



R25 to T32 Transitions: Social Science Theories Help Inform Program Design and Explain “Being Different” While Avoiding Stereotypes

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“Activating a Neural Network: Admission Strategies to Increase Diverse Neuroscience Trainees”

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Where we are headed in a short time...



- Introduce 2 social science theories – Identity Formation and Communities of Practice – critical to scientific development
 - Give an example of the complexities of identity and fitting in for young minority scientists
 - Theories applied in 2 different R25 programs transitioning to PhD and T32 programs
 - Emphasize awareness of potential impacts of ‘being different’ without rushing into or creating stereotypes
 - Empowering students to help guide their own growth through mentoring with shared responsibility – “Mentoring Up”
 - Learning how to know our trainees better – “Culturally Aware Mentorship” – No, we don’t leave our cultures at the lab door!
 - NOTE – Talking about students who are all capable of and interested in science and research – not a deficit model!
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Identity – What We Do, Who We Are and What We Want to Become



Prior research has shown science identity key predictor of starting a PhD

- Estrada and Schultz – longitudinal study of NIH-supported undergrads
- Time and path to identity variable – often later for URM, first gen, low SES
- Social/cultural background matters – adopting scientist identity may require rejecting or distancing from familiar norms
- Key role of many intervention programs

Identity development is fluid and dynamic

- One doesn't arrive at a stable, unchanging identity for many years
- Identity develops along multiple dimensions - student, career, race, gender

Two types of recognition influence identity development

- Internal recognition - am I capable? Can I see myself as _____ ?
- External recognition – do others see me as legitimate? Do others make assumptions based on how I look or talk?

Interactions in social contexts influence identity development

- People bring expectations which shape their participation
- People engage with contexts and available resources

Implications & Examples - Identity as Scientist



Intersecting identities can conflict

- How do I balance social identities based on gender, race, ethnicity, family status with my science identity?

'Recognition' can affect identity and feelings of belonging

- Alignment of internal/external – affirmation from being accepted in a program, lab or fellowship; learning with faculty (not just from them); inclusion and independence in the lab
- External messages can have big impacts – viewed only as a 'minority scientist' or fulfilling a quota; implicit messages based on distribution of lab tasks; assumptions from being in an intervention program for URM
- Identity has to evolve and grow with age and career stage
- Imposter syndrome, stereotype threat, (un)conscious bias impact identity

Implications of feeling different

- Cognitive load – concern with being “better than the best” to fend off stereotypes; extra time to find places to “be oneself” and get support
- Being the only one – discouragement; positive about becoming a role model and changing the culture

Identities Constructed in Communities of Practice

C of P (Lave & Wenger): groups who share a concern or a passion for something they do, and learn how to do it better as they interact regularly

- Shared interest (domain)
- Competence – techniques, beliefs, talking and carrying oneself like a scientist
- Interaction and learning from each other
- Shared practices unique to each group – methods, tools, shared history, ways of doing things

Membership

- Legitimacy or marginalization of newcomers determined by perceived competence with practices
- Different rules may apply to different “types” of group members
- Practices draw on & reflect the power structures of group, as well as wider society, including those based in race, ethnicity, class, and gender

Examples & Implications of C of P for Scientists



Examples of C of P's in science

- Biomedical science as a whole or an individual discipline
- PhD programs and lab groups

Challenges for newcomers

- Practices & rules often invisible (science, work habits, social expectations)
- Not consistent between labs
- Seldom malicious or even conscious – unconscious bias and untested assumptions are played out
- Perceptions of newcomers as different – greater chance of marginalization – big diversity challenge
- Think lab rotations and first year or 2 in a lab...

