# Condensed Minutes from the Annual Meeting of DAP and T32 Grantees University of Wisconsin-Madison, The Fluno Center, Madison, WI October 14, 2013 – October 15, 20213

See: http://www.genome.gov/pages/extranets/DAPT32October2013 for video files of the meeting as well as copies of meeting materials and presentations.

## *Monday, October 14, 2013*

## Welcome and Introductions

### 10:00 am *David Schwartz (University of Madison-Wisconsin) and Treva Rice (Washington University in St. Louis)*

**David Schwartz**, Director of Genomic Sciences Training Program at the University of Wisconsin-Madison opened the meeting and welcomed everyone to Wisconsin. His T32 program has been training students for the last 10 years and he is looking forward to the next 5 years as well. He gave a brief and humorous overview of Wisconsin, including what it is NOT (Garrison Keillor and Lake Wobegon) and what it IS - academic excellence, beer, cheese and bratwursts. He thanked the NHGRI program staff for their guidance in leading the training programs and in supporting this meeting, even in their absence.

**Treva Rice** gave an overview of the meeting. She announced that the NHGRI staff (Tina Gatlin, Heather Junkins and Bettie Graham) would not be able to attend due to the government furlough. In addition, the advisors would not be able to attend for the same reasons (Kim Nickerson and Vanessa Gamble). She also announced that some of the T32s that were up for renewal this year have been given an extension while a new RFA is being developed. Dr. Graham had intended to discuss some of these details for the benefit of the T32 programs, but her discussion will have to wait until a later date. It was also announced that the meeting was being videotaped. Treva announced that the planning committee (Alison Gammie, Louise Pape, Alexander Hernandez-Siegel, Zia Isola, Eboney Smith and Treva Rice) together with NHGRI program staff, were to be commended for planning the agenda for this meeting.

## Session I T32s: Mentoring, Training Experiences, Biases and Stereotypes

### 10:15 am Dealing with Biases and Stereotypes in an Academic Setting *Speaker: Molly Carnes (University of Madison-Wisconsin)*

**Jo Handelsman** introduced the first speaker, Molly Carnes, MD. Dr. Carnes, a neurobiologist in psychiatry and geriatrics who does research on change in diversity that is highly regarded at the national level.

**Molly Carnes:**

Two types of intergroup bias exist: explicit and implicit. Explicit stereotypes (e.g. about race, gender, religion) are consciously endorsed, personal beliefs which appear to be decreasing in the US over last 10-30 years. Implicit processes are based on the mere existence of cultural stereotypes and are still highly prevalent. An **IAT** (Implicit Association Test) self-test gauges the degree of implicit and explicit attitudes and beliefs and can be found on the Harvard website (see https://implicit.harvard.edu/implicit/). Implicit processes are major factors in preventing diversity in the academic medicine setting, and in perpetuating health care disparities. Dr. Carnes' presentation focused primarily on gender biases, although examples of racial bias were also provided. In general, men are associated with agentic traits (action oriented) and women with communal (nurturing oriented). Simply acknowledging these stereotypes can help break down the biases.

Background: Research shows that there are gender differences at some, but not all, levels of NIH grant awards. For example, males receive more of the highest level mechanisms (e.g. program grants) than women. Further, although there are no gender differences in type 1 awards, there are differences in type 2 awards with men more frequently being awarded renewals. Males are perceived as more hire-able, more deserving of mentorship, worth a higher salary, etc, as compared to identically credentialed females, while females are considered more likeable. Implicit bias also is evident in a race context, (blacks perceived more negatively than white), even attributing lower compliance to treatment among black than white patients. (See presentation for additional references.)

Dr. Carnes' project is a cluster randomized controlled study in 92 departments (46 pairs). Half of the departments (treatment) receive an intervention in bias literacy workshop, the other half do not, and all received surveys before and after. Dr. Carnes' noted that the half who did not receive the intervention during the study was offered the workshop after the study concluded. The workshop, which consists of 3 modules: (1) origins of implicit bias (2) bias literacy and (3) bias-reducing strategies. Module 1 demonstrates how habits of mind can be subject to error, and thus can fail our intentions. Module 2 outlines 6 bias constructs (expectancy bias, prescriptive gender norms, occupational role congruity, reconstructing credentials, stereotype priming, and stereotype threat). Module 3 provides personal bias reduction strategies including: stereotype replacement, counter-stereotypic imaging, individuating, perspective-taking, and increase opportunities for contact. Two that DO NOT work and in fact may enhance biases are stereotype suppression and too strong a belief in one's personal objectivity.

Did it work? There were significant differences between intervention and control group in several behaviors, but NOT in the IAT survey (implicit process). Some behavioral measures that changed were: increased awareness of biases, increased motivation to change, external motivation to change, self efficacy, and expectations of a positive outcome. In addition, the faculty worklife survey found improvements in feeling that their research was valued, that they "fit" into department, and in raising personal/family issues when in conflict with department activities.

In summary, these kinds of stereotype and bias interventions do show results in breaking some behavioral habits and in improving departmental climate.

Discussion: Overall, only 30% of invited faculty participated, which varied from less than 2% to nearly 100%. It appears that a critical mass of faculty must participate in order for there to be observable results in a given department (i.e. a dose-response effect). The workshop trainers were not randomized by gender as there were not enough trained males to conduct the workshops.

## Panel Discussion—Implicit bias and stereotype threat (ST) in academic settings: A discussion of best practices

### *Moderators: Alison Gammie (Princeton University) and Eboney Smith (Broad Institute)*

**Eboney Smith**: Eboney indicated that Kim Nickerson was supposed to participate in this, that it is a topic that he was excited to talk about, and that his presence was missed. Panel goals were to understand implicit bias and stereotype threat, identify how the concepts may operate in an academic training environment, and finally to discuss strategies to mitigate biases and stereotypes and improve trainee performance.

Background: Stereotype threat (ST) refers to being at risk of confirming a negative stereotype about oneself or one's social group. Background studies were reviewed contrasting black and white undergraduate student performance and attitudes (Steele & Aronson, 1995). Verbal items from the GRE were compared across student racial groups under two conditions. In one, students were told that the test was a good indicator of intellectual ability (threat condition), and in the other, students were told the test was a problem solving exercise (non-threat condition). Performance on the GRE verbal items was lower in black students than white students under the threat condition, but there was no black-white performance difference under the non-threat condition. (See presentation for references).

Situations that lead to ST include: highlighting stereotyped group, situations involving solo status (i.e. the only representative of a group present), invoking stereotypes, and evaluation scrutiny. Some consequences of ST are decreased performance, disengagement and dis-identification and altered professional aspirations. Other consequences include physiological processes such as increased anxiety, reduced working memory capacity, reduced effort and loss of motivation, reduced self-control and reduced creativity, flexibility and speed.

Suggestions for reducing ST include: Reframing the task to emphasize fairness, de-emphasizing threatened social identities, encouraging self-affirmation, emphasizing high standards with assurances of capability, providing role models, providing external attributions for difficulty, emphasizing an incremental view of ability.

The audience was asked to break out into small groups and have a discussion about the following topics. Conclusions from these discussions were then presented to the general audience. The questions for small-group discussion were:

(1) Where in your academic and research settings might implicit bias and stereotype threat be at play?
(2) How have you, your programs, and/or your institutions addressed these topics with faculty, research mentors, and/or students and trainees? Challenges? Successes?

(3) What advice, ideas, or strategies would you offer for approaching these topics with faculty, research mentors, and/or students and trainees?

## Questions and Discussion: Participants

How useful is it to have these labels? Do they help or hinder progress? The bottom line is that while research does suggest labels may lead to altered performance, we still need the labels to know if biases exist.

