

## NIH ADVANCING DIVERSITY PROGRAMS CONFERENCE ACTIONABLE STEPS FROM EVIDENCE-BASED PRACTICES AND PROGRAMS

Many individuals, especially those from certain racial/ethnic groups, remain underrepresented within the U.S. biomedical and behavioral research workforce. At all career stages, scientists from underrepresented groups (URG) experience disproportionate barriers to success. They are less likely than their majority peers to receive the guidance, support, and funding they need to thrive. These persistent, predominantly systemic barriers continue to constrain nationwide diversity and inclusion within the National Institutes of Health (NIH)-funded research ecosystem. While individually targeted approaches and various programs aiming to enhance diversity remain important to enable individuals to thrive in under-resourced environments, enacting systems-level changes is necessary toward a future in which diversity-specific programs are no longer needed and inclusive excellence is the norm.

On June 24, 2019, the NIH [Scientific Workforce Diversity office](#) (SWD) convened distinguished senior thought leaders who have established and led national efforts to enhance workforce diversity and inclusion in the NIH-funded biomedical research workforce. This gathering, the inaugural Advancing Diversity Programs Conference (ADPC), also invited early-career scientists to share their unique perspectives and first-hand knowledge on successful strategies and programs with demonstrated success for enhancing diversity and inclusion. Over the course of the ADPC, SWD's goal was to capture individual comments and suggestions to enable NIH to disseminate successful models and best practices more broadly.

In this document, SWD has articulated a set of actionable steps, presented as a summary list of comments from the ADPC (see text box) and in more detail in [Section I, Cross-Cutting Themes for Fostering Inclusive Excellence](#), which features examples of programs currently employing these strategies to provide context. These actions to consider are for both institutions and funders and reflect several cross-cutting themes: [Institutional Culture Change and Leadership Commitment](#); [Replication and Dissemination](#); [Mentoring, Training, and Professional Development](#); [Implicit and Explicit Bias](#); and [Program Evaluation, Evolution, and Partnerships](#). Of note, these themes are consonant with a substantial body of evidence for effective practices that support inclusive excellence in institutional settings ([Rosser et al., 2019](#)).

[Section II](#) of this document describes specific, evidence-based interventions by career stage for enhancing inclusive excellence – at both individual and institutional levels.

### Overview of Actionable Steps to Consider

- Make diversity and inclusion an institutional strategic priority with adequate resources and dedicated space
- Centralize and coordinate diversity programs to ease recruitment and to raise visibility and impact
- Be specific about changing institutional culture by defining and measuring it
- Reward inclusive excellence by using specific criteria to identify effective practices
- Establish institutional standards and resources for multilevel mentoring
- Employ cohort models for building a critical mass of diverse talent and to nucleate mentoring and career-development programming
- Confront sociocultural impediments (bias, microaggressions) through proven educational strategies to systematize hiring and promotion practices
- Collect and analyze disaggregated data, both qualitative and quantitative
- Proactively develop and continuously incorporate assessment and quality improvement within the structure of diversity-oriented programming
- Publish thorough, well-documented evaluation reports
- Replicate and scale effective programs to enhance impact

## I. CROSS-CUTTING THEMES FOR FOSTERING INCLUSIVE EXCELLENCE

### Theme 1: Institutional Culture Change and Leadership Commitment

Institutional culture, reflected in workplace climate, is a major contributor driving URG individuals away from the scientific workforce. Institutions must look beyond individual programs and instead elicit top-down change through strong, vocal leadership and sustainable infrastructure that upholds inclusive excellence as an institutional core value (and investment). Sufficient, dedicated resources for diversity-oriented programming include funding, personnel, and space. Financial sustainability must be considered proactively and strategically – and also benefits from both philanthropic support and public/private partnerships.

#### *Actions for Institutions to Consider*

*Action:* Select **senior leaders** (e.g., presidents, deans, provosts) who are strong advocates for diversity and inclusion and serve as role models to faculty and students, as well as to other institutions.