Strategies to lessen marginalization

- Openness to what new members bring – match talent to project
- Provide key insider knowledge and guidance for positive early impressions (mentoring/coaching)
- Important role of undergrad/postbac/PhD intervention programs

National Longitudinal Study of Young Life Scientists



- First pilot student interviews in fall, 2008 – in-person at schools
- Added students for the next 4 yrs – undergrad, PREP, start of PhD
- 533 enrolled – largest number undergraduates
- 275 started PhD
- ~40 have since left PhD
- ~50 no longer responding
- Currently just under 200 still in study
 - ~100 have graduated, rest still in PhD or MD/PhD
- **Annual in-depth interviews – typically 60-75 minutes – plus surveys – massive and complicated analysis – almost endless research questions**
- Allows longitudinal and cross-sectional studies of full cohort and subsets

Being the Only: Black Women Biomedical Graduate Student Perceptions of Climate and Coping



Sample of 47 students Black women from 32 institutions

- 28 students from the *National Longitudinal Study of Young Life Scientists*
- 19 students from the *Academy of Future Science Faculty* experimental coaching intervention
- 14 first generation immigrants
- 22 first generation college students

Data from 3 interviews each – start of 1st, 2nd, and 3rd PhD yr

Black Feminist Thought Analytic Framework

Black women have unique, shared experiences as members of a group characterized by gender and race

The experiences of Black women in the creation of knowledge is inherently valid and valuable

Black women are agents of change personally, interpersonally, and politically— study participants are the experts of their own experiences

Critical to examine the intersection of gender and race

Analysis done by 3 women members of our group – 2 Black, 1 White – best able to interpret through this analytic framework

Gender Alone Seldom Impacted Experiences

81% felt gender alone did not have an impact on the way they were treated

51% indicated the high number of women in their labs, programs, science influenced why gender was not an issue

I would say in, in my identity in the sciences. I think, my ethnicity is kinda on the forefront, mostly because where I work now and in the graduate program that I'll be starting, the gender distribution is pretty even if not more female than male. But there isn't any diversity. And there aren't any (laughter) people that look like me or have the same ethnic makeup as me. So, that is kind of on the forefront for me.

Tamara (beginning of 1st PhD year)

Being the Only – Black female



77% of students spoke about “being the only” in at least one interview.

33% spoke about it in two or three interviews.

Mention of “being the only” decreased only minimally over time (1st interview 41%, 2nd interview 39%, 3rd interview 33%).

Some Consequences of 'Being the Only'



- Influences career intentions (33%)
 - Pressure to positively represent race and counter racist stereotypes (30%)
 - Influences graduate school choice (25%)
 - Desire to be a role model and give back to their community (25%)
 - Appreciation of institutional and interpersonal support for African American students (23%)
 - Feelings of isolation or challenges forming bonds (17%)
-

First Generation Immigrant Students



Students who are first generation immigrants were **less apt to:**

- speak of being the only
- see gender as a barrier
- have race influence their career-decision making.

This is likely because they were the majority in their home nations, and therefore not socialized to prioritize race-based differential treatment.

Highlights importance of not treating Black women as a monolithic group.

Coping Strategies



- Engagement in formal and informal race-based support systems (43%)
 - John Henryism (21%)
 - Embrace power to define and interpret even though others do not expect Black women to be scientists (15%)
 - “Take it or leave it” reaction to low expectations of Black women in science (9%)
 - Think about this complexity in managing identities and critical elements of mentoring...
 - High risks of stereotype threat, imposter syndrome, burnout...but you can assume any necessarily
 - Stay tuned as we continue the stories...
-



PREP (Postbaccalaureate Research Education Program)

- NIGMS-funded intervention to facilitate college graduates from underrepresented groups completing the PhD or MD/PhD
- High percentage are Black, Latina/o, Native American
- PREP at 31 research-intensive universities & medical centers
- Not remedial
- Non-degree granting
- Usually 1 year long – sometimes 2
- **PREP Scholars** receive compensation similar to PhD student
 - 75% of time: research on substantive, independent project
 - 25% of time: weekly meetings, journal club, GRE preparation, communication skills workshops, guidance re: applying to graduate school, academic classes



Characteristics of PREP Study Sample

48 people from 7 PREP Sites

65% Women, 35% Men

94% Underrepresented by Race and/or Ethnicity

- 52% Black/African-American
- 42% Latino/a
- 8% American Indian/Alaska Native

Research Before PREP

- 65% Two or more experiences
- 19% One experience (usually a summer)
- 17% No research in a biomedical field

