

Minutes (unofficial) for Fall 2023 Directorate for STEM Education Advisory Committee

Session 1: A Year in Review by EDU's Assistant Director

Dr. Moore's presentation shares the following highlights of the EDU Directorate:

EDU is diligently and intentionally addressing issues of workforce development, broadening STEM participation in K-12 education, community college engagement, undergraduate education, professional development of teachers, and advancing STEM learning outcomes through its host of programs.

Interest and intent to help improve the research capacity of HBCUs, HSIs, and other MSIs is central to EDU.

Dr. Moore reviewed various changes in staffing and updates in programs (e.g., Noyce, S-STEM, CREST). Following his presentation, the AC members were encouraged to ask questions. Their questions spanned many areas including Cost Sharing (e.g., the change in Noyce to facilitate proposals from lower resourced institutions.) A question was posed about the role of partnerships and rural communities for reaching the missing millions, with a response referencing the role of TIP and EPSCOR in facilitating such efforts. Partnerships regarding K-12 was also raised, with a review of how DRL has partnered with the Bill and Melinda Gates Foundation, the Walton Family Foundation, and others to build equity in K-12 educational spaces. NSF convened 20 of the largest philanthropic organizations the week of November 6, 2023, to crosswalk areas of interest and review assessment measures. The foundation is also exploring data science in K-12 education – working with both philanthropic and government to spur this kind of development in the field. The goal is to pull people in and maximize resources.

Session 2: Grand Challenges in STEM Education and Workforce Development

During this session, there were three breakout sessions where AC members answered several questions. The summary of those discussions can be found in Session 7.

The questions discussed during the breakout session included:

- What are the Grand Challenges facing STEM Education for which EDU could address?
- How should the directorate prioritize its resources as we address the Grand Challenges?
- Is there anything EDU should be doing now to prepare for aiding Grand Challenges in the future? What are those Grand Challenges, and what can be done immediately for future benefit?

Session 3: Reflecting Upon Diversity, Equity, Inclusion and Access and NSF

During the opening of Session 3, Dr. James Moore III (Assistant Director of EDU Directorate) and Dr. Charles Barber (NSF Chief Diversity and Inclusion Officer) engaged in a conversation about DEIA at NSF. After opening remarks from both, they asked each other questions concerning DEIA and then invited questions from members of the AC.

The AC members and presenters engaged in discussion regarding the role of data in advancing NSF's goals, and the use of that data to tell stories that could drive organizational improvements. They further discussed the importance of synthesizing the funded work findings to better understand what has worked, what is working, what is not working, and potentially illuminate a path forward.

It is important to view DEIA efforts as a process not simply an outcome. NSF employs several strategies in this space: using data to have evidence-based conversations, engaging in effective communication within NSF, opening up lines of communication to those on the Hill, etc. Ultimately, the goal is organizational effectiveness, and DEIA is a means to such effectiveness.

There was excitement to see within NSF, and within EDU specifically, a lot of creativity and ingenuity towards broadening participation, addressing underrepresentation and expanding opportunities everywhere. There was agreement that we need to take our work to another level, and that will require creative approaches.

The AC recommends that in this challenging DEIA context, EDU and NSF think and act much more intentionally to support investigators in their institutions and other spaces. As an example, one AC member pointed out that limiting feedback to low competitive proposals (e.g. triaging) could be a barrier to broadening participation among investigators.

The AC recommends that EDU increase efforts to tell stories of impact. They suggest that we connect numbers and narratives—connect the statistics with the stories that show the power and impact of EDU investments. Leverage some of the successes (in face of the DEIA challenges) of GRFP, TIP, EPSCOR, HSI, Teacup, among others—tell these stories.

The public is ready to hear the stories of EDU investments. Consider what stories we need to tell, who needs to know our stories, and who our stories will resonate with. Be intentional about engaging different audiences in different ways, through different means. Share the successful stories as well as the challenging ones.

AC suggested that EDU has a story writer or two, and they reminded us that the lack of a story is a story.

Session 4: Closed Session to Reflect Upon STEM Education Priorities

As this session was closed, it will not be addressed in the minutes.

Session 5 COV for the Division on Research and Learning in Formal and Informal Settings (DRL)

An overview of the CoV process and findings from the CoV report for DRL was provided to the AC members. It was noted that the four years covered by the report included a lot of change and unrest including Covid-19 pandemic as well as social unrest. The COV praised NSF and DRL for how they quickly switched to online review panels and created new solicitations to meet these challenges.

They pointed out that while award rates were stable by gender, race, ethnicity, and disability, there was high variability by state, institution type, and MSI status. Moreover, panelists providing reviews of the proposals tended to be overwhelmingly white and from doctoral-granting universities. Overall, the report recommends broadening participation in panel selection and peer review. They also had some management recommendations to standardize advances, provide a few measurable targets for the portfolio balance, and they wanted to see less reliance on ad hoc reviews.

They listed some related questions they want DRL to consider, including:
How do we bring more panelists from broader range of institutions? How do PIs keep up with costs when awards have not kept up with inflation? How can NSF get panelists to have more normed evaluations when this seems to be an issue across the foundation?

Next, the advisory committee voted unanimously to accept the CoV Report.

The Division for Equity for Excellence in STEM (EES) presented an interim follow up regarding efforts in response to their last CoV review. EES has identified themes from the last report and strategies they have implemented to address concerns. With almost a year until their review, EES continues to looking for any advice from the AC on what can be done to continue addressing issues and prepare for their upcoming review.

Session 6: CEOSE Reflections: Making Visible the Invisible

During this session, it began with an overview of NSF's Committee on Equity Opportunities in Science and Engineering. This was followed by each of the EDU's four Division Directors providing an overview of how CEOSE recommendations have been integrated into division-level efforts.