Is just having an open discussion in a department helpful in reducing biases, whether or not there is an intervention? Molly Carnes indicated that having the discussion certainly affected externally motivated attitudes, but not necessarily internally motivated ones.

Response rates for Dr. Carnes study: Overall 30% attended, 50% completed at least 1 survey.

Richard McGee: His study (to be discussed tomorrow) involved group discussions about stereotypes. However, it was a clinical-trials design so that equal numbers of races/ethnicities/genders were present among mentees and coaches. Key findings in this regard are that having these discussions is absolutely essential, but they need to be done in a "safe space" where participants feel they are not being judged. Thus programs are correct to be cautious in how / where / when these topics are brought up.

Another suggestion in response to why is this topic being raised is that we also train students in how to become leaders and so students should be educated in how to deal with these situations in anticipation that they will need the skills as they progress through their career levels.

Michael Boehnke: Another question is the opposite of the first question above: Where is bias and stereotype threat **NOT** employed? Where are people most vulnerable? As faculty and staff we have too much to do so how do we do things in the best possible way to the greatest possible advantage? Suggests this be included at admissions and integration in the labs, but this is probably less significant in larger class room setting.

How do we bring up issues to students? Emphasize these are issues that everybody has as they progress through science and they are not unique to one group.

Maggie Werner-Washburne - Return activities: We invite a counselor to come and talk about biases and ST to the group. This usually leads to seeing how it is common to everyone and not just one or two individuals or groups.

Maggie Werner-Washburne: In the context of these workshops, what are the tools you give students to recognize problems in the moment and do something about it? Answer: The workshop counselor usually has example exercise and she walks students through the stages to demonstrate recognition / awareness of the problem and then discuss alternative responses / strategies. Another program is called "speaking up to bias" which is campus-wide and students are encouraged to attend and participate (i.e. seeking out opportunities that already exist on campus).

Materials for these workshops were requested. Speaker (above) indicated they could provide them so they could be posted on-line.

Maggie Werner-Washburne: Once student is already highly motivated, then we emphasize the positive and ignore the other stuff. When someone is not nice to you, then recognize you are

not marrying that person so you are not obligated to respond, especially if a response would not be helpful.

Jo Handelsman: Are we raising hot-house flowers that thrive in a protected environment but then wither when are thrown out into the real world? It's important that the training they receive alerts them to the possibility that, even if they are treated fairly in the program, they may have hurdles later on and their training should help provide strategies to deal with it.

Richard McGee: There is also growing body of literature on "stereotype resilience" that should be considered.

Eboney suggested that some resources are on the presentation (see PowerPoint).

## 11:45 am Student Panel: Training Experiences at the University of Wisconsin-Madison (Genomic Sciences Training Program)

### 1. Deborah Muganda-Rippchen

- **Pre-doctoral trainee**
- **Beyond expression profile clustering: Comparative exploration of high-dimensional biological time series**

Deborah is a computer science student working on a project that deals with time series data. She works with data that were collected at multiple time points under multiple conditions, with the overall aim of detecting similarities and differences between and among them. She also looks at how gene expression changes over time in the separate groups. The problems with this type of data are there is a lot of noise in high-dimensional time-course data, there is temporal sparseness (more or less data at different time points), there is interdependence among data points, and there are multiple conditions. So, they want to identify differences within conditions (using expression profile clustering) as well as differences across conditions (time series alignment, alignment clustering). This work was presented at ISMB in July of 2013 and currently working on writing up the paper.

Deborah's career's goals have evolved over time as she has matriculated through the programs at UW. Eventually, she hopes to become a professor and teach. Deborah has had a multi-disciplinary experience at UW, starting with a bachelor's in chemistry and math, and eventually combining computer science, bioinformatics and some genetics. She has done this by participating in various summer programs, working on multiple degrees, and working in the labs of multiple researchers. This trans-disciplinary experience has led to research collaborations in multiple disciplines that would not have been possible without the multi-disciplinary training.

### 2. Samuel Joseph (Joe) Ollar

- **Pre-doctoral trainee**
- **Optical mapping of the borteomib-resistant genome in myeloma: Target validation**

Joe graduated from San Diego State University and moved to Madison in 2011. He is part Native American, although he says he does not look it and this sometimes leads to problems for him. He is involved in community work, for example he cofounded a student outreach program which hosts a Science Night (among other things) for elementary school students. One of the highlights of his education has been the multiple rotations that he has been exposed to. Although overwhelming at times, the multiple exposures has helped him determine what projects and mentors are the best fit for him, as his first assignments did not work as well.

Joe's research on multiple myeloma which is incurable, malignant, and inevitably it becomes drug resistant. He looks at structural genetic variants during the course of the drug treatment. They have found ~2,000 structural variants in the genome, and about 200 of those appear to be drug resistant. These occur in multiple genes.

### 3. José Rodríguez-Martínez

- **Post-doctoral fellow**
- **Sequence specificity landscapes and genomescapes of DNA binding proteins and small molecules**

José works at the interface of chemistry, biology and genomics. He started in Puerto Rico, and has previously participated as a MARC (Minority Access to Research Careers) fellow, and as a RISE (Research Initiative Scientific Enhancement) fellow, as well as a DoEd GAAN fellow. Currently, he is a post-doctoral fellow in GSTP at UW and is on an NHLBI minority supplement. He is working on controlling gene expression levels. In particular, he is looking at sequence recognition properties of DNA binding molecules that previously used micro array data. Is not getting away from that data and looking at cognate site identification (CSI) intensities; how many times do sequences occur and what is the intensity. He then identifies sequence specificity landscapes using visualization methods. Regions with 0 mismatches, 1 mismatch, 2 mismatches, etc are displayed. For example, in the 1 mismatch there may be several different variants.

José's GSTP experience is that having both a mentor and co-mentor have been helpful. Also, campus resources are good, and being able to talk with senior GSTP fellows is useful. Challenges have involved removing some of the mysteries surrounding the postdoctoral experience. That is, it is now more clear what can be done in the post-doc situation as compared to what he knew as a graduate student. Some of the features that he really likes have been diversity of the projects and the weekly seminars that stimulate multi-disciplinary collaboration. The only change he would recommend that the IDP (individual development plan) should be mandatory and that post docs should take better advantage of the mentors and co-mentors.

## Questions and Answers: Participants (can be found in uncondensed minutes and in video files)

## 2:00 pm Mentoring and Individual Development Plans

### *Speakers: Richard McGee (Northwestern University) and Christine Pfund (University of Madison-Wisconsin)*

We will begin with a case study example and open discussion and then IDPs. Then, we will discuss ways to engage faculty and mentees in how to be effective mentors and mentees.

Rick briefly mentioned his clinical trials study involving over 250 PhD students. On an annual basis he does in-depth interviews with each student. This example involves a 4th year PhD student. During last year's interview, she was absolutely committed to a research career, was completely happy with her mentors and could not be happier about her training. Now, she has completely changed. There is no way she would want to be a PI and does not know what is expected of her. It turns out her mentor was a new faculty without any mentoring experience, was having the student write an R01 research proposal. When student went before her committee they said there was no way she could do all of that. So, there has been a failure on the part of the mentor to direct student properly, the student has now failed her prelims. Group discussions to talk about the following questions: Imagine you are the program director and address these questions: (1) Does this situation require an intervention? Why or why not? (2) If you had a subsequent interaction with the trainee, what would you do? (3) If you had a subsequent interaction with the mentor, what would you do? (5) What could have been done to avoid this situation in the first place?

