs and outcomes of the work. Reviewing only previously funded proposals made an interesting training challenge of creating a panel experience that attempted to match the true experience of a panel. Since the NSF funding rate is about 17%, these were all proposals that had been highly rated at the time of original review. In part because of this and in part because it is an important part of proposal review, our reviewers were asked to closely read the current program description and calls for proposals and evaluate the proposals with respect to how well they matched the current call. This allowed for a potentially greater range of quality evaluations, with the understanding that there would be a mismatch between the current call and the call the original proposals responded to. The calls used in this training were the Preparing Future Engineers: Research Initiation in Engineering Formation (PRF: RIEF), Scholarships in Science, Technology, Engineering & Math (S-STEM), and the Faculty Early Career Development Program (CAREER) for engineering education research. (Links to the calls are in a later section.)

Each of the mentees was assigned to a separate panel and served as either a lead, scribe or reviewer for each of the three proposals their quad reviewed, and as a panel participant for the three proposals they did not review (but were asked to read). There were six quads in this process, with 18 mentee participants and 6 mentors (plus two available for advising/back up for

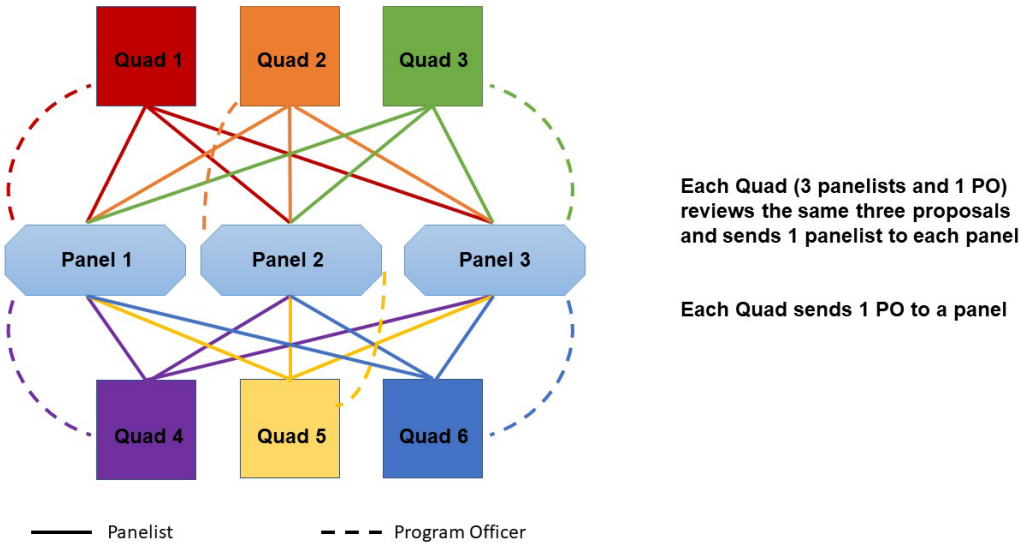

Figure 1: Distribution of quad mentors (program officers) and mentees (panelists) from their training quad to one of three mock review panels.

Table 1: Assignment of quads to roles for each of the proposals reviewed in mock panel discussions. L: lead discussant; S: discussion scribe and panel summary drafter; R: review writer and discussant.

Proposal	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6
1	L		S		R	
2		L		S		R
3	S			R	L	
4		S	R			L
5	R		L			S
6		R		L	S	

quad discussions). Figure 1 shows the distribution of mentees and mentors within the three panels. Table 1 shows the assignments of papers and roles to each of the quads. Note that no quad reviewed the exact same set of three proposals.

Recruitment & Selection

The recruitment process started with inviting former program officers interested in supporting peer reviewer training to participate as mentors since this constrained our capacity. Given the number available to support the training and their available dates, we created a timeline with specific dates for mock panels to be used in recruiting participants since participating in the mock panels was mandatory. Recruitment of participants was done through existing networks, including ASEE and CoNECD distribution lists, prior applicants to the manuscript reviewer training program, and word-of-mouth through program officers, editors, and research advisors. Information was also posted on our project website which housed the program application (https://sites.google.com/view/jee-mentored-reviewers/grant-proposal-mentored-reviewer-

program). Online applications included contact information, basic demographic information, and professional backgrounds, specifically about their Ph.D. concentration and year of degree, current position, relevant EER experience (e.g., publications, presentations, and reviewing history), confidence reviewing EER manuscripts, and the number of EER colleagues with whom they regularly interact.

