

Minutes of the Directorate for Education & Human Resources (EHR) Advisory Committee
Thursday, October 18 and Friday, October 19, 2018
National Science Foundation
2415 Eisenhower Ave., Alexandria, VA 22314 Room
W2210/W2220

Advisory Committee (AC) members present: Francisco Rodriguez (Chair), Bruce Alberts, Hyman Bass, Carlos Castillo-Chavez, Rory Cooper, Kaye Husbands Fealing, Margaret Honey, David Monk, Okhee Lee, Roy Pea, Debra Joy Perez, James Spillane, Marilyn Strutchens, Laurel Vermillion, and Lilian Wu

AC members absent: Sian Beilock, Elizabeth S. Boylan, John T. Bruer, Catherine Casserly, and Muhammed Chaudhry

Day 1: Thursday, October 18

8:30 – 9:00 Welcoming Remarks from the EHR AC Chair & the EHR Assistant Director

Francisco Rodriguez, Chair, EHR AC, & Chancellor, L.A. Community College District
Karen Marrongelle, EHR Assistant Director

Dr. Rodriguez, EHR AC Chair, welcomed Dr. Kaye Husbands Fealing as a new EHR AC member. Dr. Husbands Fealing, who is also a member of the NSF Committee on Equal Opportunities in Science and Engineering (CEOSE) AC, will serve as a liaison between the EHR and CEOSE AC committees. Dr. Rodriguez recognized and thanked Drs. Bruce Alberts and Roy Pea, two long-standing members of the EHR AC, for their service to NSF and specifically to EHR. Both Dr. Alberts and Dr. Pea are rotating off the EHR AC.

Dr. Rodriguez thanked Dr. James (Jim) Lewis for his service as the acting EHR Assistant Director for nearly two years, and welcomed him to the meeting in his role as expert for EHR Office of the Assistant Director. Dr. Rodriguez recognized recent accomplishments of a number of EHR AC members. The minutes from the Spring 2018 EHR AC Meeting were approved.

Dr. Rodriguez introduced Dr. Karen Marrongelle, EHR Assistant Director, who assumed the leadership of EHR on October 1, 2019. Dr. Marrongelle welcomed the committee to NSF, stating that she was very much looking forward to this EHR AC meeting and saw herself in a mode of listening and learning about the work of EHR and the committee's advice.

9:00 – 10:00 Session 1: NSF-Wide and EHR Public-Private Partnerships (PPP)

Moderator: Evan Heit, Division Director, EHR Division of Research on Learning in Formal and Informal Settings (DRL)

- ***NSF-level PPP Activities*** (Ken Calvert, Co-chair, NSF Co-Lead for the Agency Priority Goal Implementation Team, Co-Lead for Renewing NSF Goal Team, & Director, Division of Computer and Network Systems, Directorate for Computer & Information Science & Engineering (CISE))
- ***EHR PPP Activities*** (Sarah-Kay McDonald, Senior Advisor, EHR Office of the Assistant Director)
- ***NSF INCLUDES & PPP*** (Sylvia James, Acting Deputy Assistant Director, EHR Office of the Assistant Director Monya Ruffin-Nash, Program Director, EHR Division of Research on Learning in Formal and Informal Settings (DRL))

Dr. Heit introduced the topic of public-private partnerships (PPP), stating that PPP, considered broadly, could help NSF expand its reach and capacity as stewards of public dollars. Dr. Heit indicated that the goal of this session was to share new information about PPS at NSF and receive advice from the EHR AC.

NSF-level PPP Activities

Dr. Calvert set the stage for the PPP, by discussing a 2017 White House's Executive Order (13781) focused on reorganizing the Executive Branch. The White House Office of Management and Budget (OMB) was ordered to enact the executive order, requiring that all federal agencies must institute reform plans to increase efficiency. The NSF plan is referred to as "Renewing NSF." One of the four components of Renewing NSF is NSF's Agency Priority Goal on public-private partnerships. NSF accountable to OMB for its Agency Priority Goal and must report annually. The purpose of expanding PPP is to help with all aspects of NSF's mission and to enhance the impact of NSF's investments and contribute to American economic competitiveness and security.