Need intervention with student to determine what her options are. Let student know she is not alone and that this doesn't necessarily mean it is over. An intervention is needed to reawaken her interest in research. However, first need to determine if this change of mind is a permanent or temporary decision to leave. Intervention should also be done with mentor. The mentor needs a mentor, e.g. a more experienced senior co-mentor. It was evident that some institutions here have good system to mentor the mentors, and others do not. It is important to NOT avoid discussing these situations. Not only is the qualifying exam a key milestone time, but a year later is also a key milestone.

What could have been done? IDP is a means to a conversation. There is no single best method. It involves the mentor and trainee sitting down together, on a regular basis, to have a conversation about the long term plans for the trainee. Some structure around this conversation would be desirable. IDPs are just as much for the mentor as for the mentee so that both know where the relationship is headed. University of Pittsburgh has done an excellent job with developing these materials at an institutional level.

Helping mentors to become more effective, in particular research mentors. PI → post doc → grad student → UG student. Thus, most individuals serve both mentor and mentee roles. A resource is a book called "Entering Mentoring" (http://www.researchmentortraining.org/) by Jo Handelsman and Christine Pfund. Important elements of mentoring can be captured using a process-based approach. This has developed into a workshop with 9 different curricula (https://mentoringresources.ictr.wisc.edu/). Information on this website allows you to also build your own curriculum using existing components. The basic training consists of 4 two-hour sessions: (1) Introduction to mentor training, maintaining effective communications; (2) ligning expectations, assessing understanding; (3) Addressing equity and inclusion, fostering

independence; and (4) romoting professional development, articulating a mentoring philosophy and plan. The curriculum was implemented using a randomized trial. The study population was mostly full professors, male, white, with 15 or more years of mentoring. Pre and post surveys were administered, suggesting the mentoring workshop did produce "better" mentors as rated by mentors and mentees. The training has been adapted for different levels of mentors and researchers and in different areas of study. The website has a real-time IDP builder (see https://mentoringresources.ictr.wisc.edu/ website).
Rick talked about his CLIMB program (Collaborative Learning and Integrated Mentoring in the Biosciences), during first 2 years of the PhD. This program teaches the mentee what are good characteristics of good mentoring so that mentee will seek out these types of relationships and even elicit the desired style from their mentor. That is, mentee becomes an effective manager of the mentoring relationship.

Rick also talked about creating mentoring communities, or coaching. This process allows individuals to come into larger environment with many coaches.

The early version of this program was funded for minority students. It turned out that the program was stigmatizing these students. However, when program was opened to all students using the same protocol, it became successful.

What is difference between coach and mentor? Core element, someone with demonstrated skill moves from mentor to coach. A mentor is doing good science. As his/her ability to guide someone through it is proven, then he/she becomes a coach. It must start from a level of expertise.

## Panel Discussion: T32 Program Directors
## *Mike Boehnke, Jo Handelsman, Jeanette Papp, and Willie Swanson*

**Michael Boehnke:** To prepare students, recommend preparatory course work. Ask them to come in May or June (early) to start a research project rather than waiting until fall. Wants to give shout-out to NHGRI for providing resources to have experts come in to the program to give workshops. Mentors are lab director or PI, but try to get a second person who is helpful in taking other courses or outside the department. Co-mentor is chosen in various ways. Proactive open-door policy by program director. Has student mentoring, from very informal to formal, e.g. panel discussions. Active tutoring and study group, and strongly encourage students to take part and get involved early. Also, tutees become tutors. Recognize that different performance levels can constitute success, depending on where the student started from. It was extremely important to have lots of opportunities to get together, often with food and beer.

Jo Handelsman: What we can do to impress on colleagues at NIH to bring about a better form of graduate education, particularly regarding mentoring. We are at important point now because a few years ago nobody was talking about what we are talking about today. There are now more resources (mentoring, etc) on websites and reports available now, for example, President's Council of Advisors on Science and Technology related to undergraduate

education. Know more about best practices with data upon which to base recommendations. One of the key things is teaching students to be good mentors. This also helps students become better mentees. Learning to be good teacher is also key. Entrepreneurism is critical if we are serious about breadth of careers. Professional development should be included as required process in training by NIH. Hope NIH spends more money on training grants in the future to include / require these professional development elements in the programs. Teaching students about diversity of careers available is important. It is also critical to find a way for each of us to tell our students how much we love our jobs, i.e. happy role models! What is keeping us in the profession that we are in and students don't hear that. They only hear about rejected grant applications and problems. Faculty need to be trained to be good mentors. This should be required part of the training grants. For example, mentoring programs like Chris and Richard described are some good examples of workshops.

**Jeanette Papp:** Echoes that mentoring training should be required of the mentors. However, she cautions that the faculty are already so busy, and already have so many mentees, that they will not find the time to do it unless it is required! For our program, we do not have a co-mentor. However, the director and co-director of the program meet with the student's advisor annually to make sure the student is making good progress. So far we have never lost a URM student on the training grant. Currently have 2 URMs. One is very senior and with other personal duties her commitment to program is not as great as it should be. The other is very young and not serious enough for the mentor, so the director had to step in and make adjustments. Another problem they see is the "failure to launch" where students get to the end but don't quite finish properly. They also try to make sure each trainee gets extra training or knowledge that they might need but are not getting through the regular coursework. Try to make the point that their training on the grant is not only for them, but also go help advance research and science in general. That is, they are making an important contribution to the field during the course of the training. Encourage students to start thinking of themselves as mentors also. Have not, to date, done much with "who to be a mentor or mentee", but think this is a good time to add to their program. How to do team building and work in / set up laboratory and how to do work within large consortium are important training components.

**Willie Swanson:** His program is still new. Willie thinks is important to sponsor interactions between labs and their students. At annual faculty meetings, each student is discussed. Usually start with more advanced students first to make sure they are on good developmental trajectory. They have co-mentors. They have student discussions. The University is just now starting to talk about IDPs so this will be added to his program, currently it is informal.

## Questions and Answers: Participants

**Rick and Chris follow-up:** Regarding IDP and career development, be sure the student has a core, critical self-assessment, and that this opens a discussion with the mentor. Getting it down on paper will help direct the conversation. Rick's studies shows that the rate of professional development is much steeper (better) when formal written career development plans and with formal mentor and co-mentor assignments.

What is true scientific mentoring and co-mentoring? Mentors should not be too closely related in the same field. They should bring together two different ways of looking at the problem, e.g.

different fields. You also need at least annual face-to-face meetings among them. Multidisciplinary is one way of describing this protocol. This way, the mentors themselves begin to better understand the whole process and the "other" point of view.

Time to degree: Should not be looking at this as metric. What you do, professional development and multidisciplinary, is more important than how long it takes to get to associate.

Outside activity: May also be important, for example, exposure even off campus like biotech. Jo believes that programs that do this do NOT end up spending more time than programs that do not. Jo believes some data should be collected to document this.

Mentoring: It seems like any attention to mentoring is good and is better than nothing. What is the best thing you can do to get biggest bang for your buck? You will not get much out of it if it is a one-time thing. It's something that must be done / repeated in different ways across time. For example, hosting a brown bag seminar on mentoring and go from there, e.g. make it regular. Start small and build. Have an expert come and talk to your lab. Bring a mentoring case to every faculty meeting and spend nominal time talking about it (e.g. 15 minutes). Bring a human resources case to the faculty meeting for discussion.

Question about what is actually coming from NIH regarding IDPs in the future and how strong will that recommendation be. Jo doesn't think we are at too much risk of over-mentoring.

We may not want to use as our bench-mark the absolutely best student to gauge success. Success may need to gauge relative to where they start from, especially if they come from non-traditional backgrounds.