- Examples of institutions with senior leadership that strongly advocate for diversity and inclusion include the University of Maryland, Baltimore County (UMBC), Wayne State University (WSU), NIH, and Massachusetts Institute of Technology (MIT).

*Action:* Develop **strategic plans** to enhance diversity and be accountable to adhere to them by tracking progress toward clearly defined goals. These plans should incorporate both curricular and co-curricular interventions – and they should withstand leadership changes.

- [WSU's Office of Scientific Training, Workforce Development, and Diversity](#) has had success in implementing a research-based and engaged curriculum through its NIH-supported Building Infrastructure Leading to Diversity (BUILD) and Med Direct programs.
  - *The data: Compared to a less than 20% 6-year graduation rate for URG individuals, 100% of BUILD participants graduated within 4.5 years. WSU has also implemented accelerated programs that allow students to obtain a master's degree in 5 years.*

*Action:* Implement a **centralized coordination model** for diversity-oriented programs to ensure synergy between programs. Such strategies might involve dedicated space, such as an inclusive excellence center, to support intentional dialogue and build a community of faculty, administrators, and students who are committed to diversity and inclusion.

- The University of California, Berkeley (UC Berkeley) plans to create a physical space – an inclusive excellence resource center – where interested, committed faculty who have demonstrated a commitment to diversity and have outcomes can share with one another (and others).
- Harvard University created the [Graduate School of Arts and Sciences](#) to centralize services for graduate students, set standards across individual schools, and put greater focus on campus climate – an approach they term “Diversity 2.0.”

- *The data: Harvard has increased its proportion of URG PhD recipients from 4% to 14% since it introduced a trans-institutional, coordinated approach that was not part of its previous efforts in which each school addressed diversity and inclusion in isolation.*
- The University of California, Davis (UC Davis) [Educational Enrichment and Outreach Programs](#) within the College of Biological Sciences employ a centralized coordination model to streamline recruitment and evaluation. This approach alleviates the burden on students to apply to multiple programs, makes it easier to obtain a critical mass of participants, and prevents duplication of effort.
  - *The data: UC Davis is the top college for women in STEM, was ranked second nationally for awarding bachelor's degrees to minority students in biological and biomedical sciences in 2018, and it was ranked first nationally in 2018 for awarding PhDs to Hispanic students in the biological and biomedical sciences.*
- The California State, Los Angeles (Cal State LA) [Minority Opportunities in Research Programs](#) (MORE) is a confederation of diversity-oriented programs that aim to prepare undergraduate and graduate students for success in PhD programs. It is considered a pilot for a larger, campus-wide Office for Undergraduate Research that is under consideration.
  - *The data: Cal State LA is the top baccalaureate institution of origin for Hispanic science and engineering PhD recipients, and MORE alumni account for 80% of these students. Since the inception of MORE, 165 alumni have earned a PhD, and 167 are in strong PhD programs nationwide.*

**Action: Articulate culture change** by being prescribed and specific to ensure culture change is not a nebulous concept to broader audiences.

- [MIT's Office of Minority Education](#) focuses on creating a sense of belonging for URG students, reminding students and faculty of its competitive acceptance rates and acknowledging that students have different levels of preparedness leading up to undergraduate school.
  - *The data: The [MIT Mentor Advocate Partnership](#) reports that 80% of first-year undergraduates feel that their faculty/graduate mentors helped them make connections with other staff and professionals.*
- Syracuse University's [Collaborative High-Impact Activities in Natural Science Education](#) (CHANcE) project aims to change institutional culture by creating a culturally aware and culturally responsive environment through introducing active learning and inclusive pedagogy strategies in the classroom. This is an evidence-based strategy that has been shown to improve the performance of all students, particularly URG students.
  - *Research findings: Effective student learning blends cultural understanding with high-impact curricular practices; students learn to think like scientists: mental organizational structures, self-evaluate and self-correct understanding and thinking processes.*

**Action:** In addition to holding institutional leaders accountable, **reward faculty** for demonstrating inclusive excellence and penalize those who do not follow policies and procedures designed to enhance inclusive excellence. Promotion and Tenure Committees are one vehicle.