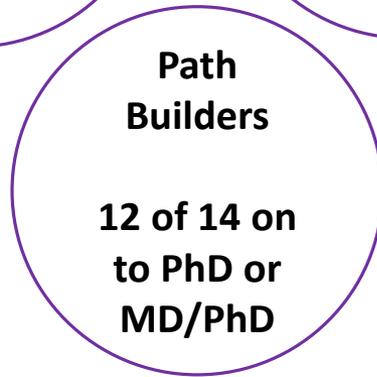
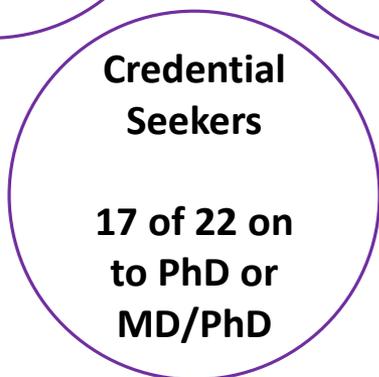
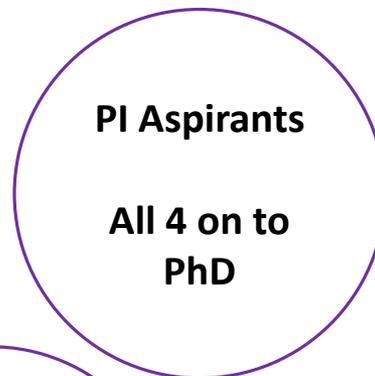
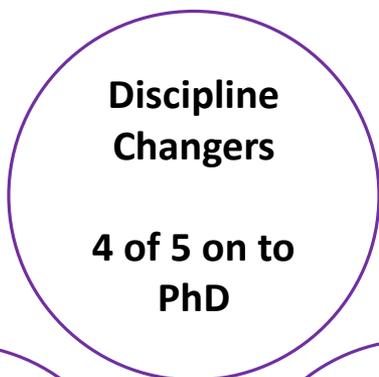
Graduate School Preparation

- 46% took GRE before starting PREP
- 23% participated in undergraduate NIH-funded programs
- 23% applied to graduate school
- 2% were accepted to graduate school



Why are students in PREP and not the PhD?

Five “patterns” of entering PREP Scholars = similar successful outcomes



PREP subsample:

- Interviews at beginning & end of PREP with 52 (48) students
 - 94% URM, 62% female
 - 83% had prior research
 - Varied graduate school preparation pre-PREP
 - 42% took GRE
 - 25% undergrad NIH programs
 - 25% applied grad school
 - 4% accepted to grad school

Caution: Pattern names are not labels nor stable. They are meant to be descriptive to help understand variations among incoming PREP Scholars.



“In one year [PREP] was able to change my whole future around. Definitely.” - Anita

Findings: How do Scholars Develop during PREP?

Development, often dramatic, in “*a whole bunch of areas:*”

1. Readiness for Research
2. Readiness for Academics
3. Readiness to Present Self (Identity)

*“it’s not just the **academic and research** side that I thought was gonna be my main focus but **how to convey my personality . . . to others was the extra I got from the program too.**”*

- Nathan

3 - “Readiness to Present Self” Continuum



▶ Acquiring speaking & writing skills

▶ ▶ Understanding how to communicate one’s thinking about science

*“ . . . it's one thing to . . . be able to repeat things back. But, it's completely **different when you actually have to speak it, and use the language verbally . . . [to] be able to answer more abstract questions.**” - Lisa*

▶ ▶ ▶ Readiness for seeing oneself and being seen and accepted by others as a grad student and/or scientist

*“If you are a scientist, **it’s not only the work that you are doing in the lab. It’s also how you present that work to other people, to the world.**” - Michael*