Dr. Calvert explained that NSF will pursue the APG by implementing a strategic vision for future partnerships that builds upon existing and emerging experience. NSF will enhance and expand its investments along three axes: research and innovation; research infrastructure; and workforce development. Along each axis, NSF will pursue a staged strategy aligned with its mission. The stages of this process include: (1) strategically identify opportunities with potential partners (e.g., workshops, meetings, other outreach); (2) work externally as well as internally to efficiently formalize partnerships (e.g., formulate and sign MOUs, streamline MOU processes internally); and (3) implement partnerships (e.g., issue new or updated funding opportunities, make awards, execute agreements).

EHR PPP Activities

Dr. McDonald provided an overview of EHR PPP activities and described how EHR is thinking carefully about how partnerships help EHR achieve its mission. EHR partners can play many roles, such as advisors, helping to identify challenges, establish priorities, set agendas, and model approaches. EHR partners can provide other resources, such as internships and training opportunities, access to subject matter experts, data, tools, and additional funding. EHR partners may also engage in synergistic activities. Dr. McDonald then provided a number of examples of ways EHR is active in partnerships, including catalyzing and supporting partnerships through grant programs and leveraging resources to accelerate innovation. Overall, EHR has a long history in partnerships. Some partnerships are formal and directly with EHR; others are facilitated through funding mechanisms. Some partnerships with EHR are more informal.

NSF INCLUDES & PPP

Drs. James and Ruffin-Nash described how partnerships are integral to the NSF Big Idea NSF INCLUDES. The NSF INCLUDES Design and Development Launch Pilot awards included over 750 partnerships, which are viewed as integral to implementing the collective impact framework. Additional partnerships related to NSF INCLUDES a \$1M gift from Boeing that will be used to target women, especially women veterans, returning to the STEM workforce. This \$1M is part of a larger \$11M gift from Boeing to NSF to support workforce development.

On October 25-26, NSF INCLUDES is convening federal agencies, private foundations, community-based organizations, academic institutions, and others for a two-day Funders Collaborative Meeting that will focus on supporting existing and innovative funding mechanisms for broadening participation in STEM. The meeting goal is to focus on building relationships and identifying best practice and collaboration mechanisms.

10:00 – 10:30 Session 1 (Discussion): NSF-Wide and EHR PPP

Moderator: Evan Heit, Division Director, DRL

10:45 – 11:30 Session 2: STEM Workforce Development

Moderator: Lee Zia, Deputy Director, EHR Division of Undergraduate Education (DUE)

- **National Science Board (NSB) Task Force on the Skilled Technical Workforce** (Matt Wilson, NSB Policy Director (Acting)/Science & Engineering Policy Analyst)
- **Reskilling America's Workforce: Exploring the Nation's future STEM Workforce Needs: A Spotlight on Engineering and Advanced Manufacturing** (Robin Wright, Director, EHR Division of Undergraduate Education (DUE))

Dr. Zia introduced the topic of STEM workforce development through examples from within and external to NSF. Within EHR, all four divisions support STEM workforce development.

National Science Board (NSB) Task Force on the Skilled Technical Workforce

Dr. Wilson began by reviewing the purpose of the National Science Board (NSB): (1) to establish the policies of NSF within the framework of applicable national policies set forth by the President and the Congress and (2) to serve as an independent body of advisors to both the President and the Congress on policy matters related to science and engineering and education in science and engineering. In July, 2018, the White House issued an executive order, establishing the National Council for the American Worker, with the NSF director as one of ten council members. The council was charged with developing a national strategy with respect to the skilled technical workforce and working with agencies on its implementation. Both the House and the Senate are interested in this issue.

The prior November (2017), the National Science Board had established a Skilled Technical Workforce task force, charged with identifying opportunities and challenges facing workers at all stages of their careers and with making recommendations to strengthen the US skilled technical workforce. The work of the task force to date has included gathering of high quality data, communicating the importance and contributions of the skilled technical workforce, and holding convenings and listening sessions with stakeholders. NSB noted that there are divergent pipelines for educating

engineers and scientists and skilled technical workers.

Reskilling America's Workforce: Exploring the Nation's future STEM Workforce Needs: A Spotlight on Engineering and Advanced Manufacturing

Dr. Wright began by defining reskilling as the education needed when one is out of a job, or between jobs, in order to get the next job. Dr. Wright shared that it used to be that education created a wave that would carry someone throughout a lifelong career. Today's students will have an education that will only take them so far, and they will need to have skills to gather new information that they will need to move along on their career paths. Lifelong learning is the possibility of many small waves.

