Building Capacity for Institutional Transformation in the Twenty-first Century: Women of Color in STEM and SBS Fields
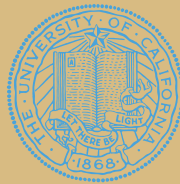

Systemwide Roundtable Report
Wednesday, October 17, 2012
University of California, Irvine

ADVANCE PAID
OFFICE OF ACADEMIC PERSONNEL

ROUNDTABLE FEATURES

On Wednesday, October 17, 2012, over 100 faculty, academic administrators, and staff gathered at UC Irvine for the second UC ADVANCE PAID Roundtable. Attendees received an electronic portfolio of materials to review before the meeting; view PDF here http://www.ucop.edu/ucadvance/_files/roundtable-2/attendee-portfolio-roundtable2.pdf .

GOALS OF THE ROUNDTABLE

1. Provide a context for Institutional Transformation.

2. Equip faculty, administrators and graduate student leaders to be agents on behalf of Institutional Transformation;

3. Improve the recruitment and climate for Women of Color in STEM (Science, Technology, Engineering, and Mathematics) and SBS (Social and Behavioral Sciences) fields.

ROUNDTABLE PRESENTERS

Michael Drake, Chancellor, UC Irvine

Aimée Dorr, Executive Vice President and Provost, UC Office of the President

Yolanda Moses, Associate Vice Chancellor for Diversity, Excellence and Equity and Professor of Anthropology, UC Riverside

Gregory Washington, Dean of Henry Samueli School of Engineering and Professor of Mechanical Engineering, UC Irvine

Carroll Seron, Chair and Professor of Criminology, Law & Society, Sociology, and Law, UC Irvine

Barbara Dosher, Dean of School of Social Sciences and Professor of Cognitive Sciences, UC Irvine

Valerie Jenness, Dean of the School of Social Ecology and Professor of Criminology, Law & Society, Sociology, and Nursing Science, UC Irvine

Herbie Lee, Vice Provost for Academic Affairs, Campus Diversity Officer for Faculty and Professor of Applied Mathematics and Statistics, UC Santa Cruz

Cecilia Conrad, Vice President for Academic Affairs, Dean of the College and Stedman-Sumner Professor of Economics, Pomona College

Mary Ann Mason, Professor and Co-Director of the Earl Warren Center for Law and Social Policy at the UC Berkeley School of Law

Albert Bennett, Dean of the School of Biological Sciences and Professor of Ecology and Evolutional Biology, UC Irvine

Diane O'Dowd, Department Chair and Professor of Developmental & Cell Biology, UC Irvine

Luis Mota-Bravo, Director, Outreach, Research Training and Minority Science Programs, UC Irvine

Francis Leslie, Dean of the Graduate Division and Professor of Pharmacology and Anatomy and Neurobiology, UC Irvine

Susan Coutin, Associate Dean of Graduate Division and Professor of Criminology, Law & Society and Anthropology, UC Irvine

Kelly Marie Ward, PhD Student, School of Education, UC Irvine

Marina Corrales, PhD Student, School of Education, UC Irvine

INTERSECTIONALITY/THE DOUBLE BIND

The roundtable was focused on the intersection of race and gender for faculty in Science, Technology, Engineering, and Math (STEM) and Social and Behavioral Sciences (SBS). Throughout the day, different themes and issues were addressed with this population in mind. This section synthesizes the ways this population was discussed, addressing questions such as where are we losing these women in the pipeline and why are they leaving?

Dr. Moses' opening presentation offered a framework for the day by introducing the "Double Bind" as described in two in-depth studies conducted by Malcolm, Hall, and Brown (1976) and Ong, Wright, Espinosa, and Orfield (2011). These articles, read beforehand by roundtable participants, examined women of color in science programs. Dr. Moses' comments foreshadowed much of the day's conversation as she emphasized the importance of climate and data collection.

Presenters and participants repeatedly underscored the importance of examining Women of Color as a population facing unique challenges and barriers. Historically, efforts to address discrimination or exclusion based on race or gender most often helped men of color or white women. The experiences of Women of Color cannot be attributed to only race or gender, but the combination of those things and traditional interventions may not be effective in supporting this population. Reports on changes in demographics throughout the higher education pipeline of only race or gender marginalizes the group.

Presenters and attendees also noted that we should be careful to not always aggregate Women of Color into one homogeneous group. African Americans, Latinos, Asian Americans, and American Indians, among others, perceive and are perceived differently in different contexts. The work of Mary Ann Mason and Joan Williams at UC Berkeley/UC Hastings highlights how stereotypes differ across racial and ethnic categories. Several presenters noted that additional factors to consider are social class, international status, sexuality, and family status.