Mechanisms of PREP



- 1. High expectations for future success as graduate students**
 - Scholars are treated as if they are graduate students
 - Scholars experience life as a grad student/young scientist
 - PREP replicates, to some extent, the 2nd year of grad school
- 2. Readiness for research, academics, and presenting self occurs similarly for two processes**
 - Applying for graduate school
 - Being accepted in labs and by others as a scientist
- 3. Student-centered mentoring from PI and PREP Personnel**
 - PI relationship uncomplicated by long-term lab productivity; PI provides well-designed project & promotes independence
 - Individualized guidance with the Scholar's best interest in mind
- 4. Time for development and reflection**
 - PREP diverges from a traditional evaluative atmosphere
 - PREP Scholars talk about maturing and becoming more comfortable managing multiple responsibilities
 - PREP allows time for decision-making



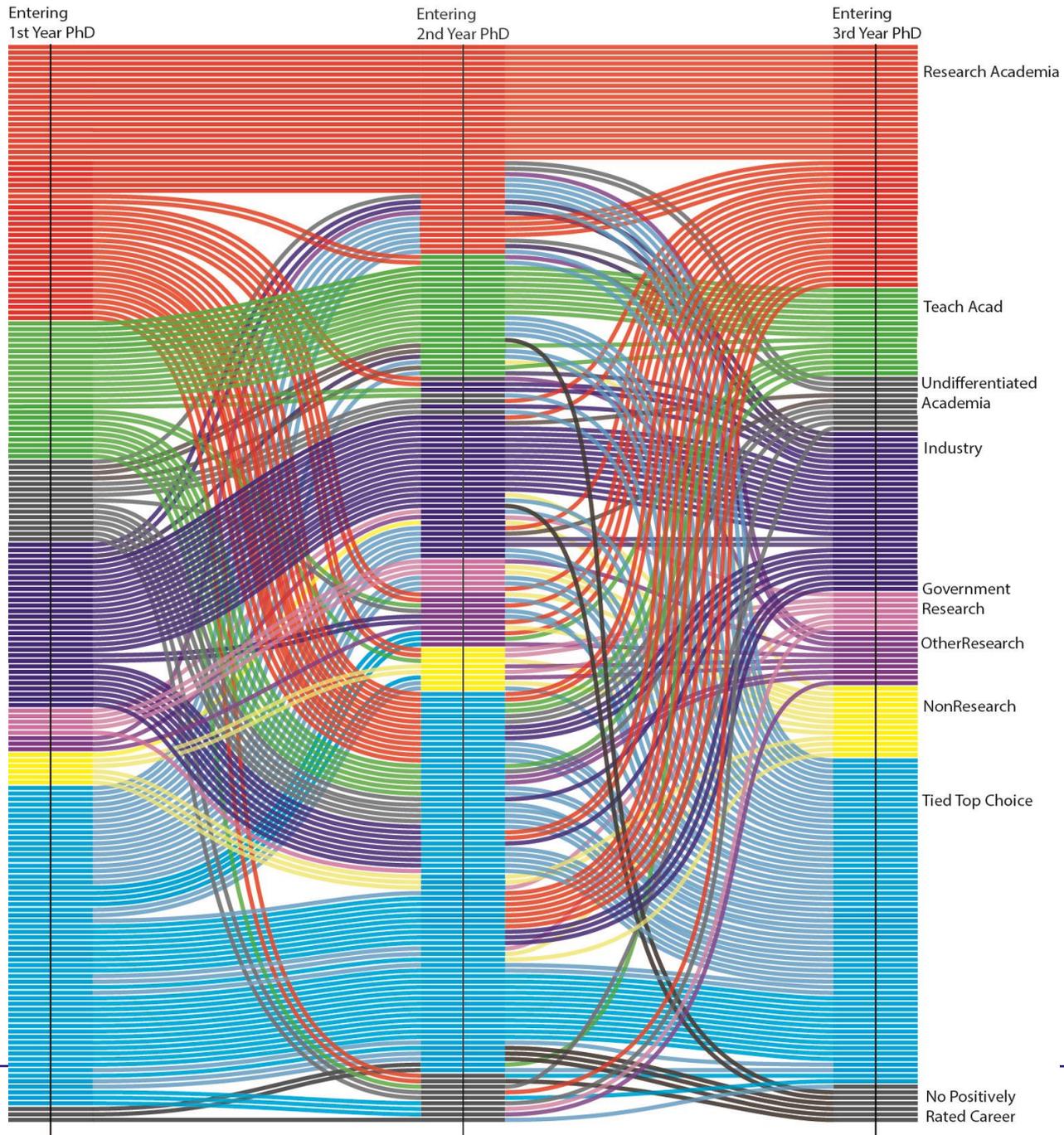
So what is happening during the PhD?