Council of Economic Advisers reports that the face of the labor market has been transformed; that skill development has been front-loaded, however, any degree must stay current; and that the information gap between employers, workers, and educational institutions has continued to expand.

Dr. Wright asserted that it will take a change in attitude for everyone in order to properly address this issue, and that a recent NSF workshop, Reskilling American's Workforce: Exploring the National's Future STEM Workforce Needs: A Spotlight on Engineering and Advanced Manufacturing, may be part of this change. The workshop included 160 participants representing many sectors. A first impression from the workshop was that the needs aligned irrespective of the sector represented. The country is learning how to learn, and that strategies are needed to address this aligned mission. Additional workshops on other workforce needs may occur. The EHR AC subcommittee on STEM Education of the Future may also be addressing some of these issues.

11:50 – 12:20 Session 2 (Discussion): STEM Workforce Development

Moderator: Lee Zia, Deputy Director, DUE

12:20 – 1:20 Session 3: NSF Big Idea: What is Mid-Scale Research Infrastructure and How Might it Benefit EHR Communities?

Moderator: Karen King, Program Director, EHR Division of Research on Learning in Formal and Informal Settings (DRL), and Co-Executive Secretary for the Committee on Strategy for the National Science Board

- **Mid-scale Research Infrastructure** (Jim Ulvestad, NSF Chief Officer for Research Facilities)
- **Mid-scale research: Programmatic Experience** (Allena Opper, Program Director, Directorate of Mathematical & Physical Sciences (MPS))
- **Examples** (Earnestine Easter, Program Director, EHR Division of Graduate Education (DGE)
Karen King, Karen King, Program Director, EHR Division of Research on Learning in Formal and Informal Settings (DRL))

Dr. King introduced the topic, indicating that mid-scale research infrastructure is one of NSF's Big Ideas and indicated that an NSB task force was initiated to make recommendations about NSF mid-scale infrastructure. She noted that EHR did not currently have formal mid-scale research infrastructure investments.

Mid-Scale Research Infrastructure

Dr. Ulvestad indicated that research infrastructure funding between the \$4M and \$100M mark is a challenge for research communities, as marked by a number of community reports and calls. A 2011 NSB report on midscale instrumentation in response to America COMPETES Act of 2010 did not recommend additional mid-scale investments at NSF at that time. While mid-scale infrastructure is neglected, it is not ignored as limited funding is carved out of existing budgets, often with training and post-doctorate components. The ways of doing science are changing, particularly with respect to infrastructure. There is increasing reliance on cyber infrastructure, increasingly diverse scales, and increasingly dynamic situation. As such, issues for research communities include funding, agility, matching oversight to scale, rapidly evolving technologies, and varied operational methods. NSF is challenged with respect to how to innovate to meet these evolving needs. It is addressing this challenge through the NSF Big Idea on Mid-Scale Research Infrastructure.

Congress passed the American Innovation and Competitiveness Act (AICA) in 2017, which included charging NSF with evaluating existing and future research needs, particularly in the area of mid-scale research infrastructure.

In response, NSF issued a Request for Information on projects in the \$20-100M range. NSF received 192 responses, totally approximately \$10B. In October 2018, the NSB issued a report, Bridging the Gap: Building a Sustain Approach

to Mid-scale Research Infrastructure and Cyberinfrastructure at NSF, in response to House Appropriations language in FY2018. The report called for NSF agency-level commitment to mid-scale infrastructure, and to develop an investment strategy and evaluation and assessment program. The NSF FY2019 budget request includes \$60M for mid-scale research infrastructure. Working groups are focused on funding two levels of infrastructure: \$6-20M and \$20-70M.

Mid-scale Research: Programmatic Experience

Dr. Opper shared practical programmatic issues from the Division of Physics within the NSF Directorate of Mathematics & Physical Sciences, related to research infrastructure. It was stated that mid-scale research infrastructure takes years of planning, funding both for pre-implementation and then consistent and unexpected on-going funding, coordination with co-funding agency partners, and substantial oversight with implementation.