- Vanderbilt University **tracks faculty's participation** in non-mandatory, culturally aware mentoring training and hopes to incorporate this data into the decision-making process for promotion and tenure.

**Action: Implement a cohort model** to enhance sense of belonging by providing participants with opportunities to interact with and empower their peers. To increase participation, programs might span departments, centers, or an entire institution. Cohorts are useful for developing a strong science identity and research efficacy and may also have a positive impact on mitigating imposter syndrome. Cohorts of URG scientists recognize the importance of having a diverse faculty and that URG scientists need role models.

- The [UC Berkeley Biology Scholars Program](#) (BSP) challenges the “by the numbers” view (e.g., SATs and high school GPAs are good predictors of success) about who can and should do science. It requires active participation of its members in support of each other's success.
  - *The data: Students enter BSP with lower test scores and high school GPAs than majority students outside of the program yet graduate in biology majors at the same rate and with nearly equivalent GPAs. Of the 3,600 participants (1992-present), 60% are racial minorities, 70% are women, and 80% are low income/first-generation students.*
- WSU has found cohorts to be instrumental to its success in retaining URG individuals.
  - *The data: WSU has a 100% retention rates across its programs, which span across the career path.*
- The [NIH Distinguished Scholars Program](#), a cohort model for enhancing diversity and inclusion of principal investigators in the intramural research program (IRP), has also demonstrated early success since its inception in fall 2018.
  - *The data: Since DSP inception, representation of URG faculty in the IRP has increased from 8.3% to 12.1%.*
- UMBC and several other universities have cited cohort models as important vehicles for establishing a greater sense of belonging and support for program participants.
  - *The data: [UMBC STEM BUILD](#) program: 98% retention for BUILD trainees (direct entry), 100% retention for transfer students. UMBC Meyerhoff program: Since 1993, more than 1100 students graduated (312 PhDs, 59 of which are MD/PhDs, 141 MDs, 274 master's degrees, primarily in engineering and computer science.*
- NIGMS recently launched its [Maximizing Opportunities for Scientific and Academic Independent Careers](#) (MOSAIC) program, which is a distributed-cohort model for enhancing faculty diversity at NIH-funded institutions. MOSAIC consists of a K99/R00 award to the scholar and UE5 cooperative agreements to professional societies to assemble cohorts of MOSAIC K99/R00 fellows based on scientific areas; provide networking, mentoring, and skills development; and encourage the exchange of ideas on how to employ evidence-based approaches to promote diversity. The first cohort of 15 scholars will ultimately grow to 75 scholars when the program reaches steady state.

*Action for Funders to Consider*

*Action:* Hold institutions accountable for addressing disparities in student matriculation, faculty hiring, and other important aspects of inclusive excellence by **taking these factors into account systemically and holistically** when making funding decisions.

- The National Institute of General Medical Sciences (NIGMS) includes “commitment to diversity and inclusion” as a scored review criterion for NIGMS training programs and incorporates diversity language in funding opportunity announcements to recognize the importance of institutional commitment.

**Theme 2: Replication and Dissemination**

It is important to build on models that have been demonstrated to work, and there are many examples of programs that have been replicated successfully at other institutions. Rather than “reinventing the wheel” and implementing new programs, institutions and funders should conduct thorough environmental scans to identify successful models that could be replicated and disseminated.

*Action for Institutions to Consider*

*Action:* Publish thorough, well-documented evaluation reports on diversity programs to inform the larger community of challenges and achievements.

*Actions for Funders to Consider*

*Action:* Systematically identify programs that are effective in enhancing diversity, study the critical elements of these programs, and **replicate or scale effective programs** at other institutions to enhance impact.