One question always asked in each interview is:

“As of today, what do you see as your eventual primary career interests?”

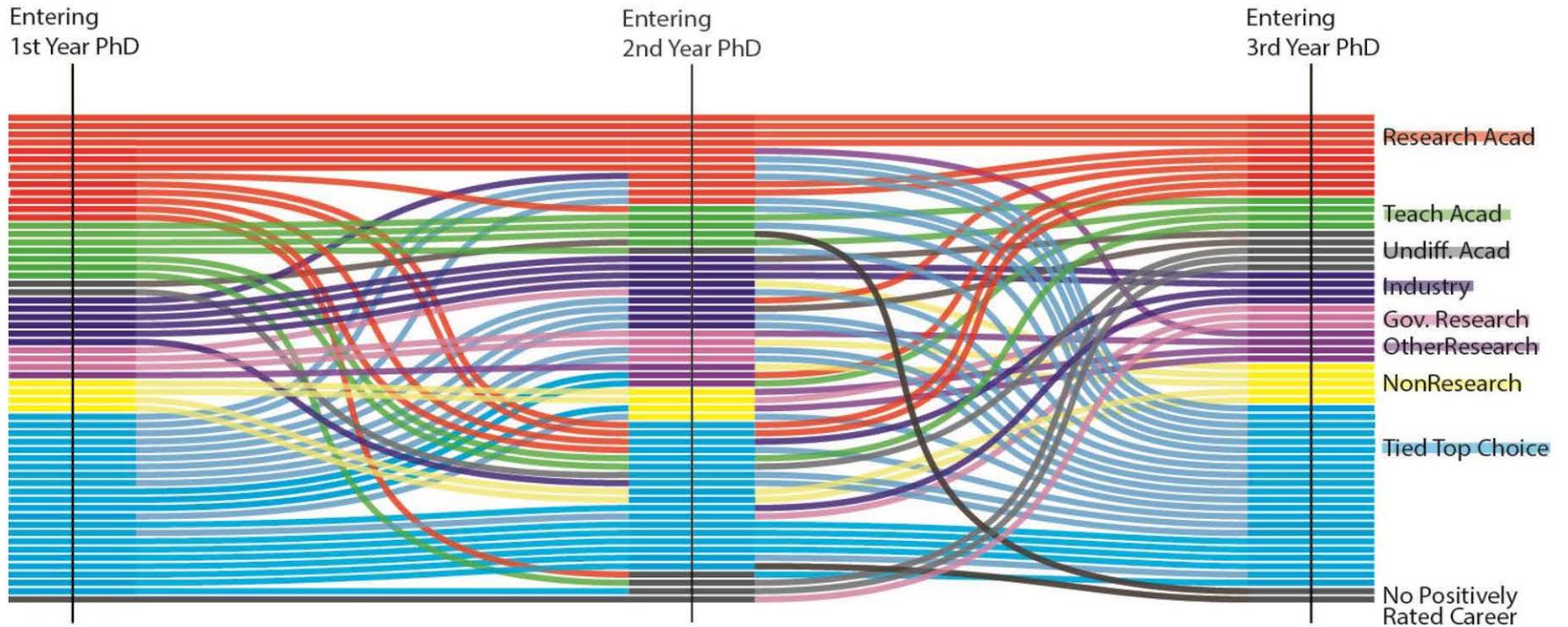
Studying responses in interviews to get nuance and explanation rather than just ranking on a survey – eventually need for deeper understanding of what leads to career intentions and/or changes