## Session II Program Monitoring and Future Directions

### 3:30 pm DACC Presentation: Measures of success for DAPs and T32s using REDCap Data

*Speakers: Treva Rice and DACC Team*

The DACC presented data on measures of success for the DAP and T32 programs. Baseline data were collected during the training period. Follow-up data were collected at various time points after the training period. For the DAP programs, multiple follow-up records available and data from only the most recent follow-up visit were analyzed. For the T32 programs, there was typically only one follow-up record. In each case (for DAPs and T32) the date of follow-up was not standardized across students. Rather, the follow-up date is typically during the last one to two calendar years. Thus, the interval between baseline and follow-up could vary from as little as 1 year to as long as 15 years. Consequently, follow-up statistics were reported in 5-year bins. Data were also analyzed separately by baseline career level (for example pre versus post-doc for T32 and K-12, UG, etc for DAPs). The relevant question assessing "success" at follow-up was whether the trainee was still in a STEM field. Additionally, current status (student versus employed) was also assessed.

The number of institutions and programs and the race/ethnicity breakdown for each of the DAP and T32 programs are shown below. For the DAPs, about 10% of the sample does not self-

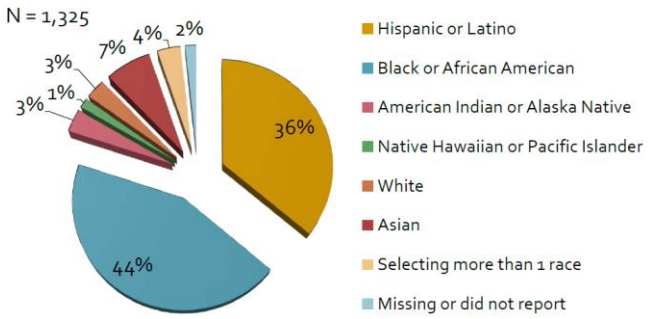
report a URM race/ethnicity (i.e. white or Asian). For the T32s, about 10% of the sample does self-identify as URM.

## Institutions and Programs

✓Baseline data only
✓ Baseline + Follow-u

| | DAP Institutions | K-12 Sum | UG Sum | UG | PB Sum | PB | GR | PD | MF | FA |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | U Washington Seattle | ✓ | ✓ | | | | ✓ | | | |
| 2 | Baylor CM | | ✓ | | | ✓ | | | | |
| 3 | Broad Institute | ✓ | ✓ | | | | | ✓ | ✓ | ✓ |
| 4 | Dana Farber Cancer Ins | ✓ | ✓ | | | ✓ | | | | |
| 5 | Harvard U | | ✓ | | | ✓ | | ✓ | | |
| 6 | Jackson Laboratories | ✓ | ✓ | | | | | | | |
| 7 | Johns Hopkins U | ✓ | | | | | | | | |
| 8 | UC Santa Cruz | | | ✓ | | | ✓ | | | |
| 9 | Harvard U / UNM | | ✓ | | ✓ | ✓ | ✓ | ✓ | | |
| 10 | USC | | ✓ | ✓ | | | ✓ | | | |
| 11 | Washington U St. Louis | | ✓ | | | ✓ | | | | |
| 12 | Yale U | | ✓ | | | | | | | |
| | | 5 | 9 | 2 | 1 | 4 | 4 | 1 | 1 | 1 |

## DAP: Race and Ethnicity

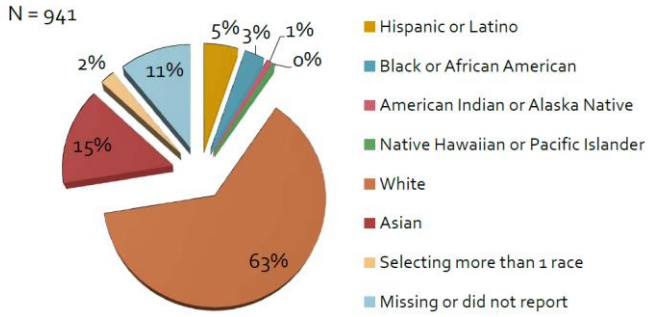



## Institutions and Programs

✓Baseline data only
✓ Baseline + Follow-up

| | T32 Institutions | Pre-Doc | Post-Doc |
|---|---|---|---|
| 1 | Harvard / MIT | ✓ | |
| 2 | MIT / Broad | | |
| 3 | Princeton U | ✓ | |
| 4 | Stanford U | ✓ | ✓ |
| 5 | UC Berkeley | ✓ | ✓ |
| 6 | UCLA | ✓ | |
| 7 | U Michigan | ✓ | ✓ |
| 8 | U Pennsylvania | ✓ | ✓ |
| 9 | U Washington Seattle | ✓ | ✓ |
| 10 | U Wisconsin Madison | ✓ | ✓ |
| 11 | Washington U St. Louis | ✓ | ✓ |
| 12 | Yale U | ✓ | ✓ |

## T32: Race and Ethnicity




In the T32 sample, there are 123 pre-doc trainees who have a follow-up record within 5 years of training, 122 pre-docs with a follow-up record that is dated 5-10 years post-training, etc. The percentage of trainees who remained in a STEM field at the follow-up visit ranges from 40% (pre-docs at the 10-15 year follow-up visit) to over 90% (some post-docs groups).

For the DAPs, the percentage of trainees remaining in STEM varies from 47-48% (K-12) to 90% (GR at 5-10 yrs). As with the T32s, the groups with the smaller percentage remaining in STEM also have the largest percent of missing data. There are TWO noteworthy patterns in all of these tables. First, these numbers are more favorable than US averages, where (e.g.) less than half of US STEM students persist in STEM until graduation (see Graham et al, Science, 2013). Further, African-American student persistence is even lower, switching twice as often as the white students. Second, the strata with the smallest percentages also have the largest percentage of missing data (where the % remaining in STEM + the % not in STEM + the % missing = 100%). Thus, the smaller percentages remaining in STEM may not be representative, particularly if the data are not missing at random.

Additional data on percentages of trainees remaining in STEM, by employment versus student status, were also presented with resulting patterns similar to the above.

## Questions and Discussion:

**Defining Follow-up date:** Follow-up was defined as the number of years since the date of the training. The definition needs to be more precise and consistent across all trainees. It is the number of years since training ended, since they were not supported on the grant, since graduation, etc.

**Defining STEM:** (1) How does practicing medicine relate to being defined as STEM? (2) The current question is answered by program coordinators and defining STEM may vary across coordinators. (3) Will need to use other questions (employed and in what field, student and what degree) to QC the data as to STEM or not-STEM. (4) If still in high-school, then STEM may be "undefined".

**National Student Clearing House (Eboney Smith):** Used for tracking some of the students after the training. Cost is about $400 (per year or one-time fee?). It was suggested that perhaps the DACC could pay for this and then all program coordinators could have access.

**Informed Consents versus follow-up:** Whether public sources are used to track progress as above is in part dependent on what (if any) level of informed consent was completed.

**Dates:** The date of the baseline record reflects the date that the training was conducted. The date of the follow-up record represents the date that the follow-up data were collected. There are multiple follow-up records that are missing a date. The DACC is working with the relevant programs to determine why those dates are missing and if they can be filled in. For example, if the follow-up is entered under the 5$^{th}$ follow-up record but is missing a date, we can assume that it represents follow-up at 5 years post-training? These questions are being verified with the program coordinators.

**QC via Coordinator Phone Conferences:** Have phone conference among the program coordinators to resolve some of these problems, to standardize some terminology and definitions, etc.

**Controls:** Are there matched controls?

**Timing:** Depending on when the data are collected (May, July, December), the person may not have graduated yet, so some concern there may be underreporting. However, it was noted that the date are shown in 5-year bins so the timing of the reporting may not be as important. What is recommended "best" time to do reporting? Fall, or after the summer session was recommended at one time.