- The Howard Hughes Medical Institute (HHMI) worked with UMBC to replicate the [Meyerhoff Scholars](#) program at University of North Carolina, Chapel Hill, Penn State University, and Howard University.
- The cohort or cluster hiring model has been implemented at several institutions including NIH and WSU and has found to effectively enhance faculty diversity and improve retention rates.

*Action:* Work with institutions that are producing the largest number of PhD and MD-PhD recipients from underrepresented groups to **scale their impact**.

- *The data: If the top 30 baccalaureate institutions for URM PhDs and MD-PhDs make the effort to double the number of their African American undergraduates who go on for these degrees, a decade hence the United States would have almost 2,000 more African American doctorates in the natural sciences and engineering. This would represent an increase of almost one-third over the 6,000 or so African Americans who earn their bachelor’s degree at a U.S. institution.*

*Action:* **Scale programs** that tap into the large talent pool of individuals who have been involved in the criminal justice system.

- [Prison-to-Professionals \(P2P\)](#) seeks to reach, touch, and change the lives of people with criminal convictions through advocacy, mentoring, and policy change and has a 97.5% post-secondary education matriculation rate.

### Theme 3: Mentoring, Training, and Professional Development

Continuous mentoring and professional development training are crucial to the success of all researchers, including URG scientists. It is critical that mentoring and training are infused into the fabric of student and faculty experiences at institutions – creating a culture that values “growing your own talent,” providing continuous career development, and implementing inclusive practices.

#### *Action for Institutions to Consider*

*Action:* Recognize the value of providing students with **several different types of mentors**, each serving a different purpose (i.e., the [Thrive Mosaic Model](#), a developmental framework that supports scholar development, advocacy, and self-care, while also mitigating systemic marginalization and obstructionist practices), and form mentoring teams comprised of both junior- and senior-level faculty.

- Both WSU and MIT have had great success with vertical learning communities comprised of near-peer, peer, and senior-level mentors.

*Action:* **Train faculty to be strong mentors** and provide them with resources such as mentoring plans to facilitate their work. Ensure mentors are committed to success of their mentees and provide critical support during career transitions (e.g., first grant application, grant renewal, transition to new position). Evaluate the effectiveness of mentor training and adapt training resources as needed.

- The NIH-supported [National Research Mentoring Network](#) (NRMN) implements and disseminates innovative, evidence-based best practices to improve mentoring relationships at institutions across the country. NRMN connects highly knowledgeable and skilled mentors with motivated and diverse mentees, ranging from undergraduate students to early-career faculty, and facilitates long-term, culturally responsive interactions between them. NRMN provides coaching and tools for success in grantwriting and submission at more than 100 actively engaged partner institutions and organizations in five U.S. regions, including both public and private institutions.
  - *The data: Overall participation in the six NRMN grantwriting/coaching programs is highly diverse, and a third of participants are B/AA scientists. Since NRMN’s inception, 2,134 mentees and 134 grantsmanship coaches have been trained, resulting in 546 non-duplicative investigator participants who have been awarded a total of 152 awards totaling about \$65 million. Of these awards, 89 are from NIH (71% awarded to URG scientists, 73% awarded to women scientists, and about 20% of the awards went to institutions with a track record of high URM enrollment.*
- The NRMN-supported Health Equity Learning Collaboratory combines virtual coaching relationships and in-person meetings between grantwriting coaches and early-stage investigators, many of whom were PIs of the NIH-funded Research Centers at Minority Institutions, the Clinical and Translational Science Awards, and other partnering organizations.
  - *The data: This grantwriting/coaching program recently reported that investigators in its post-intervention cohort were approximately five times more likely to submit a grant application after adjusting for covariates.*

- The University of Alabama, Birmingham (UAB) [Mentoring Across Training Programs](#) (ATP) is assessing the percentage of faculty who successfully complete the online and in-person mentoring training based on the overall number required and is obtaining feedback from faculty mentors and trainees regarding quality of mentoring.