Following the presentations, and a brief Q&A, the AC members engaged in discussion.

The AC appreciated the vision presented by the Division Directors and noted a focus on doing more community-driven projects, specifically "not doing work on us, but with us." It is important for us to learn from and apply information from programs like TCUP or work with two-year colleges. Institutions that are under-resource already, have insightful and fundable ideas, idea of exemplary practices that could benefit all institutions. Thinking about different ways to invest in such institutions is important. As is helping disseminate their findings more widely.

Yet, the AC questions if EDU has the right structure or right mechanism to actually make this happen. The data are clear from the COV, PIs and reviewers tend to be overwhelmingly white from doctoral institutions (e.g., R1s). NSF has to be intentional about coming up with a plan to move forward and address these disparities, and it must be factored into the application process, review process, and selection process to break the status quo. For example, many of the research projects continued to use a tiered structure model for awards, based on the needs of a "typical R1" laboratory. Understanding the needs to reach other models, and factoring those into the process is important.

It is important that NSF understand just what kind of infrastructure will we need to secure a different approach to research, especially if we have a community college partner or community members contributing to the research in a way that is typically not seen at R1s.

A discussion focused on funding going to organizations that are lacking so much in diversity, that there isn't even a single "white woman" let alone people from more minoritized communities in the leadership. They receive funding for "broadening participation" yet are lacking evidence that they are doing so in even modest ways. Several AC members agreed that such lack of efforts should be accompanied with the money being pulled back from such groups. They aren't meeting their proposed broadening participation goals as part of their broader impacts, yet fail to make any concerted effort to achieve them. NSF should use its influence to assure broadening participation is taken seriously by institutions that have benefited greatly from NSF funding without evidence of successful efforts in broadening participation (or even that they have learned from their failures.)

AC members recommended an agency wide adoption of the required use of graduate student mentoring plans to aid in student development.

Concerns were raised about authentic partnerships and fair funding when major (e.g., Carnegie Class - R1) institutions partner with smaller, often minority serving institutions. Understanding where the funding is going, and where the voices are being heard is important. Central to this is building capacity in a lasting manner for the lower resourced or new institutions, as well. Constraining program funding in a way that these goals can be achieved (vs. tossing a few peanuts at the MSIs) seems important. However, it's critical that NSF not merely be imposing, but learning what is working and what isn't and refining along the way.

Discussions regarding the importance of leveraging what has been learned from existing programs to broaden participation, like CREST and HBCU-Up, and adopting, when appropriate, such practices across the agency seem important.

Session 7: Further Reflection Upon Session 2

Following up with Session 2 breakout sessions, each of the three breakout rooms discussed what they identified as grand challenges facing STEM Education and workforce development. This was followed by a discussion, centered around where EDU's attention should be focused.

The recommendations from the AC focused on conducting studies to understand targeted problems, engage in its convening powers to tackle serious challenges, focus on K-12 STEM teacher needs, and to make use of this information to come up with creative improvements.

There was wide support by the AC for NSF to conduct a consensus study (Needs Assessment) of some sort around funding for graduate students going beyond just GRFP, but for all forms of graduate student funding coming out of NSF. The AC recognized that it has been nearly 75 years since the GRFP was created. The AC is calling upon NSF to understand graduate student debt, particularly for students coming from lower resourced communities, and to create a [new] program to address the needs to support graduate students both financially and in other ways.

NSF should also be understanding “producers” that is faculty who are generating successful undergraduates from minoritized populations who go onto graduate school and faculty who are mentoring and supporting graduate students from minoritized populations who then graduate. Understanding the “producers” and creating a program that facilitates those efforts that goes beyond NRT or GRFP is important. GRFPs are awarded to the individual, NRT is awarded to the institution. Funding needs to go directly to the “producers.” There was further discussion about the importance of understanding this mentoring relationship further.

NSF should make use of its convening powers to bring really smart people together to navigate around the current state of STEM education and workforce development to develop and improve upon policies and to think deeply about a path forward for DEIA work.

Mathematical understanding/ quantitative reasoning is another area for which the AC had identified as a grand challenge facing STEM education and workforce development. They feel like there is a body of evidence that is not finding its way into practice. Moreover, the focus is often on the student and less on other areas that could be disproportionately acting as barriers to learning and developing in this space. Continued focus on K-12 STEM education and STEM experiences for students and teachers is encouraged by the AC in areas of Mathematics, but also with Technology, Science and Engineering.

Meeting with Office of the Director

EDU AC met with NSF Director Sethuraman Panchanathan, Chief Operating Officer Karen Marrongelle, and Chief of Staff Brian Stone.

This session began with NSF Leadership thanking the AC members for their efforts. The Director then asked for recommendations. During this time the AC members asked questions and provided information on the following topics.

In thinking about “The Hill” the AC wondered what are the compelling federal interests regarding Diversity, Equity, Inclusion and Access and how is NSF engaging in this space. The AC recommends making sure the “story” of DEIA be told effectively to enable the mission of broadening participation going forward in a divided government at the national and state levels.

The AC would like to continue to draw attention to the importance of active support of STEM K-12 teacher and expanding engagement of institutions of higher education including open access, broad access, rural institutions, and minority serving institutions.

The AC is hoping to understand the impact of TIP, particularly the regional engines, and their impact on STEM education and workforce development.

The AC encouraged NSF to examine how do we get past a 1950’s model of education, and better make use of other educational through industry partnership (e.g., internships). It is important to leverage learnings in partnership with Industry as we expand to reach the missing millions. This is critical if we hope to “graduate” more students in STEM at ALL levels and from all regions of the nation to meet workforce and national needs.