Career Decision Thinking- Top Choices





Career Decision Thinking- Top Choices



Transitions into and during the PhD



NIGMS R25 “Initiative for Maximizing Student Development” (IMSD)

Branded as Collaborative Learning and Integrated Mentoring in the Biosciences (CLIMB)

CLIMB open to all beginning PhD students in 5 life-science PhDs – diversity profile relatively low – preferred by students

Complement regular PhD curriculum during the first 2-3 years of the PhD

Design based largely around entry into new Communities of Practice

Impacts of early impressions – academic, oral, technical, etc.

Thriving in a laboratory rotation – “Don’t be paranoid, but everyone is watching and listening” – early entry into a C of P

Anticipating transitions of various kinds – normalize vs. something only seen by those less qualified or prepared (real or perceived)

Transitions into and during the PhD



Social Support – group process and ‘coaches’ not aligned with program

Making visible what might be invisible in settings and programs

Evolution toward qualifying exams – right of passage into the C of P – brings along impressions and evaluations already acquired

Transition to T32 – Does the T32 act like a separate C of P or just a funding source?

Reframing the Mentoring Relationship - Shared Responsibility

It is critical to keep in mind that it will be less about what your mentor(s) will 'give' to you and more about how the two of you can collaborate to meet your mutual needs.

Mentoring Up

Adapted from Gabarro and Kotter (1980) *Harvard Business Review*.

Entering Research: Workshops for Students Beginning Research in Science.

Branchaw, J., Pfund, C. and Rediske, R. (2010). W.H. Freeman & Co., New York.

Mentoring Up: Learning to Manage Your Mentoring Relationships

Lee, S., Pfund, C., Branchaw, J., and McGee, R. (2016)

In *The Mentoring Continuum: From Graduate School Through Tenure*. Glenn Wright, ed. Syracuse, NY: The Graduate School Press of Syracuse University.

Beyond “Finding Good Mentors” to “Building and Cultivating Your Mentoring Team” (2016)

Rick McGee, Steve Lee, Christine Pfund, Janet Branchaw
National Postdoc Association

Goals of “Mentoring Up”

- Think and assess what you are seeking from your mentors
- Shift from thinking about good and bad mentors to the core attributes of effective mentoring relationships
- Recognize that effective mentoring is not just about mentors guiding mentees, but also about mentees guiding mentors – *mentoring up*
- Learn more about recent theoretical, practical and research advances to guide development of effective mentoring skills
- Become familiar with key resources to continue building your skills as mentees (and mentors)

Culturally Award Mentorship - CAM



Deriving from work of Angela-Byars Winston – U Wisconsin Madison

Enabled by National Research Mentoring Network (NRMN)

8 of us from 4 different universities – working together almost 2 years

7 hour training after 1-2 hr pre-work – assumes prior basic training in skills of effective mentoring

Pilot tested in 6 very different institutional and cross-institution settings

Being expanded to mentor/mentee combinations

Amazing conversations and early impacts



Faculty rapidly engaged in dialogue around culture, mentoring and diversity we have never seen before

While focused on mentoring, actually impacting faculty relationships as well

Big skill gains reported in many areas, like:

“Intentionally creating opportunities for my mentees to bring up issues of race/ethnicity when they arise”

“Going outside of my comfort zone to help mentees feel included in the lab”

“Respectfully broaching the topic of race/ethnicity in my mentoring relationship”

First MS under review...

Culturally Aware Mentorship (CAM)

The screenshot displays the NRMNet website interface. At the top, the browser address bar shows the URL <https://nrmnet.net>. The NRMNet logo, featuring stylized human figures in red, orange, and yellow, is positioned on the left, with the text "NRMNet National Research Mentoring Network" to its right. Social media icons for Facebook, LinkedIn, Twitter, and YouTube are located in the top right corner. A search bar with the placeholder text "Search this website ..." is situated below the social media icons.