*Action:* **Systematically assess student satisfaction with their mentors** to identify areas that require intervention. Learn from the results to determine what groups are at greater risk for attrition.

- Vanderbilt University asks students to rate their satisfaction with mentors to better understand and address the needs of various trainees.
  - *The data: URG students rated mentors poorly in several areas: encouraging a healthy work-life balance; helping navigate graduate-school program requirements; providing constructive feedback on oral and written communication skills; and encouraging discussion of how racial/ethnic or gender identity influences training experiences. Female students rated mentors poorly in several areas: helping to meet and/or collaborate with external scientists; helping navigate graduate-school program requirements; providing opportunities to present data at conferences; and providing constructive feedback on oral and written communication skills.*

*Action:* **Be mindful of training fatigue** when administering new or continuous mandatory education about diversity and inclusive excellence. It is useful to incorporate both online and in-person trainings.

- The [UAB ATP](#) is a required mentor-training platform that includes culturally relevant programming. Faculty mentors complete a series of brief, 30-minute online trainings before participating in an interactive, in-person training that reinforces module content. Faculty can choose from different dates and times to complete the in-person training.

*Action:* Do not promote (including inadvertently) the **diversity tax**. In general, all early-career faculty have a lot of time demands, but URG faculty are often offered (and feel the need to accept) more service and outreach-related requests.

#### Theme 4: Implicit and Explicit Bias

Both implicit and explicit bias continue to hinder the growth and success of URG scientists. It is important to be direct when talking about these issues and to continue to educate the scientific community on the impact that these biases have on decision making and career outcomes.

##### *Actions for Institutions to Consider*

*Action:* Conduct further **research on the effectiveness of implicit bias training**, to understand and eliminate resistance to participation in these trainings. Create opportunities for **constructive discussion** on implicit bias and racism.

- The Syracuse University [Collaborative High-Impact Activities in Natural Science Education](#) (CHANcE) program aims to transform institutional culture to increase capacity for inclusion. The approach is not about “fixing” students but rather effecting institutional change through professional development activities for faculty.
  - *Findings: Social justice is not an argument that moves STEM faculty to action; STEM faculty vary in level of willingness to engage in course transformation; STEM faculty participation in an anti-racism workshop yielded mixed results; after completing implicit bias testing, STEM faculty resisted accepting evidence of implicit bias.*

*Action:* Approach decisions regarding recruitment and promotion **systematically** to alleviate the impact of biases.

- NIH SWD offers implicit bias education to IRP leadership and search committees for scientific positions.

*Action:* Involve **all institutional leadership** in conducting implicit bias training, being mindful to not only place this responsibility on URG scientist leaders.

- One of the NIH-funded [Diversity Program Consortium](#) institutional hallmarks of success is INST 3: Demonstrated commitment to enhancing the diversity of the biomedical faculty, with one metric being “review of hiring and promotion procedures and enforce policies that mitigate bias.”

*Action:* **Identify and respond appropriately to microaggressions and microinequities.** It is important that an administrative office and processes are in place to respond to acts of discrimination and harassment on campus and that the larger community can see that these incidents are taken seriously.

*Action:* **Highlight the success** of URG students and faculty to mitigate faculty biases regarding URG scientists’ likelihood of success.

- Faculty at MIT were excited about obtaining more students from the BUILD and WSU Med Direct programs after witnessing the success of the first cohorts.
- Several early-stage faculty panelists explained painful experiences of not being considered fully qualified by their colleagues. In one case, an African American scientist was presumed to be a non-faculty member.