Dr. Opper shared several strengths of mid-scale infrastructure investments, including the opportunity for significant impact to the field, the ability to stimulate future opportunities (both large and small), creating a focal point for the research community, and developing increased visibility for research. She also shared some challenges of mid-scale infrastructure investments to keep in mind, including identifying a process for identifying research community priorities, designing a process for strategic nurturing of R&D to result in projects, developing appropriate review and oversight, balancing research priorities, and managing the increased visibility. Dr. Opper concluded stating that the impact of infrastructure to the field can be large, because a lot of people may be able use it, even if it is a small fraction of the research community, and it can lead to paradigm shifts. Ultimately, the question for an NSF program to address is: Is NSF and the research community comfortable with the tradeoffs required for on-going infrastructure investments?

Examples of Mid-Scale Research Infrastructure

Dr. Easter described an NSF investment that include EHR funding that is similar in scale to mid-scale research infrastructure, the Institute for Research on Innovation & Science (IRIS) the University of Michigan. IRIS is funded through a series of awards, starting in 2012: “IRIS data allow observational experiments that can directly...[track] how scientific training affects career trajectories and restores to industry.” Member institutions contribute their data that feed into large nodes and allow users to access data and use data to access research questions.

Dr. King described several mid-scale research infrastructure projects supporting education research. One example was the University of Michigan’s Elementary Math Lab, in which researchers use the laboratory to delve into the complexity of teaching and learning mathematics to students. The laboratory is outfitted with video and audio recording capacities. A second example was an advanced cyber-infrastructure: databraries, which are web-based data libraries that securely store and share video data, which allows for transparency and reproducibility in worldwide usage.

1:20 – 1:45 Session 3 (Discussion 3) NSF Big Idea: What is Mid-Scale Infrastructure and How Might It Benefit EHR Communities?

Moderator: Karen King, DRL PD, and Co-Executive Secretary for the Committee on Strategy (CS) for the NSB

2:00 – 3:00 Session 4: Recent Awards & Activities Related to Broadening Participation & Institutional Capacity Building

Moderator: Jermelina Tupas, Acting Director, EHR Division of Human Resource Development (HRD)

- **Hispanic-Serving Institution (HSI) Program Update** (Talitha Washington, Program Director, EHR Division of Undergraduate Education (DUE))
- **NSF INCLUDES Update** (Paige Smith, Program Director, Directorate of Engineering (ENG))
- **Historically Black Colleges & University Undergraduate Program (HBCU-UP) Excellence in Research** (Brandon Jones, Program Director, Directorate of Geosciences (GEO))
- **Tribal Colleges and Universities Program (TCUP) Update** (Jody Chase, Acting Deputy Director, EHR Division of Human Resource Development (HRD))

Dr. Tupas introduced the session, describing the commitment of EHR to its broadening participation programs and the NSF-wide commitment to the NSF Big Idea, NSF INCLUDES.

NSF INCLUDES Update

Dr. James built on the morning NSF INCLUDES presentation. NSF INCLUDES is a comprehensive national initiative

designed to enhance US leadership in discoveries and innovations by focusing on diversity, inclusion, and broadening participation in STEM at scale. Dr. James described the multi-level program management structure, the leadership team, and the design team. The leadership team provides higher level of guidance on mission, vision, and goals. The design team is responsible for engagement in terms of providing guidance on future direction and budget and ensuring that NSF INCLUDES is aligned with the mandates described within the budget request. With multiple alliances and partnerships throughout the agency, NSF is modeling partnerships that are consistent with the implementation and design of NSF INCLUDES projects. The five key design elements of NSF INCLUDES-funded awards are: shared vision, partnerships, goals and metrics, leadership and communication and expansion, sustainability and scale.

Dr. James summarized the funding landscape of NSF INCLUDES to date, including, in year one, a test bed of 40 development launch pilots, 13 conferences and workshops to help communities to understand and create collaborative infrastructures, and an evaluation contract for developmental evaluation and technical assistance for the pilots. In year two, 70 design and development launch pilots were funded, with 758 partner organizations working on broadening participation in STEM through collaborative change. In year three, a PI meeting and center summit were held. Funding included on-ramps to the NSF National Network, a cooperative agreement Coordination Hub, and five Alliances. NSF INCLUDES has engagement with technical colleges, and a recent partnership with Boeing was announced. Year four will focus on building the network. Alliances and the coordination hub will establish their roles in engaging the community. A convening of the national network will also take place.