Conflicting with this variety in the population is the paradox of the "small n". The fact that there are so few women—including Women of Color—in the highest levels of academia (this is especially true for STEM fields) means that for certain types of research and data-keeping, Women of Color must be lumped together as one monolithic group in order to generate significant findings. Many presenters talked about the issue and how it eloquently represents the larger problem. How can we better understand the trajectories of women of color with the hope of supporting them if there are too few to study?

THE PROBLEM

The following is a brief discussion of different themes that presenters and attendees identified as problematic for Women of Color.

Climate

Hostile or chilly climates may deter Women of Color from advancing in higher education. Climate comprises multiple factors including attitudes, behaviors, perceptions, and institutional context. Some factors are easily identifiable, such as overt discrimination, and can be addressed. For example, presenters noted that collaboration and group work could often have negative consequences for Women of Color as they are often relegated to secretarial roles in those groups and are otherwise shut out of academic conversations. Climate also includes more covert issues such as devaluing translational research and implicit disapproval of those women who choose to have families. These less visible issues are often not tied to individuals' actions but reflect the culture of the academy. Accumulation of both overt and covert discriminatory and exclusionary experiences may push Women of Color out of the pipeline. Dr. Jenness noted that part of the reason people from majority groups may not recognize climate issues may be due to unexamined privilege. In particular, White privilege was discussed as a factor in allowing many people to ignore inequitable representation of Women of Color in graduate programs and faculty positions. The idea of meritocracy was also implicated as a barrier to equity in that it allows people to justify covert discrimination and denies unearned privilege (Jenness).

Confidence & Self-Efficacy

Intricately tied to the effects of climate are issues related to confidence and self-efficacy. Dr. Seron discussed expertise confidence and career-fit confidence and their role in predicting persistence for Women of Color in engineering programs. Expertise confidence is made up of the tasks and competencies required of a professional and predicts one's intention to stay in an engineering major. Career-fit confidence is the belief that the professional role will *suit* the individual, and predicts whether one intends to be an engineer in five years (Seron, 2012). In both areas, men have significantly larger endowments of confidence than women. Relational confidence was also identified as a problem for Women of Color and is related to the degree of comfort felt with the culture of the setting, including their interactions with colleagues and supervisors.

The issue of "solo status" was another theme throughout the day. As Women of Color make up such a small percentage of graduate and faculty populations, it is likely they are one of few, if not the only, Women of Color in their programs. Being the only one affects how one perceives her own

experiences and how other people perceive her. Women of Color report experiencing social, intellectual, and even physical isolation (Gay, 2004). Another issue is "problematic popularity" where Women of Color are highly visible (due to their solo status) and disproportionately sought out to sit on committees and panels to be the voice of diversity (Gay, 2004).

Implicit Biases and Unexamined Privilege

Implicit biases are a problem at every stage of higher education. More than one presenter mentioned that no one, regardless of race or gender, is free from bias. Dr. Dosher explained the phenomena of amplified bias in multi-stage hierarchical processes like hiring and faculty review. Starting even with a small amount of bias over the course of a multi-staged process results in substantial inequity over time. For example, starting with equal gender representation at stage one in a selection process and inserting a small amount of preference toward men to move to the next stage will create an effect that accumulates over time. Once you reach the highest stages of the process, the effect will have grown so that men outnumber women two to one, the effect of very small differences accumulating and compounding through the selection process.

Biases have infiltrated every stage of academia, beginning with which students are allowed into universities for undergraduate education, and which are deemed suitable for graduate education. At the faculty level, biases affect hiring, promotion, and even decisions about grants. Such biases can even affect Women of Color when they are in positions of power. Students' biases toward Women of Color strongly affect their perception of Women of Color faculty and their teaching. Biases against certain types of institutions were also mentioned by participants who noted that Historically Black Colleges and Universities (HBCUs) and Hispanic-serving institutions (HSIs) are implicitly devalued, and that students from those universities applying for graduate admissions or faculty applicants with degrees from such institutions are thought not to be well-prepared.

Steering Committee Members (L–R): Mary Ann Mason (UCB), Doug Haynes (UCI), Susan Carlson (UCOP), Linda Katehi (UCD), Maureen Stanton (UCD), Yolanda Moses (UCR)

PIPELINE

Participants discussed how, as they move through the pipeline from high school to faculty positions, Women of Color are funneled out. It is important to understand where students exit the pipeline, and the specific challenges associated with each section of the pipeline.