## Theme 5: Program Evaluation, Evolution, and Partnerships

The importance of data-driven decision making is well recognized among the scientific community, but it cannot occur without significant resources and planning. Moreover, an abundance of research has been published on diversity-oriented programming, and it is vital that institutions build upon existing knowledge and reflect on other institutions' experiences (existing resources, career development already funded at an institution) to avoid programmatic redundancy and inefficiency. Finally, it is critical that institutions advertise their diversity-oriented programming effectively to students and faculty, as well as highlight to the broader community their commitment to inclusive excellence. Showcasing success often creates opportunities for partnerships and collaborations.

### *Action for Institutions to Consider*

*Action:* Raise awareness of diversity-oriented programming and its achievements both within institutions and to the broader community to emphasize the importance of diversity and inclusion, make resources more accessible to eligible program participants, and share successful models with other institutions.

*Action:* Hold events for institutions to share experiences and discuss opportunities for greater impact. Also pursue partnerships with philanthropic organizations, industry, and alumni to increase funding available for diversity-oriented programming.

*Action:* Develop and track **metrics for culture change**.

- Detailed hallmarks of success have been outlined for the NIH-supported [Diversity Program Consortium](#), and these include metrics on culture change. One example is monitoring inclusivity in the classroom through course evaluations.

*Action:* **Collect and analyze disaggregated data** (rather than using “one-size-fits-all” approaches developed nor tested for any one group) to inform critical stages for intervention and to better understand the needs of specific groups and scientific disciplines.

- The ADVANCE program has been specifically successful in supporting women in STEM at UMBC and focuses on culture change.
  - *The data:* Since the inception of the [ADVANCE Program at UMBC](#) in 2003, the number of women tenure-track faculty in STEM has increased 60% in 2018 compared to a 14% increase in men. The number of STEM women at the assistant, associate, and full professor ranks have increased substantially: assistant professors by 15%; associate professors by 75%; and full professors by 140%. As of 2018, 24% of all UMBC STEM faculty are women.
- African American men continue to be severely underrepresented in many fields and career stages, and it is difficult from a legal perspective to target these groups specifically. UMBC was able to work diligently with attorneys to develop effective diversity programming.

*Action:* Calculate **return on investment** of diversity programming, considering input variables such as cost per student, but also student and institution-level outcomes.

*Action:* Gain insights on effective communication and other approaches via **community connections**. Consider sending faculty representatives to community organizations that interact routinely with URG individuals to obtain a contextual understanding about barriers to STEM interest and involvement.

*Action:* **Broaden the definition of successful outcomes** for diversity-oriented programming.

- Syracuse University has had success in producing clinicians who engage in research careers, but this is not widely accepted as a positive outcome.

*Action:* **Qualitative data** can inform a stronger understanding of key challenges impeding diversity; e.g., through obtaining perspectives of diverse stakeholders. Ask students and faculty for input on their needs regarding training and other support. Encourage URG trainees to share their powerful anecdotes in workshops for faculty.

*Action:* Proactively develop and continuously incorporate **assessment and quality improvement** within the structure of diversity-oriented programming.

#### *Action for Funders to Consider*

*Action:* Assess which institutions are consistently receiving more funding awards than others and consider the long-term impact of uneven funding across institutions.

*Action:* Look for opportunities to **collaborate with the Department of Education, the Department of Justice, and other federal agencies** to address institutional inequities, such as incarceration rates and educational opportunities, at a larger scale.

- *The data: One in three Black males can expect to be incarcerated at some point in their lifetime. Less than 4% of formally incarcerated individuals have some form of post-secondary education, compared to about 35% of the general population.*

*Action:* Provide sufficient funding to institutions to **implement sustainable infrastructure** for enhancing diversity and ensuring inclusive environments. Ensure that each institution in a **partnership receives sufficient/equivalent funds** such that institutions with less resources are not at a disadvantage.

- WSU had to allocate significant funds from its own budget because the University of Detroit, Mercy received all of the NIH BUILD funds. Although the partnership was instrumental to WSU, not all institutions would be able to take the same measures.