HBCU-Undergraduate Program: Excellence in Research (EiR) Track

Dr. Jones provided an update on the Excellence in Research (EiR) program under the umbrella of HBCU- UP. EiR is a new congressionally mandated track to provide increased support in research. The program is expected to help build research capacity by supporting PIs at an institution for research in HBCUs. Every NSF directorate is participating. The program was awarded 20 million dollars FY18 and 10 million FY19, with additional iterations expected. There are two types of awards, single and multi-investigator. There have been two rounds of solicitations to date. There was a distribution of the awards across the directorates. MPS made the largest number of awards from the first round of the awards with 47 in total.

Hispanic Serving Institutions (HSIs)

Dr. Washington stated that Congress mandated, through the Consolidated Appropriations Act of 2017, that NSF build the capacity of HSI institutions that do not typically receive high levels of funding from NSF. The American Innovation and Competitiveness Act (AICA, 2017) also mandated NSF to enhance the quality of undergraduate STEM education at HSIs, and to increase the retention and graduation rate of students pursuing associates or baccalaureate degrees in STEM. EHR responded by convening an EHR AC subcommittee, holding listening sessions with various stakeholders around the nation, and issuing a Dear Colleague Letter for conferences, in order to identify critical challenges and opportunities regarding undergraduate STEM education at two- and four-year HSIs, and potential actionable solutions that fall within NSF's mission, policies, and practices. In addition to community recommendations, an HSI program (NSF 18-5240) within EHR was established.

Tribal Colleges and University Program (TCUP)

Dr. Chase summarized the multiple stands of funding within the TCUP program, most of which include a connect to another NSF directorate. TCUP has supported growth in STEM capacity in a range of ways, including funding partnerships. Partnerships are based on the premise that they help institutions accomplish work that they could not do separately. TCUP funds partnerships that develop an operation model which includes a management plan that details how the partnership will work. Some of the funded partnerships include TCUP institutions and mainstream universities. Mutual respect is viewed as creating mutual results. In addition, the TCUP Enterprise Advancement Centers allow Tribal community colleges and universities to serve as a STEM partner to the tribe or local community to address infrastructure, environmental, research or education needs.

3:00 – 3:30 Session 4 (Discussion): Recent Awards & Activities Related to Broadening Participation & Institutional Capacity Building

Moderator: Jermelina Tupas, Acting Division Director, EHR Division of Human Resource Development (HRD)

3:45 – 4:00 PREPARE TO MEET NSF DIRECTOR AND CHIEF OPERATING OFFICER

Moderator: Francisco Rodriguez, Chair, EHR Advisory Committee

4:00 – 5:00 Talk with NSF Director France Córdova & Chief Operating Officer F. Fleming Crim

Moderator: Francisco Rodriguez, Chair, EHR Advisory Committee

Dr. Rodriguez welcomed Drs. Córdova and Crim to the EHR AC meeting by providing an update on a EHR AC membership and congratulated NSF on its leadership with respect to NSF's leadership with respect to the new NSF award term and condition related to sexual harassment.

Dr. Córdova greeted the EHR AC committee, EHR leadership and staff, and visitors to NSF. Dr. Córdova indicated that NSF was operating under a continuing resolution is in effect until December 7. She summarized her recent work, including on CoSTEM and the National Council for the American Worker. She congratulated Sylvia James, Jim Lewis, and EHR staff on successes to date with respect to NSF INCLUDES, stating that other agencies have expressed interested in joining the NSF-led effort.

Dr. Córdova shared changes at NSF with respect to the ethical conduct of scientific research, including addressing sexual harassment. Such efforts are deemed necessary to establish and re-establish trust in science by the public. She indicated that such efforts clearly involve partnering with universities and other grantees.

Dr. Córdova re-enforced NSF's commitment to public-private partnerships as they are opportunities for messaging about our values and extending the reach of science. She also reported on recent NSB activities.

5:00 Meeting Adjourned for the Day

Day 2: Friday, October 19

8:45 – 9:00 Welcome to Day 2

Francisco Rodriguez, Chair, EHR Advisory Committee

Dr. Rodriguez offered thanks for thoughts, reactions, and suggestions relating to our mission and yesterday's discussions. He provided an overview of the day's schedule, and asked AC members to share what stuck with them from yesterday as these will be used to shape the spring meeting themes.