Because of the time constraints, the selection process started with availability for the selected days of the mock panels. Post-doctoral researchers were prioritized because of the potential impact on their careers and their immediate potential for joining review panels. Early career faculty and researchers and doctoral students within a year of completion were included as well. Participants came from a variety of training backgrounds including social sciences, multiple engineering disciplines, and engineering education. Because our training programs have an underlying goal of building community within engineering education research, special consideration was given to individuals deemed "lone wolves" (as described by Donna Riley and Jennifer Karlin et al., [7]) who are less connected to an EER network and diverse participants who may not have been previously connected to the EER community.

Most applicants who were not selected were invited to apply to the next cohort of the manuscript review training program. A few graduate students applicants early in their programs were not included, however, they have inspired ideas for including proposal review training in a graduate school context. We have done peer-review training workshops for undergraduate and graduate students, with a focus on providing feedback for articles meaningful to the audience (e.g., writing for courses, conferences, or journals).

For the manuscript review training, mentee/mentor groups were formed based on 1) similar methodological perspectives so that in reviewing articles the group can use the same lens for reviewing, and 2) similar time zones so that meeting times are easier to schedule. With multiple international participants and mentors, finding meeting times was a challenge if time zones were not closely aligned. For the NSF proposal review training, participant time zones were all in North America, but the challenge of scheduling meeting times was still difficult enough that the primary driver for quad formation was to find groups of three participants who could meet during a mentor's available time. Taking into consideration multiple perspectives and viewpoints while acknowledging personal positionality is generally important in the proposal review process. Here, these multiple perspectives could be used to benefit preparation for panel conversations by considering how one might present strengths and weaknesses (or areas for improvement) of a proposal to a broader group with a range of areas of expertise and experience.

Training

The timeline from acceptance into the program to the completion of the mock review panel is shown in Figure 2. The training available to all participants had three phases, 1) an introductory asynchronous individual preparation, 2) a synchronous training where quads met each other before developing reviews, and 3) asynchronous individual and synchronous quad preparation for the mock panels. Quads were asked to hold a final meeting after the submission of their three reviews to prepare for their panel roles.

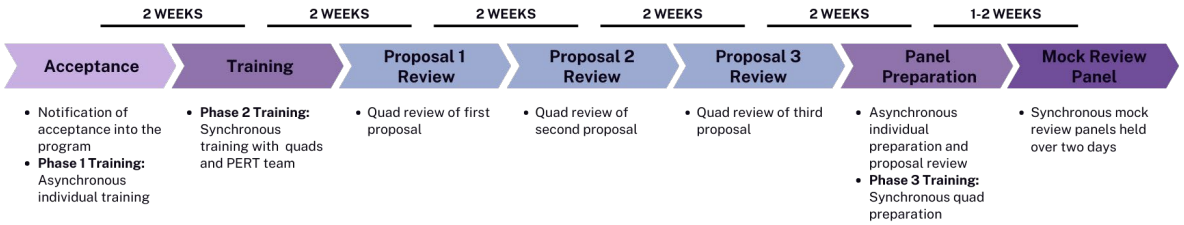

Figure 2: Training timeline for the proposal review training program.

Phase 1 Training: The introductory training addressed the proposal review process, bias, review criteria, and specific calls for proposals. The following instructions were sent out to participants at least a week before the synchronous training meeting:

1) Review this overview of the National Science Foundation proposal review process: https://www.nsf.gov/bfa/dias/policy/merit_review/. Follow links to completely see the overview, but it is not necessary to go into the PAPPG for details (except as suggested below).
2) Watch this video on bias in the review process and keep track of your quiz results: https://tipsforreviewers.nsf.gov/
3) Read about the criteria that the NSF uses to evaluate proposals: Intellectual Merit (https://www.nsf.gov/pubs/policydocs/pappg22_1/pappg_3.jsp#IIIA2a) and Broader Impact (https://www.nsf.gov/pubs/policydocs/pappg22_1/pappg_3.jsp#IIIA2b). In particular, notice the elements to be considered.
4) Skim at least one call for proposals chosen from:
    a) Preparing Future Engineers: Research Initiation in Engineering Formation PRF: RIEF (https://www.nsf.gov/publications/pub_summ.jsp?WT.z_pims_id=503603&ods_key=nsf20558)
    b) Scholarships in Science, Technology, Engineering & Math S-STEM (https://www.nsf.gov/publications/pub_summ.jsp?WT.z_pims_id=5257&ods_key=nsf22527)
    c) Faculty Early Career Development Program CAREER (https://www.nsf.gov/publications/pub_summ.jsp?WT.z_pims_id=503214&ods_key=nsf20525)

All three of the proposal calls were the current calls for proposals used in the training process. Most of the proposals were older and did not necessarily meet the expectation of the current calls, which is a specific aspect we wanted participants to understand.

While the focus of this training was based on materials related to National Science Foundation priorities, it was strongly informed by prior work and calls for anti-racist action in the peer-review process for both funding and publication, in particular the work of Kelly Cross [8], James Holly, Jr. [9], Leroy Long [10], and Brooke Coley, Denise Simmons and Susan Lord [11].