A red navigation bar contains the following menu items: ABOUT NRMNet, OUR PROGRAMS, PARTNER WITH NRMNet, UPCOMING EVENTS, PUBLICATIONS, VIDEO LIBRARY, and NRMNet LOGIN. The "OUR PROGRAMS" menu is expanded, listing: MyNRMNet, Guided Virtual Mentorships, Coaching Groups for Grant Proposal Writing, Research Mentor Training, Research Mentee Training, Building Capacity for Research Mentor & Mentee Training, NRMNet Mentor Certifications, and NRMNet Supplement and Pilot Projects.

The main content area features a central banner with the text "career progression" and two circular images labeled "Mentoring" and "Development". To the right, a dark grey box contains the text "UNLOCKING SCIENTIFIC POTENTIAL THROUGH MENTORSHIP" and a description of the network's support for career advancement. A red "JOIN NRMNet" button is located at the bottom of this box. A vertical "Feedback" button is on the far right.

Below the banner, six categories are listed with corresponding circular images: UNDERGRADUATE STUDENTS, PHD CANDIDATES, POSTDOCTORAL RESEARCHERS, JUNIOR & SENIOR FACULTY, NON-FACULTY RESEARCHERS, and ACADEMIC ADMINISTRATORS.

The Windows taskbar at the bottom shows various application icons, including Internet Explorer, Google Chrome, Microsoft Word, and Outlook, along with system tray icons and the date/time "6:38 AM 4/6/2017".

Our Group – the power of diversity



“Scientific Careers Research and Development Group”

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Longitudinal Study

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Jennifer Richardson, PhD (Western MI U)

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Others

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Publications



- McGee, R. and Keller, J.L.: (2007) Identifying Future Scientists: Predicting persistence into research training. (2007) *CBE-Life Sciences Education* 6, 316-331. (PMC2104502)
- McGee, R. and DeLong, M.J.: Collaborative PhD dissertations spanning multiple mentors and institutions: Impacts on student development. (2007) *CBE- Life Sciences Education* 6, 119-131. (PMC1885910)
- Gazley, J L Remich, R, Naffziger-Hirsch, M, Keller, J, Campbell, P, and McGee, R. Beyond Preparation: Identity, Cultural Capital, and Readiness for Graduate School in the Biomedical Sciences (2014) *J Res Sci Teaching*; 51, 1021-1048, DOI: 10.1002/tea.21164.
- Wood, CV, Campbell, PB and McGee, R. 'An Incredibly Steep Hill'; How Gender, Race, and Class Shape Perspectives on Academic Careers among Beginning Biomedical PhD Students. *J of Women and Minorities in Science and Engineering*. 2016; 22(2):159-181. PMC5323240
- Remich R, Jones R, Wood CV, Campbell PB, McGee R. How Women in Biomedical PhD Programs Manage Gender Consciousness as They Persist Toward Academic Research Careers (2016) *Acad Med*; 91, 1119-1127

Publications (cont.)



Remich, R, Naffziger-Hirsch, M, Gazley, JL and McGee, R. Scientific Growth and Development During a Postbaccalaureate Program: Results from a Multisite Qualitative Study (2016) *CBE Life Sci Ed*; 15; PMC5008872.

Coaching

Thakore, B K, Naffziger-Hirsch, M E, Richardson J L, Williams S N and McGee, R (2014) “The Academy for Future Science Faculty: randomized controlled trial of theory-driven coaching to shape development and diversity of early-career scientists”, *BMC Medical Education*.14:160. PMID: 25084625 (PMC4121509)

Williams, S N, Thakore, B K and McGee, R (2016) Coaching to Augment Mentoring to Achieve Faculty Diversity: A Randomized Controlled Trial, *Acad Med*; 91, 1128-1135

Williams, S N, Thakore, B K and McGee, R (2016) Career Coaches as a Source of Vicarious Learning for Racial and Ethnic Minority PhD Students in the Biomedical Sciences: A Qualitative Study, *Plos One*; 11, PMC4965118.