9:00 – 9:20 SESSION 5: UPDATES

- **STEM Education Advisory Panel** (Nafeesa Owens, Program Director, Division of Human Resource Development (HRD))
- **Federal STEM Education 5-year Strategic Plan (2018-2023)** (Sylvia James, Acting Deputy Assistant Director, EHR Office of the Assistant Director)

STEM Education Advisory Panel

Dr. Owens provided a background on the STEM Education Advisory Panel as well as its activities to date. Congress charged NSF, NASA, NOAA, and the Department of Education (ED) with creating a national-level panel to advise the National Science and Technology Council's (NSTC) Committee on STEM Education (CoSTEM), assess CoSTEM's progress to date, and help identify opportunities to the Federal STEM Education 5-year Strategic Plan. CoSTEM is responsible for the development and implementation of the Federal STEM Education 5-year plan, which seeks to communicate priorities and activities across federal agencies and to develop an implementation structure. Composition of the STEM Education Advisory Panel was determined through a public nomination process, followed by review and joint announcement of the 18-member panel by NSF, NOAA, ED and NASA. During the inaugural in-person meeting, panel members commented on an internal governmental report as well as began discussion on agenda items for the upcoming year, including assessment of diversity, inclusion and persistence in STEM, criteria and methodology to evaluate effectiveness of federal STEM programs, "best" practices and public sharing and dissemination.

Federal STEM Education 5-year Strategic Plan (2018-2023)

Dr. James recapped the Federal STEM Education 5-Year Strategic Plan (2013-2018) and shared that the 2018-2023 plan is in progress under the leadership of the White House's Office of Science and Technology Policy (OSTP), with input from the White House 2018 State-Federal STEM Education Summit, federal science agencies, FC-STEM members, and CoSTEM. The plan, however, is embargoed until its official release at the end of 2018.

Dr. James provided a number of updates, including that (1) NSF has a new term and condition related to sexual harassment; (2) two EHR Committee of Visitors reports (DUE and DGE) will be given at the Spring 2019 meeting; (3) the National Research Council consensus study, "English Learners in STEM Subjects: Transforming Classrooms, Schools, and Live," with EHR funding, has recently been released; and NSF 2026 Idea Machine submissions are due soon.

9:20 – 10:00 Session 6: NSF Response Processes to the National Academies of Science, Engineering, and

Medicine Report, “Graduate STEM Education for the 21st Century”

Moderator: Charisse Carney-Nunes, Acting Deputy Director, EHR Division of Graduate Education (DGE)

- **Opportunity for Engagement: Graduate STEM Education for the 21st Century** (Nimmi Kannankutty, Acting Director, EHR Division of Graduate Education (DGE))
- **Update from an NSF-wide Program Officer Committee** (Earnestine Easter, Program Director, EHR Division of Graduate Education (DGE))
- **Update from the EHR Advisory Committee Subcommittee on Graduate Education** (Marilyn Strutchens, Emily R. & Gerald S. Leischuck Endowed Professor Mildred Cheshire Fraley Distinguished Professor, Auburn University)

Dr. Carney-Nunes introduced the topic and explained the NSF was responding to the National Academies of Science, Engineering, and Medicine Report, “Graduate STEM Education for the 21st Century,” in multiple ways, which would be shared in this session.

Opportunity for Engagement: Graduate STEM Education for the 21st Century

Dr. Kannankutty focused on two outcomes of the “Graduate STEM Education for the 21st Century” report: (1) US STEM graduate education is the “gold standard” and (2) adaption is needed in graduate program to address emerging needs. Dr. Kannankutty grouped the report’s themes for improvement of STEM graduate education into three categories: (1) institutional change and educational improvement; (2) improved learning environments; and (3) informed decision-making. She then shared her perspective on how the “ideal” STEM graduate education, with a student-centered focus, aligned with the three categories and are currently addressed by DGE funding programs. Dr. Kannankutty summarized the report recommendations for federal and state funding agencies and shared that NSF was getting input from three groups—a subcommittee of the EHR AC, a working group composed of program officers from across NSF, and a group from DGE—in order to respond to the recommendations.

Update from an NSF-wide Program Officer Committee

Dr. Easter summarized the activities to date of the NSF-wide program officer committee, indicating that the report was in progress.

Update from the EHR Advisory Committee Subcommittee on Graduate Education

Dr. Strutchens summarized the activities to date of the EHR AC subcommittee, indicating that the report was in progress.