*Action:* Create opportunities for funded institutions to engage with each other.

- The Burroughs Wellcome Fund holds awardee dinners and other networking events to bring universities together and share their experiences.

## II. EVIDENCE-BASED INTERVENTIONS BY CAREER STAGE

### 1. Undergraduate and Graduate Training

*For Individuals (trainees or faculty)*

Stress the importance of diversity to students (e.g., by asking them to write diversity statements) to help them recognize the importance of diversity before they become faculty.

Give students early research experiences to get them excited about research, as many students do not consider a research career when they begin college. Award class credit for research experience when possible to alleviate financial pressures that many individuals face, including those from URGs.

- A survey of [UC Davis Biology Undergraduate Scholars Program](#) (BUSP) alumni who pursued biomedical PhDs found that nearly half of the students started college with the goal of becoming a biomedical doctor. Most students served by BUSP cannot afford to volunteer in a lab. BUSP is an important recruitment pool for upper division research programs. It serves as a mechanism to kindle interest in undergraduate research (and nurtures interest for students already excited about it).
  - *The data: BUSP participants have greater persistence than non-participants in life sciences courses and greater academic achievement compared to non-participants.*
- The University of Texas, El Paso offers zero-credit research courses to allow students to receive critical training and recognition at no additional cost. Enrollment is increasing, and some departments are at capacity, currently measuring impact (course enrollment enables tracking student outcomes).
  - *The data: Undergraduate researchers achieve higher GPAs than students not doing research; as of the summer of 2018, more undergraduate researchers are graduating than non-researchers; of those who graduated (as of summer 2018), more undergraduate researchers are enrolling in post graduate education than non-researchers.*
- WSU's "Laureates and Leaders" program guides a cohort of undergraduate students from URG in their pursuit of graduate school from their sophomore year to graduation.
  - *The data: 78% of laureates and leaders from the class of 2018 went on to graduate programs, and 64% went on to PhD programs in STEM.*
- [UMBC's Meyerhoff Scholars Program](#) is a 4-year merit award for incoming freshmen that involves financial support, community-building experiences, academic and career-development support, peer and faculty mentoring, and family involvement.
  - *The data: Since 1993, more than 1,100 students graduated from the program, and alumni from the program have earned 312 PhDs, 141 MDs, and 59 MD/PhDs.*

- [UMBC's STEM BUILD](#) program is for promising first-year students, native & transfer students, and students selected by 5 collaborating institutions, who are at risk for successful completion of STEM degrees.
  - *The data: A randomized control trial compared BUILD student outcomes to those assigned to a STEM Living Learning Community and related control group. Of those accepted to the MARC U-STAR program, 6 were BUILD trainees, 2 were STEM Living Learning Community Participants, and 0 were in the control group.*
- Howard University's MARC U-STAR Program's participants undergo required training activities that make them competitive for graduate school. The framework is based upon Social Cognitive Career Theory. The practices and activities include selecting a faculty research mentor, midterm progress report, graduate school workshop, RCR training, abstract and manuscript preparation, oral presentation preparation, and summer research experience.
- The UAB [Mentoring Across Training Programs](#) (ATP) is a required mentor-training platform that includes culturally relevant programming.
- [Burroughs Wellcome Fund's Graduate Diversity Enrichment Program](#) (GDEP) aims to enhance the graduate experience and provide early exposure to various professional environments and networks for which future research and/or professoriate opportunities might manifest. Student support includes participation in conferences and workshops, networking opportunities, and provision of equipment, materials, and supplies. This program is still being piloted.

#### *For Institutions*

Recognize the potential excellence of students; don't always rely on standardized test scores and other quantitative measures. Assess the proportion of institutions that are no longer requiring standardized test scores for applications and the impact of not using these as a factor in student admissions. Use interviews to select highly motivated students and develop their talent.

Promote science careers to students who have not yet obtained a college degree to increase the talent pool and support those who express interest as they embark on difficult courses.