**What program is called versus level of education student is at during participation:** QC needs to be done on this question. For example, Jackson program is called an undergraduate program, BUT they do accept high school students in the summer program. Thus, it looks like there are a few students working on a high school degree who are participating in a summer

undergraduate program. *Post processing of the data needs to take the student's current level into account*.

**Quality of the date:** Mike Boehnke is concerned about quality of the data collection. Particularly from this point forward some of the above questions need to be addressed.

**Why are data missing:** Even though question may be asked, responses are not always provided. How to increase response rate? Missing data is largest problem for the K-12 students, in part because they are harder to track.

**Balance follow-up effort with success by specifying specific time points for follow-up:** For example, may be best to schedule fewer follow-ups but do them at milestone time points such as at the end of UG or Grad period.

**Specify most important questions that need to be answered and how often:**

**Devise new field which specifies date that Next follow-up should be conducted:**

**Continued discussion:** Program coordinators will meet with DACC in the morning for breakfast to further discuss some of these issues.

## Tuesday, October 15, 2013

**Breakfast meeting notes**

- **STEM classification:** The general feedback was that trainees who are in medical school should be classified as STEM. However, feedback on whether to retain STEM classification after school varied. Some thought trainees would be retained as STEM only if they included research as part of their residence and later profession. Others felt that MDs should be classified as STEM under all circumstances. The bottom line is that this needs to be explicitly defined and that everyone should use the same definition. A compromise is to classify those in medical school or practicing medicine as non-STEM. However, there should be a companion variable for medical practice. Thus, depending on the prevailing definition, physicians may be classified either way.
- **Guidelines and Standards and Practices Manual.**
    - Post this manual on our website for collaboration and comments.
    - Current limit on number of publications needs to be addressed.
- **Retaining contact for follow-up:**
    - Some use LinkedIn, since it has lowered the age of participation to age 14. Thus, K12 students are using this. Perhaps create a voluntary group like "NHGRI Global Professional Network," where opportunities and recruitment information could be posted.
- **Missing data:** Suggested missing data reports be sent to individual programs, in time for the next big deadlines.
- **Deadlines:** Post deadlines on the website

- **Set up phone conference call** with Program Coordinators: First Agenda
    - Start with S&P document – and allow collaborative opinions
        - First item is defining STEM
    - Missing data – what ARE the important variables for which we need complete data?
    - What should follow-up frequency be?

## Session III: DAPs - Mentoring and Pipeline Challenges

## Alex Hernandez-Siegel

Recruitment strategies particularly for URM: Most URMs come from the South, Southeast and Southwest (see maps). For recruiting, Alex uses information on US colleges and census to locate universities with large URM populations who have relevant programs (e.g. biology-bioengineering/biomedical). He contacts the departments as well as science faculty members, student affairs professions, and individuals who coordinate undergraduate programs in the departments. In addition, career services offices, academic advising centers, multicultural student services and advising programs at these universities are contacted. He has created a database of these contacts, maintains it, and makes contacts annually.

The Boston area DAP and T32 programs all meet together on a regular basis to use team approach to distribute materials and resources, e.g. program enhancement in building science and professional skills.

Reviewed study by Mooney and Rivas-Drake (Chronicle of Higher Education, 3/28/08) conducted across 27 universities looking particularly at Hispanic/Latino students. The sample could be described as three basic types of individuals:

(1) Assimilationists (26%): Did not feel different from white peers and saw path to achievement as colorblind (e.g. did not think discrimination was too strong and that minority students did not need extra credentials to be competitive). Prototype member may be from middle class family who attended predominantly white schools and had no qualms about achieving their dreams.

(2) Accommodationists (32%): This group did perceive discrimination and believe that minority students must work hard to earn educational credentials and successfully find jobs. Although they saw barriers, this group believed they would succeed.

(3) Resisters (43%): This group perceives high levels of discrimination and feels more distant from white students than any other group. Their background most frequently was at least 70% minority (Latino and African American).

This study suggests that, although each student should be looked at on a case-by-case basis, their background and where they come from does say a lot about their attitudes towards education and success.

Another point to remember is that students talk. When they go back home they have a lot to say about their summer experiences and they share it with their peers. Thus, the environment you create in your lab and in your program should be representative of what you want your

alums to share with future prospective students. So, your attitude should be inclusive, that is, your students should feel like they are part of your lab and not just a temporary visitor. Take them out to lunch, include them in discussions. Your mentors and coaches should be part of this inclusive attitude and environment as well. The PI meets with all the students twice during the summer.

Questions: Summer students typically have completed their junior year (rising seniors); if they return for a second summer they are super-seniors. Most of the students Alex has worked with have gone on to graduate school.

## Zia Isola:

(Kent) In the 3rd iteration of the DAP, which is primarily a scholarship program. Recruiting was not central activity in the past, but Zia has tried to increased awareness in the different departments and other programs (e.g. MARC) about the DAP.

Recruiting challenges include: (1) creating awareness, interest and motivation to apply (2) perception of campus as diversity-friendly (3) finding appropriate research fields and resources for students and (4) finding opportunities to connect to in the community. Other challenges related to institutional commitment. The role of the campus leaders (chairs, deans, etc) in making diversity a priority usually means dollars as well as informing attitudes. The admissions process and criteria are also important at the institutional level. And, having a leadership that shapes the campus climate to set the tone for increasing diversity is important.

Recruiting strategies include cultivating student interest, building institutional commitment and partnering with other programs and institutions. Regarding cultivating student interest, it is important to recruit with student organizations that support URM participation in STEM such as SACNAS, ABRCMS, NSBE, AISES etc. The student groups on the UC campus include SACNAS, WiSE and NSBE). Involving faculty in recruiting outreach when possible is attempted by having recruits talk with faculty when they visit. She also gets involved in hosting visiting student groups (e.g. lab tours and panels). Also, emphasizing research status itself may not be enough. Recruits should be informed about support systems that will ensure professional success such as mentoring, workshop and IDP resources which is part of the cultural environment on the campus.

With regard to building institutional commitment, campus leaders should include diversity objectives, both in long- and short-term planning. Using outreach as part of the faculty merit reviews would help build institutional commitment. Additionally, admissions process should be more holistic and not rely solely on quantifiable data such as GRE and GPA. Finally, finding supplemental funding to support the DAPs, McNair, and other programs should be an institutional commitment.

Success stories include ACCESS-RMI-STEM diversity programs. These cross across community colleges and 4-year colleges by forming a recruiting pipeline network where resources, support, and community sharing are amplified. Outreach relationships with regional community colleges to increase the transfer rate from CC to UCSC.

Take away messages include collaboration, supporting student successes and engaging campus leaders and faculty. For example, successful recruitment relies heavily on successful retention of existing students and alum. While engaging campus leaders and faculty is a lofty goal, it is easier said than done. One needs to be consistent and persistent and patient. Look for opportunities and be prepared to act on them, by building a consensus and coalitions. You need to build a critical mass of allies.

## David Schwartz:

David discussed how the URM trainees had prior research experience at UW and interactions with faculty trainers. Genomics science is intrinsically transdisciplinary so that recruitment occurs across a broad range of programs and departments.

Some of the challenges include weather (it is cold in Wisconsin in the winter). Diversity and awareness among the faculty is a challenge. Also, there is a great deal of competition with both the east and west coasts, and financial incentives are lower in the middle of country than on the coasts.

## Snyder (Stanford):

Challenges to recruiting: In 2008 they had a small pool of applications, approximately 20 per year. Possible causes included a limited infrastructure and not knowing about the applications and admissions ahead of time.

Now, in 2013, Anita Blanco travels to over 28 universities a year and multiple student research and professional conferences. She also attends various events at Stanford, and arranges for individual prospective students, and student groups involved in research programs, students from the University of Puerto Rico to visit Stanford. They also coach and guide applicants through the application process (one-on-one basis).