10:15 – 11:30 SESSION 7: EHR PROGRAM HIGHLIGHTS

Goal: To provide EHR AC members with insights into EHR programs, including highlighting how they support EHR’s work on broadening participation & institutional capacity.

Moderator: Elizabeth VanderPutten, Deputy Director, Division of Research on Learning in Formal and Informal Settings (DRL)

EHR-wide: EHR Core Research (Sarah-Kay McDonald, Senior Adviser, EHR Office of the Assistant Director)

EHR Division of Graduate Education: CyberCorps: Scholarship for Service (SFS), Community College and Cyber Pilot (C3P) Program (Victor Piotrowski, Program Director, Division of Graduate Education (DGE))

EHR Division of Undergraduate Education: Robert Noyce Teacher Scholarship Program (Sandra Richardson, Program Director, Division of Undergraduate Education (DUE))

EHR Division of Human Resource Development: Louis Stokes Alliances for Minority Participation (LSAMP) Program (LeRoy Jones, Program Director, EHR Division of Human Resource Development (HRD))

EHR Division of Research on Learning in Formal and Informal Settings: Innovative Technology Experiences for Students and Teachers (ITEST) Program (David Haury, Program Director, EHR Division of Research on Learning in Formal and Informal Settings (DRL))

Dr. VanderPutten introduced the five programs that would be shared during this session, asking each to highlight its work with respect to broadening participation.

EHR-wide: EHR Core Research

Dr. McDonald provided an overview of the EHR Core Research program, which has been a directorate-wide program supporting foundational and exploratory research in STEM education since 2013. She stated that research does not often occur in a linear function following the four main types of research outlined in the “Common Guidelines for Educational Research and Development” (IES and NSF, 2013). Instead, it may move back and forth between the research types. The EHR Core Research program is focused on building a research base, addressing the most pressing current issues in STEM education, founded in theory and empirical data. The program is based on EHR’s three pillars. Dr. McDonald highlighted that the program has made over 430 awards since 2013 and provide five examples. She concluded by indicating that a new funding opportunity was forthcoming.

EHR Division of Graduate Education: CyberCorps: Scholarship for Service (SFS), Community College and Cyber Pilot (C3P) Program

Dr. Piotrowski indicated that NSF takes a multi-faceted approach to cybersecurity. CyberCorps: Scholarship for Service provide scholarships for students who are then committed to work for the government for a set amount of time. Since its inception, the program has awarded 3,300 scholarships, with 70 universities currently participating. The benefits are full tuition, fees plus stipends for up to 3 years of study where they are placed in 140 different branches of the government. This program has students at all levels of education, with a 94% success rate. The CyberCorps SFS Building National Capacity component of the program offers capacity building awards that lead to an increase in the ability of US higher education institutions to build programs in cybersecurity. With the recent the National Defense Authorization Act, Congress mandated that NSF fund the Community College Cyber Pilot (C3P) program, a community college cybersecurity pilot program that focuses on associate degrees or certificates, those who currently have a bachelor’s degrees, veterans of the Armed Forces, and improving cybersecurity education at the K-12 level.

EHR Division of Undergraduate Education: Robert Noyce Teacher Scholarship Program

Dr. Richardson summarized the Robert Noyce Teacher Scholarship program, which is composed of four tracks: Track 1 – the scholarships and stipends track for undergraduate STEM majors to teach in high need districts; Track 2 – the teaching fellowship track for NSF Teaching Fellows targeting STEM professionals; Track 3 – the teacher leadership track; and Track 4 – the research track on recruiting and retaining STEM teachers to teach in high need school districts. There are also capacity building projects for exploratory or planning stages for a later full award. The Noyce program is congressionally mandated. The funded projects vary but require substantive collaboration, mentoring, and leadership that broadens participation and seeks to diversify the STEM teacher pipeline.

EHR Division of Human Resource Development: Louis Stokes Alliances for Minority Participation (LSAMP) Program

Dr. Jones indicated that the LSAMP program is focused on assisting universities and colleges in their efforts to significantly increase the number of students in and completing high quality STEM degree programs in order to diversify the STEM workforce. LSAMP was authorized by Congress in 1991, based on a model of academic and social integration as well as preparing students professionally. The program now funds awards to both two- and four-year institutions as well as alliances. The program has evolved over time as it better understands the needs of students and the challenges and opportunities of the institutions. The LSAMP program has resulted in 50,000 bachelor’s degrees by students from underrepresented minority groups.