High School to the University of California

Dr. Mota-Bravo shared data that highlighted differences across race and gender of 10th graders who are likely to attend a UC campus. For all racial and ethnic groups, females are more likely than males to attend a UC campus. Of all groups, Asian American females are most likely to attend, followed by white females. There is also a correlation between the proportion of URM students in a high school and the proportion of students from that school that are UC-eligible. Schools with higher percentages of students of color produce lower percentages of UC-eligible students. This maxim holds even for those students with high GPAs; having a high GPA in a high percentage URM school does not increase one's chances of attending a UC campus. Some factors listed as problematic in this section of the pipeline are academic preparation (of students, parents and teachers), lack of educational resources, lack of role models in STEM, varied understanding of the importance of higher education, and insufficient knowledge about science careers (Mota-Bravo).

Challenges in Undergraduate Programs

Using data from the UC Office of the President, Cecilia Conrad noted that the UC loses Women of Color in STEM between declaring their intent to major in a STEM field and graduation. African American, American Indian, and Chicana/Latina women all enter UC with higher intentions to major in a STEM field than actually translate into completed Bachelor degrees. These women enter college with a stated interest in STEM but change their minds somewhere along the way. Women of Color in large introductory biology classes fail at higher rates than any other group (O'Dowd). Women in engineering, regardless of race or ethnicity, receive 22 percent of Bachelor's degrees. Once race and ethnicity are considered, Women of Color undergraduate degree holders make up a very small proportion of engineering degrees. Some sub-disciplines such as environmental and biomedical engineering have relatively larger representations of women; however, their representation is still far below fifty percent (Washington). Though representation of undergraduate Women of Color in the Social Sciences is relatively higher than in STEM programs, over time women exit the pipeline to graduate degrees and faculty positions (Dosher).

TABLE 1. BARRIERS TO PROGRESSION THROUGH THE PIPELINE FOR WOMEN OF COLOR

Intent to Major → Bachelor's degree	Bachelor's degree → Doctorate degree	Doctorate degree → Faculty position	Faculty position → Tenure
Interest in science	College GPA	Family responsibilities	Gender and racial bias in evaluations of teaching
High school preparation	Research experience	Faculty relationships	Climate
Self-efficacy	Solo status	Finances	Family responsibilities
Peer network	Funding issues	Climate	Racial bias in grant making
Faculty relationships	Mentorship and role models	Biases in the hiring process	Gender bias in some fields but not others
Pedagogy	STEM climate		
Social identity	Biases in performance assessment		
Climate			
Social support			
Bias			

Table adapted from Cecilia Conrad's UC ADVANCE PAID Roundtable presentation, *What Does Science Tell Us About Broadening the Participation of Women of Color in STEM/SBS Fields?*

Doctorate Degrees

The next big transition is from undergraduate to graduate degrees, where at the University of California, Irvine there is a loss of either racial or gender diversity (or both) in every school. Dr. Dosher noted that the "pivot point" was in graduate programs. Disaggregating the data from the School of Social Sciences revealed that there tended to be fewer women and students of color in "quant heavy" programs such as economics, mathematical and behavioral sciences and philosophy of sciences. Programs such as Anthropology, Sociology and Political Sciences were more gender-balanced and racially and ethnically diverse. The transition to doctoral programs is also where Asian American women began exiting the pipeline in all disciplines (Conrad) .

Faculty Positions

Finally, by the time they reach the level of the professoriate, representation of Women of Color is very low. Even in those disciplines that have been thought to be more "friendly'" toward diversity, such as the Social Sciences, Women of Color are underrepresented disproportionate to their representation in graduate and undergraduate degrees. In addition to issues with climate and biased hiring practices, at this stage, family and finances may play a role in shaping the decisions of Women of Color. Women of Color faculty must also contend with biases in evaluation and promotion processes and dysfunctional faculty and department relationships. Table 1 outlines some of the issues in the pipeline at each stage.

"STEM++"

Throughout the day, presenters and attendees felt strongly about not thinking of STEM as wholly separate from other disciplines. Dr. Dosher advocated for "STEM++": STEM plus Health Sciences, plus the Social and Behavioral Sciences (SBS) and to also include the Arts. Increasingly, external funders are encouraging interdisciplinary work and are are also requiring evaluation of programming targeting marginalized groups. SBS researchers have the skills and training to conduct such evaluations (Dosher). Additionally, issues such as diversity, climate, and self-efficacy, among other things, are researched in SBS. Theoretical grounding for shaping programming and interventions in any discipline must come from research conducted in SBS disciplines. Another reason to think interdisciplinarily is because Women of Color move through and exit the academic pipeline at many of the same transition points, regardless of discipline. As mentioned before, the more technical and quantitative fields in the Social Sciences have similar representation of Women of Color as programs in STEM.