They also are building a pipeline, from k-12, 9-12 college prep, and a summer undergrad program. They are building expertise in the undergraduate admissions office (best practices and tools), the campus graduate diversity office, student groups, campus cultural centers, and engaging faculty, graduate students and postdocs. Other collaborations highlight off-campus programs (e.g. train the trainer) partners with student programs such as the SACNAS chapter, uses the McNair database, and scouts student profiles on other website.

Some of the lessons learned are to know yourself. Are your students and faculty happy and this should become a selling point. Also know that retention is part of recruitment. Using senior students and alum as recruiting participations is an opportunity for outreach, if they are happy! Other lesions include building an infrastructure of tools and techniques and knowing how to use them effectively. Top prospects should interact with multiple people (students, faculty) and this should start early. Also understand that everyone can help with recruitment of URM, and that non URM can be good volunteers in helping to recruit.

Overall questions:

Maggie Werner-Washburn (SACNAS president) said that they were very interested in building relationships with the DAPs and T32 so that interactions are more effective.

When looking at the spread of program types across the universities, it is obvious that not all institutions have all kinds of programs. Therefore, we are not necessarily competing, but rather we should look at this as opportunities for networking and helping students move along the pipeline to find the next best step for them. What kinds of opportunities do we have for this? This is talked about every year, but not sure what is done about it. Sharing websites has always been mentioned but not sure how effective this has been so far. How well do we share information across programs? Although we do this on an individual basis, not sure how wide-spread the networking really is.

Money: Where do you come up with money to do the extensive recruiting that is talked about? This is not necessarily part of the budget in the training grants. Some help is through collaborations. When attending SACNAS, other campus programs will help, especially if resources are combined across programs to attend the meetings. So, diversity programs and STEM programs (e.g.) may combine resources for their common recruiting goals. Also, (Anita Blanco) visiting all of those programs and institutions is not all one person. For example, she has established contacts with existing resources on campus so that she knows when someone may be traveling to a location of interest or a specific meeting and she may ask them to distribute materials or visits specific individuals or departments while there. This involves building resources on your campus and keeping them up to date. Anita generally works with these individuals ahead of time to “cross-train” them so that they know what is expected during their visit.

How do you set up these visits to other colleges and what do you do when you are there? Some organizations have set visit times or they may have seminar series where they invite speakers to come talk about other programs. How do you get on the invite list? When you make first contact with the office you tell them about your opportunities and that you would like to speak to their students about them. Focusing on regional organizations is usually easier because the distance is closer and you are more likely to have common connections and interests. Some of contact may involve sharing not only opportunities but also research itself. This enhances excitement about doing research as well.

Having lunchtime talks about science and research at local institutions, especially when there are multiple institutions in the area is good method to reach potential students. Sometimes you have to just go out and start knocking on doors and let them know you want to talk to their students about research opportunities.

Also, you can make lots of pointless visits if you don’t have the right receptor. How do you find the right receptor? It’s just something that you figure out as you go.

Emphasis was placed on building your infrastructure. For example, find where there are local chapters of special organizations that you are involved with, like SACNAS, and connect with those leaders. Then try to open up opportunities for cross-visits to talk about science or research or research opportunities.

Sometimes it is easier to bring students to you rather than go to other institutions. Think about bringing small groups of students from a local organization or institution to your institution for a day of touring and talks.

You can't start too early. For example, even if you are a post doc group you might try some focus on local undergraduate groups as well. When they do reach the right stage they will remember you.

## 9:30 am Mentoring URM Undergraduate and Graduate Students

- ***Douglass Henderson*** **(University of Wisconsin-Madison)**
- ***Angela Byars-Winston*** **(University of Wisconsin-Madison)**
- ***Molly Carnes*** **(University of Wisconsin-Madison)**

## Mentoring URM Undergraduate and Graduate Students panel with Douglass Henderson, Angela Byars-Winston and Molly Carnes

Byers-Winston is counseling psychologist who has studied career development, in particular variables that are associated with gender and race in term of successful career development in STEMM (and medicine). She will provide background on the theoretical underpinning. Then, Dr. Henderson who is a Professor of Engineering and Physics will speak. He has led the most successful graduate program for URM on U Wisconsin campus. This program is so successful the model has been replicated. Then, Molly Carnes will finish showing how they have translated both the theoretical underpinnings and a successful model into an R21program.

## Angela Byers-Winston:

Angela works with Chris Pfund focusing on what matters in mentoring. She is looking at what is it about the relationship between research and mentoring that shapes individuals' self perceptions and their ability to do research. Her R01 research looks at several variables they think are important in this relationship and (1) conducted factor analysis to validate the measures, (2) conducted multivariate analyses to test the model of mentored research relationships, (3) conducted qualitative interviews with research mentors and mentees, and finally (4) piloted and evaluated a new Mentor Cultural Competence workshop.

To understand this, we need to break down the relationship into various parts. The research population is summer undergraduate students participating in an intensive research experience. There are over 400 students since 2007, looked at retrospectively. Most of the students are URM while most of the mentors/faculty are white. Thus is a cross-cultural relationship. The students rate their self confidence, their skills and knowledge, and their mentor's effectiveness. The model pathways they believe in: individual differences and variables influence how people experience or perceive the research experience and how they rate their own skills and abilities. There are group differences in this by gender, race/ethnicity, etc. Together, all of this affects the eventual outcomes.

The directional relationships among these variables were investigated. The prior research experience did impact on the students' self perceptions of their own skills and knowledge. This perception of their own skills and knowledge was bidirectionally related to their perceptions of

the mentor's effectiveness. In other words, the degree to which students rate their mentor's effectiveness influences how they rate their own skills and knowledge. So, something about the quality of the mentor-mentee relationship has an effect on the outcome. There are specific indicators of the mentor-mentee relationship such as the right kind of feedback and the right time and impressing the student that they are making a difference. Basically, the relationship matters. It drives the student's confidence in whether they are doing research right and doing it well. This confidence in turn drives the outcome, which is whether the student is successful in a STEM field.

They have developed a 26-item scale on mentor effectiveness around this model. Two particular items on this scale that are important in leading to higher self confidence, and thus greater likelihood of outcome success are:

(1) Mentor shows interest in the student's research project
(2) Mentor shows appreciation of the student's contribution

Thus, the mentoring communicating to the student that their science is important is the critical factor.

Implications for Mentors (Byars-Winston et al., 2013):

(1) Communicate that mentees' science is valued
(2) Mentee research confidence is positively related to mentors' ability to (1) offer constructive feedback when necessary (2) provide the mentee with an overview of how their research fits into an overall research project and (3) make the mentee feel included in the lab.

"Developing emerging scientists involves more than increasing their research competencies; it also involves social factors like being recognized as a scientist and having their scientific contributions be viewed as credible."

In addition to good science, there are cultural negotiations in the STEM context that minority students must deal with to determine how they fit within the cultural of science.

Students, when they come to the training program, bring (1) their cultural identity (2) their STEM identity (emerging sense of self as a scientist) and (3) academic career self perception. These three identities are interacting and competing to identify an individual's self perception.

So, given a student's self perception, how to mentors communicate what is needed (as above). For example, how one person is made to feel that they belong in the lab may be different than how another person is made to feel they belong to the lab.

What is the cultural context of research mentoring relationship in the sample with 75% of mentees being identified as URM: What is the salience of cultural factors in the research mentoring relationship? Qualitative interviews about the role of gender and race/ethnicity were conducted with alumni mentors and mentees.