EHR Division of Research on Learning in Formal and Informal Settings: Innovative Technology Experiences for Students and Teachers (ITEST) Program

Dr. Haury summarized the ITEST program as one focused on developing a high-quality STEM workforce by supporting student awareness and motivation through technology rich experiences. The ITEST program is funded by H-1B visa money. Funded projects must engage youth, preK to high school, in formal or informal education settings. Projects must give explicit strategies for recruiting and selecting participants from one or more underrepresented populations; identify the specific needs of the group being served; and include specific plans for addressing those needs that are developmentally appropriate. ITEST has seven questions that guide its research funding around STEM workforce development.

12:00 – 12:20 Session 8: EHR Subcommittee Update: Future of STEM Education

Margaret Honey, President & Chief Executive Officer, New York Hall of Science, and Chair, EHR AC Subcommittee on the Future of STEM Education

Dr. Honey summarized the EHR AC subcommittee on the Future of STEM Education, including its membership, NSF staff support, and activities. The committee met four times and has been involved in conversation with NSF staff and

experts outside of the NSF community. In the spring, the committee reviewed its charge and focused on the changing landscape of work, including conversations with program staff from several EHR divisions to discuss technology in education, the future of work, inclusion and access, and the data revolution. There were two additional gatherings with speakers and then with a panel. Two other meetings were informed by outside experts describing their innovative work and how they are re-imagining STEM education. The discussions have included different approaches to innovation in education, equity and access, project based learning, and public private partnerships. Dr. Honey presented common themes across the activities that will be refined and included in an upcoming report.

12:20 – 12:40 Reflections from the EHR AD

Goal: To highlight issues about which EHR would like EHR AC perspectives.

Karen Marrongelle, Assistant Director, EHR Office of the Assistant Director

Dr. Marrongelle thanked the EHR AC committee and the many EHR staff for their work both behind the scenes and as presenters during the two-day meeting. Dr. Marrongelle indicated that it is an exciting time to be at NSF, given the NSF 10 Big Ideas that are not only revolutionary, but also energized our communities and given structure to the funded work. The theme of public-private partnerships is found throughout NSF and EHR and is being taken very seriously as it can lead to collective impact. The critical issue with respect to partnerships is how to be strategic, such that the benefits are beyond the costs. Dr. Marrongelle as for the EHR AC's help in thinking through metrics for potential partnerships as well as for the high-level priorities and partnership the EHR may want to consider focusing on. Dr. Marrongelle drew the committee's attention to the upcoming NSF INCLUDES partnership meeting.

Dr. Marrongelle indicated that mid-scale research infrastructure has been another intriguing theme. The challenge for EHR is to think about what mid-scale research infrastructure means for education and integrating high tech tools into the educational landscape, particularly around broadening participation. She referred back to an AC member's questions: How do we transform education through midscale infrastructure? Dr. Marrongelle mentioned the challenge around the tension between privacy concerns and understanding how learning takes place in smart cities, online courses, and other learning opportunities that produce large volumes of data—and where data is not collected.

Dr. Marrongelle emphasized that evaluation work is very important to EHR, and that this work is led by the Evaluation and Monitoring Group. She mentioned that following investments, including fellowship recipients and ideas in their initial stages, is critical to ensuring recipients and ensuring investments are paying off in terms of both workforce and breakthroughs. In terms of the future of STEM education, Dr. Marrongelle concurred with the EHR AC subcommittee that a fundamental question is: How are education systems becoming student ready?

Dr. Marrongelle concluded by thanking everyone for the in-depth and thoughtful conversation, and said she looks forward to the work ahead.

12:40 – 1:30 AC Discussion

Facilitator: Julie Johnson, Program Director, EHR Division of Research on Learning in Formal and Informal Settings (DRL)

Dr. Johnson asked the committee to reflect on what has occurred over the past few days.

1:30 – 1:45 Closing Remarks

Francisco Rodriguez, Chair, EHR Advisory Committee

Dr. Rodriguez thanked the EHR AC members, EHR staff, all the speakers from NSF, and visitors to the meeting. He noted the dates for the Spring 2019 meeting: April 25-26, 2019. He then asked for final comments from the AC.

1:45 Meeting Adjourned