Teach faculty to empower students to ask their own disciplinary questions and get away from the idea that only some people are born geniuses; teach faculty to be mindful of terminology used to describe successful students.

## **2. Transition to Independence/Faculty**

#### *For Individuals*

Acknowledge that not all postdocs are equipped to be good teachers upon graduation, and many could benefit from targeted training about effective teaching practices.

- The "Professor 2.0" concept provides new faculty more onboarding time than the usual week-long orientation. This concept might include the whole first semester, where new faculty can read about pedagogy and learn about who their students are and what they need to learn effectively.

Provide coaching and training to faculty who are pursuing R01 grants for their institutions.

- NRMN currently provides these resources.

Increase awareness of typical startup package and assist faculty with negotiations.

#### *For Institutions*

Encourage institutions to create more opportunities for postdocs to build their networks.

Ensure that mentoring addresses external funding challenges.

Develop interventions that alleviate the stress involved with holding a position in academia; provide strong support structures for early-stage faculty and be transparent about challenges and failures, as well as successes.

Recognize that postdocs have different needs than more-experienced faculty.

- [Burroughs Wellcome Fund's Postdoctoral Enrichment Program](#) (PDEP) aims to enhance the postdoctoral training and overall experience of junior scientists from URG by providing enrichment support at critical junctions in their careers. Support includes mentor collaboration and training, networking, and professional development workshops.
  - *The data: Between 2013 and 2015, 80% of PDEP awardees secured faculty positions.*
- [HHMI's Hanna H. Gray Fellows Program](#) provides financial, professional development, networking, and mentoring experiences to scientists in the postdoctoral training phase and continues to provide long-term support to help the scientists successfully transition into independent faculty. The program consists of 4 years of postdoctoral training with flexibility to extend and 4 years of faculty grant support with flexibility to carry forward. There are currently 30 Hanna Gray Fellows training at 18 institutions, with plans to advance 60 fellows into the research professoriate between 2020 and 2030.
- [Vanderbilt University's Academic Pathways Program](#) is designed to prepare recent Ph.D. graduates for a tenure-track career through financial support. It offers a \$60,000 stipend and \$20,000 as a research and professional development fund.
  - *The data: Interviews with fellows revealed several helpful practices: having a senior mentor and connecting with junior faculty on the job market; and financial support for conferences and writing/editing help.*
- The [NIGMS Postdoctoral Research Associate Training](#) (PRAT) program provides high-quality postdoctoral research training in the basic biomedical sciences in NIH intramural research laboratories to a diverse group of postdoctoral fellows to prepare them for leadership positions in biomedical careers. Training includes a mentored laboratory experience as well as intensive career and leadership development activities.

## CONCLUSIONS

As described in this document, the NIH Advancing Diversity Programs Conference convened a diverse group of scientists, researchers, and faculty members across the biomedical research ecosystem to share their individual perspectives and unique expertise about enhancing workforce diversity. Across five topic panels, conference participants presented data-driven perspectives on enhancing scientific workforce diversity and they discussed new program data and outcomes, best practices, and lived perspectives. The primary goal of the conference was for NIH to hear about the range of approaches these senior leaders have taken to develop and implement inclusive excellence at their respective institutions.

NIH intends to reflect on the ADPC discussions as it develops a set of best practices to enhance diversity and inclusion across the NIH-funded extramural community. Through dissemination of the evidence-based practices described herein, NIH aims to create and maintain cultures of inclusive excellence – those cultures that establish and sustain scientific environments that cultivate and benefit from a full range of talent. Creating a diverse and inclusive scientific workforce is not only essential for research excellence, but it is also good stewardship of federal funds, as articulated in the NIH Strategic Plan. The individual experiences, examples and multiple actions detailed in this document provide a path to support systemic and sustained culture change where thriving students and faculty from all backgrounds can make major contributions to the biomedical and behavioral research enterprise.