Results:

There is significant difference between mentees and mentors in whether the fact that there is cultural diversity in the relationship should be addressed. Mentors are less likely to say it is important to address the existence of cultural diversity while mentees feel the cultural diversity should be addressed. Mentors say, we talk the language of science that that

should cut across all borders. Mentees say, yes, in the beginning we should address it. But, how many mentors (who tend to be white) are equipped to do that.

A Mentor Cultural Awareness Workshop was developed to address this issue. It has been piloted at U Wisconsin at other institutions at both the faculty and the post-doc levels. .

## Douglass Henderson:

Douglass talked about a model program: Graduate Engineering Research Scholars Program. This program (GERS) received a presidential award for excellence.

There is a documented need in the engineering field to produce more minority graduates. Prior to 1999 there were approximately 11-14 URM students which is 1% of the graduate student population (of > 1200 students). Some departments had an international student population of over 60%.

At that time the campus culture reflected inaccurate biases and unconscious assumptions, for example, that URM students underperformed, that it was hard to find URM students that were interested in your research, and that the cold weather hindered recruitment. Similar biases existed in recruiting diverse faculty. For example, there were not enough URM PhDs who were competitive enough to fill faculty slots, the pool was too small, that U Wisconsin could not compete with higher ranged engineering schools for the small pool of qualified URM candidates, cold weather, and that recruiting URM faculty was a waste of time/effort/money since they just left after a few years.

At that time, the solution to increase the number of URM students in engineering was to develop a faculty-run summer research experience program with institution-funded fellowships that included intense follow-up and tracking of students, called the GERS (Graduate Engineer Research Scholars program). Student funding came from RAs, fellowships, and some TAs. At that time, most PhD students were completely funded at admission and immediately joined a faculty member and research group. This was NOT the case for URM students prior to GERS. They were given awards and told to take courses and not worry about research because they could shop around until the end of the first year. The faculty found these students less attractive because they had already spent a year on campus but had not done any research. Thus, URMs were not treated the same as other graduate students. And, it was assumed their performance would be subpar. The GERS program treated all graduate students the same.

Since fall of 2000, 107 GERS students have received degrees; Masters (45% female) and PhD (57.1% female). This is compared to approximately 11-14 total URMs prior to 1999. The 107 represents nearly 5% URM as compared to 1% prior to 1999. Of the 107 graduates, most have going into industry or are faculty or work in a national lab. A few (< 10) are in the medical field, are post-docs or are MD-PhDs.

Some of the key components of the program include:

(1) putting together a financial plan for trainee while a student
(2) Involving student in research they day they enter the university, and assigning a faculty advisor from the beginning

(3) Being an advocate for student from program staff, faculty committee, departmental allies and graduate school

The GERS has a visible impact on the university climate, with GERS students being model undergrads, being visible in student organizations, performing well in labs, good faculty experience with URM students in the classroom, and faculty dialogues about students in committee meetings, including sharing modification strategies.

Factors that influence the success of the program included availability of funding, committing to 5 years with a student "sight unseen", and faculty being committed to diversifying their departments.

## Molly Carnes:

TEAM-Science (Training, Education, And Mentoring in Science). The rationale is to put the evidence into practice using the successful model of URM graduate student recruitment, retention and career launch (GERS).

The faculty (across different schools, departments, research areas, etc) was queried to determine if they thought there were fundamental academic career competencies that all graduate students should achieve for successful progression toward the professoriate, regardless of the particular field they were in.

A set of 8 core competencies areas were suggested:

(1) research excellence in area of choice
(2) student design, data collection, analytic techniques relevant to the research question
(3) leadership and management
(4) oral communication of research findings
(5) scientific writing
(6) responsible conduct of research
(7) teaching
(8) collaboration

Key elements of the TEAM are:

(1) Career development approach: Not just skills but look beyond and toward professoriate
(2) Individual SWOT analysis
(3) Trained career coaches assigned (in addition to research mentor) who met with both mentor and mentee
(4) All stakeholders (mentors, coaches, etc) are trained in using 8 competencies to frame career development discussions
(5) All activities evaluated with response to feedback

Institutional structural emphasis on (1) recruitment (2) retention (3) professional development (8 competencies, etc) and (4) financial support. With regard to financial support, it has saved at least 1 student who had a research mentor whose grant ran out and thus did not have funding to continue support of the student. Since the institution was committed, funding was found through other resources so that student could finish their training as planned.

Conclusion is that this model can be (and was) successfully transformed into practice. Ongoing evaluations include assessments of self-efficacy, scientific identify, mentoring relationship, degree completion, and continuation toward the professoriate.

## Questions and Discussion:

Underlying assumptions across all 3 presentations:
Assumed that successful attainment of a research career and successfully training with persistence are influenced by the person and the environment in which they interact.
Most of us focus our training programs on the competencies of the individual in terms of research acquisition, and attend less to the cultural negotiations in the context of the environment they are in, especially for URMs. The students must be allowed time to talk about these cultural contexts, for example being the "lonely only". These contexts often extend even into the career, often with experience of "racial fatigue". These may include continued experiences of people underestimating their competencies, working twice as hard to prove I'm just as good. This is the context of the workshops that Molly and Angela talk about particularly for the mentors so that they are aware of these contexts in their mentees.

For Molly: Regarding the 8 core competencies, do you use those as a checklist from the time of admissions on? Molly: Not so much as a checklist. Each student completes a 2-year career development plan around those competencies, with instructions that there is no right or wrong way to fill out the plan. Just write out the goals and the timeline when you should accomplish it. The students have specific objectives within each of the core competencies. For example, in order to accomplish this competency I should take these specific courses, etc. Then, when career coach meets with student, they both have access to this career plan. Also, a 9$^{th}$ core is added, "personal" so that it is clear to student they have to take care of their self as well, whether it is getting enough sleep, spending time with family, etc. Then at every meeting with career coach and/or research advisor this plan is updated and progress is discussed, changes may be made, etc.

From the programmatic side it would be good to track these competencies so that faculty advisors are all on the same page with regard to each student.

Since 75% of students are URM and 90% of faculty are white, how does this affect the interactions discussed in these talks? Henderson: As indicated earlier, many of the departments have very high percentage of international students, so that even the white US students may be a minority in the engineering program and experience feelings of isolation. So, the problems already mentioned, for example cultural fatigue factor, are experienced by many of the students, even those we think of as majority students in the US. Mentors and advisors should encourage the student to talk about it and at least acknowledge its existence, then get to the business of science.

How do you do mentoring to help students feel part of the lab? Angela is hoping to get another 4 years of funding to find out. What makes you feel like you are part of the larger enterprise, etc.?

Currently Angela is working on developing parallel questionnaire for mentor (like already developed for mentee) to determine effectiveness of mentoring relationship.

Recent report stating that research mentors say they have less time for mentoring than they have ever had before. Do you recommend that the research mentor have help in other aspects of mentors since PIs have so little time? Angela suggests that trainees, as part of their career development plan, specify which person / mentor / coach can help with which aspect of the core competencies. The research mentor, maybe through participation in the workshops, should understand that they are one part of training process and they should be prepared to refer the student to other components as needed. Mentors may need some training in order to be able to do this.

Funding sources: For supporting students, fellowships and state dollars are a start, and support using resources from existing programs is helpful.

## 11:00 am Keeping Students in the Pipeline and Sharing Information and Resources
## Discussants: *Bruce Birren, Cherilynn Shadding, Debra Murray*

Some of the key questions they were asked to talk about were:

(1) How can programs work together to keep students in the pipeline?
(2) How can the networking among DAPs and T32 programs be more effective?

In addition, they wanted to talk about:

(1) Why do students leave the pipeline?
(2) What are the problems and where are they occurring

In response to this last question, they developed a survey and asked all of the attendees to complete it prior to the meeting.