Phase 2 Training: The synchronous training was two hours and included introductions, reflection, small group work, and large group discussion. There was time for the quads to meet each other and build rapport through a reflection and discussion about the pre-session individual work. Small group work included discussion about what makes a good review (since all participants have received feedback on some writing or proposal), followed by a larger group

collection of tips and best practices. The quads broke off again to review sample proposal reviews to identify improvements and discuss ways to incorporate positive aspects and avoid negative aspects of the sample reviews.

Between Phases 2 and 3 of the training, each quad spent time reading and reviewing three proposals, allowing about two weeks for each proposal. Quads scheduled meeting and discussion times independently. The timeline was adhered to by sending out the new proposals every two weeks. This also allowed quads to fully focus on one proposal before a new proposal was added to the mix.

Phase 3 Training: Once all three proposals had been reviewed, quads were asked to jointly view a set of ASEE training videos on the grant review process (five modules, 17 minutes total) and discuss the main ideas after each video to prepare for the panel experience. At this point, the remaining proposals were shared so that quads could quickly read the proposals and compare them to the ones they had reviewed more closely. Limiting the review time was intentional to mimic the time likely available to reviewers on formal panels in the future. As with most NSF panels, training also included a synchronous introduction and reminders about confidentiality, conflicts of interest, roles, and ratings at the beginning of the panel session.

Agenda for Mock Panels

The mock panels were scheduled for four hours per day over a two-day period. The three panels had staggered starts so that our evaluation team could meet with the panels at the same points in their panel discussions and so that the project leads could be available at the beginning of each panel to introduce the mock panel activity and answer questions. The amount of time was chosen so that there was enough time to address all components of a panel experience and to model the minimum day length of an NSF panel.

Table 2: Two-day mock panel agenda.

Day 1: 0:00-0:20 Welcome and Introduction (including confidentiality agreement) 0:20-1:50 Proposal Discussion 1:50-2:00 Break 2:00-3:30 Proposal Discussion and First Evaluations 3:30-3:50 Overview of Day 2 Expectations; Draft Questions (prep for "homework" of drafting panel summaries overnight)
Day 2: 0:00-0:30 Welcome and Finalize Proposal Rankings 0:30-2:30 Finalize Panel Summaries (reviewing, discussion, editing) 2:30-3:00 Closing and Reflection with Program Officers 3:00-4:00 Debrief (as a focus group) with Project Evaluators

All panels completed at least one proposal summary. However, as a learning experience with great experts available, panels spent more of their time than allocated discussing the process and ways this experience may be like or unlike future experiences on formal panels.

Summary & Recommendations

Evaluation of the program was done through focus groups and an exit survey. Overall, participants spoke very positively about the program and, particularly, their quads. Mentees felt that the experience was comfortable within their quads and the review panels, and that they had the ability to freely speak to their thoughts and opinions. Mentors cited their favorite part of the experience as working with their mentees. All mentees increased their confidence for participating in mock review panels and writing grants, with most saying that their confidence improved greatly. Both mentees and mentors also felt that there was a significant connection between their peer reviewing skills and their ability to conduct engineering education research. The majority of program participants felt that the workload was reasonable and that the activities were well-paced within the program.

Although both mentees and mentors indicated positive feelings for the program overall, many also felt that program logistics could be improved. The largest issue between both mentors and mentees was the clarity of instructions given by the project team. Many felt that tools (such as the panel summary review template) which would have helped them earlier in their proposal reviews were not made available until the mock panels. There was also a consensus among the group that it would be valuable to have a central location for both mentors and mentees to communicate, view documents, upload their reviews, and keep track of their progress. Additionally, the majority of participants indicated that they wished there had been a clearly defined agenda in place from the start of the program with detailed instructions for reference rather than the "just-in-time" approach to providing information used by the team. One respondent commented within the focus group that they wished the panel had been conducted over the summer when classes were out, which the remaining participants agreed with. Some participants also suggested making this a for-credit course or certificate program which young faculty, post-docs, or graduate students could enroll in. Finally, there was a strong desire for more community building and networking within the program for both building research connections and the EER community.

With all of these comments in mind, future iterations of this program will consider making the following changes:

1) Creating a clear agenda for all participants detailing the program and distributing it prior to the start of the program
2) Developing a repository where all documents are centralized and accessible to everyone throughout the program
3) Automating the ability for mentors and mentees to keep track of the quad's progress throughout the program, similar to a dashboard available for the journal manuscript review process [3].
4) Including a community-building and networking social event either virtually or through a conference such as ASEE
5) Moving the program to be conducted over the summer and change it to a for-credit program

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