Based on literature survey (see presentation for references), reasons for leaving training programs (leading to professoriate) include the following:

Undergraduate:

(1) Salary projections
(2) Training duration
(3) Gatekeeper courses
(4) Affordability
(5) Social and academic integration
(6) Poor or lack of mentoring

Graduate

(1) Financial burdens
(2) Social and academic integration
(3) Poor mentoring
(4) Environment and culture

Many of the above problems have been discussed already.

Results of the DAP/T32 survey: Pipeline was defined as STEM career development towards a PhD and beyond. There were 17 respondents.

(1) 67.4% of the respondents had at least 1 trainee who left the pipeline
(2) 80% had a trainee who left STEM the career

(3) Thus, almost all respondents had someone leaving the pipeline

When did the trainee leave? Of those who left:
(4) Undergraduate, 63.6% (7)
(5) Post-Bacc, 27.3% (3)
(6) PhD, 36.4% (4)
(7) Faculty, 0%

Question: Were all of these URM or were they a combination of URM and majority? Since the questionnaire was for URM, the panel assumes they were all URM.

Did you contact your trainees to understand why they left? Most indicated they did (yes 72.7%, no 27.3%). It was not always easy to contact some of the younger students to determine why they left. The reasons cited in the DAP/T32 for leaving were:
Undergraduate:
(1) Inadequate high school preparation
(2) Other pathways (STEM and nonSTEM)
Graduate
(1) Poor mentoring
(2) Other pathways (STEM and nonSTEM)
(3) Family issues
(4) Financial burdens or better financial prospects

Some of the more specific answers that sent into the above categories included:
(1) Inadequate preparation
(2) Needed by family
(3) Medical reasons
(4) Discovered passion was not in research
(5) Better financial opportunities
(6) Bad training experiences

Audience question: Feels that going into medicine should not be classified as “leaving the pipeline” and believes that this change would alter results noticeably and result in not as many trainees “leaving the pipeline”. This is a continuation of the STEM classification discussion that was had yesterday. The audience liked the classification used in this morning’s talks that looked at STEMM, with the second M representing medicine.

Audience comment: We should be cautious and not consider “leaving the pipeline” as a failure. Some may move to, for example medicine, and this is not a failure. The purpose of our training programs should be to introduce students to the possibilities that are open to them. Our responsibility to the trainee is to see that they go into whatever it is that is right for them.

Survey question: Have you helped any trainees return to the pipeline? 30.8% responded yes they had. In general, there were a variety of reasons centering on temporary pauses in their training, but that with support the trainees did re-enter.

Survey question: Do you have current trainees who are in the NHGRI pipeline? 61.5% of respondents said yes. This question asks whether programs are successfully able to refer

trainees to one of the other NHGRI-supported programs. Most of the positive responses were referring from high school to college level programs. However, one respondent indicated they thought that few of the students who have been shared in the NHGRI pipeline have funded at the T32 level.

Survey question: How can we improve the NHGRI pipeline?

(1) Updated and improved website
(2) Structured and purposeful networking
(3) Others?

**Defining what is a pipeline:**

Is a "pipeline" what we should be talking about, or is it more of alternative pathways? What is the ideal? Perhaps we need a more relaxed definition, using more of a networking model rather than a straight pipeline.

From leaky pipeline to irrigation system: Minority education through the lens of community-based participatory research. (Starks, Segrest and Burke, Prog Community Health Partnersh 2012 6(4):471-9). Proposes a model to understanding minority departures from the education pipeline as a basis for supporting careers that align with community goals for health.

Do we need to redefine what is meant by the pipeline? NIH Biomedical Research Workforce Working Group Report (http://acd.od.nih.gov/Biomedical_research_wgreport.pdf) shows that of 83,000 biomedical trained PhD students in 2009, there were 9,000 graduates who took 5-6 years to graduation. About 70% did a postdoc with median length of 4 years. Where did they end up? Of 128,000 biomedical US-trained PhDs:

(1) 18% in science related non-research
(2) 6% in government research
(3) 43% in academic research or teaching (23% were tenured)
(4) 18% in industrial research
(5) 13% in non-science related field
(6) 2% in unemployment

This illustrates that if we limit our definition of "success" to tenured track academic research, we will fail. Our definitions need to be expanded.

For participant discussion: What can we be doing to connect ourselves better?

Desire to have NIH know that when review panels meet to discuss R25's and other training grants, the definition of "success" should be expanded and not narrowly consider tenure track positions in a premiere research institution as the only metric of success.

What can we do to train our minority students in working towards future leadership positions, as heads of departments, as CEOs of companies, etc? Need to train students to take on leadership and management roles at whatever current level trainee is at (as student, as junior trainee or faculty, etc). It is not a trivial issue in how to teach leadership skills to our students.

In terms of interactions among programs, the one-on-one communication works the best for me. I need to know if a particular student is interested in my research and in working with me in my lab. The one-on-one communication where you bring this particular student to my attention works best for me.

Having some kind of a database would be helpful, like the McNair database. There is a national database for SACNAS that is helpful in sending good students to those programs. Need to look at other models and have NIH develop a secure portal for this.

In looking at many of these numbers in the last two days, we need to know the denominator. What are the success rates for society at large and for minority groups? However, getting this data will be difficult. For example, how many entering kids declare certain majors, and in the end how many actually attain that? Participant feels that if we factor in those that eventually go into medical school our numbers will look much better.

Suggestion for future meetings is to bring in current trainees and have them talk about their research.

In terms of networking, we should consider going NIH-wide and not limit to just NHGRI. We should think about this as a relay race, where we pass the baton (the student) from one training program to another. But, as just said, there are a "billion" training programs out there and it would be helpful to have them at least referenced under a single umbrella to know where and how to pass the baton. Having invested so much in a single student already, we don't want to leave it up to chance as to where the trainee goes next.

So, each of us know about other training grants or programs, but not all of them. How do we find out about them, how do we plug into them. How do we make personal one-on-one contact with them to keep our students moving along the best training trajectory?

Do we need to get people with training grants and NIH staff who manage the grants together in a meeting to talk about the need for cross-communication?

A suggestion was made to have the NHGRI meeting at the SACNAS meeting. We would have our students there and a mini poster session across all the DAPs and T32. This would be a community and network building opportunity.

Since NIGMS has a large training program, it would seem reasonable to start having a conversation between NHGRI and NIGMS to see what can be done to increase communications.

**Action Item:** Ask that our next training coordinators meeting be a SACNAS next year? It could be tied into the SACNAS agenda, or the day before or day after. If it could not be done within the actual conference, then perhaps it could be held somewhere nearby.

## Open discussion:

Treva reviewed some items that were brought forward for discussion or action:

Metric of Success: The group wants NIH to think about the definition of the metric of success? It's not just tenure track, but running programs and doing other things in the biomedical field. This was discussed extensively at multiple points during the meeting.

Leadership and Management: How do we teach our trainees to become future leaders and managers?

Database: Develop a database of students, modeled after other programs such as McNair, that may be maintained securely by NHGRI (or NIH).

Consider having our next meeting in conjunction with a national meeting like SACNAS and to do this in a way that coordinates with other training programs from other institutes, with the aim of broadening the discussion and learn from everybody's best practices

NHGRI should have an annual meeting where trainees are brought together with a focus on the science.

Biases and stereotypes in the academic setting: Eboney has volunteered to collect and summarize suggestions for dealing with these issues. Everyone should please send their comments to her.

All resources that have been discussed during the meeting will be posted on the website. This includes the PowerPoint presentations, resource materials that were distributed, and links to other websites or resources that were discussed.

For some of the database issues that were brought up, the DACC will contact the program coordinators to set up a conference call to discuss these issues.