Another issue that participants considered is why there are more Women of Color in SBS than in STEM programs. What is it about SBS that attracts Women of Color? Roundtable participants felt that Women of Color perceived a clearer link for research that could "make a difference" in SBS. The potential for advances in science and technology to "make a difference" in the world are enormous, yet for some reason this

potential is not clearly communicated to students studying in many STEM disciplines. It may be there is something about the climate of STEM, or the perceived climate, that is off-putting for Women of Color. Whatever the issue, participants agreed that stakeholders across disciplines must work together to find and test solutions.

Carla Solomon (UCSD) and Ricardo Alcaíno (UCSB).

SOLUTIONS: WHAT ARE PEOPLE DOING?

The following section introduces some of the programs and interventions that presenters and audience members have implemented in order to address underrepresentation and climate issues as they relate to Women of Color.

Strengthening the Pipeline

- **UCI School of Biological Sciences Minority Science Programs (MSP)**

  Dr. Mota-Bravo noted that the goal of this program is to increase the number and academic excellence of underrepresented minorities pursuing biomedical research careers and leadership positions. MSP is addressing the pipeline and has forged relationships with stakeholders from a variety of educational settings. MSP partners with K-12 schools, community colleges, and other universities. MSP programs provide students the opportunity to engage in research and emphasize mentoring and other academic supports so that they may be closer to their peers.

- **CalTeach**

  Dr. Bennett shared the successes of the CalTeach program. This program is focused on addressing the lack of K-12 math and science teachers who do not have undergraduate degrees in those content areas. CalTeach is an interdisciplinary program made up of Education, Biological Sciences, and Physical Sciences.

Students in the program graduate with Bachelor of Science degrees in Biological Sciences, Chemistry, Earth Systems Science, Mathematics, or Physics and Astronomy in addition to receiving their California Single Subject teaching credential. Completion of the degree happens in four years. While students are learning their content, they are also learning how to be teachers. Hopefully, having better trained math and science teachers in K-12 will increase the quality of education in those areas and inspire students to pursue STEM in the future.

- **UCOP HBCU Program**

  An audience member reminded participants that UCOP has a program to encourage UC campuses to create partnerships with HBCUs. The program provides funding to departments that are willing to support summer research opportunities for students from HBCUs. Participants agreed that relationships with HSIs should also be built. Not only can HBCUs and HSIs provide a pool of qualified applicants to graduate programs, but staff and faculty at these institutions have the skills and knowledge to support students of color.

Improving Climate, Promoting Persistence

- **Innovative Teaching Strategies**

  Dr. O'Dowd presented some strategies for improving learning in large lecture hall classes. These introductory biology classes can have over 400 students, all bringing a range of academic preparation from their high schools and different learning needs. The class periods are organized into three to four segments made up of mini-lectures, small group discussion, clicker questions and "garage demos." Dr. O'Dowd has also implemented a "learn before lecture" (LBL) strategy. As a part of LBL, students are introduced to new material before hearing a lecture on the material. Pre-class worksheets and quizzes allow for more activity-based learning to occur during class time. Strategies such as LBL may be especially helpful for those students who often fall through the cracks in these large settings.

- **Double Jeopardy**

  A research project headed by Dr. Mason and Professor Williams conducted sixty interviews with Women of Color (20 African American, 20 Latina, and 20 Asian American). The interviews were focused on the women's experiences in academia and the barriers they faced. The findings from these interviews are being synthesized into a series of videos. The videos can be used as a starting point for educating people on the intersection of race and gender and how this intersection affects different groups. http://toolsforchangeinstem.org

- **UCI's DECADE Initiative**

  Under the direction of Dean Leslie and Associate Dean Coutin, the Graduate Division at UCI received federal funding to increase diversity in doctoral programs at UCI. The Diverse Educational Community and Doctoral Experience (DECADE) is seeking to create a replicable model for promoting inclusion and equitable representation of racial and ethnic minorities and women who are underrepresented in their fields. Thus far the program has enjoyed some success. DECADE is modeled after the UCI ADVANCE program and is centered on students and faculty working together to address the issues unique to their own departments. Strategies to achieve these goals include a speaker series, community building events, and a funding program for innovative projects aimed at improving climate.
  http://www.grad.uci.edu/about-us/diversity/decade/

Increasing Faculty Representation

- **Presidential Post-Doctoral Fellowship Program (PPFP)**

  This program has been successful in placing people of color and women in faculty positions at University of California campuses. In the last decade this program has appointed 100 fellows. Of the first 51 to be eligible for tenure, 50 have received tenure. A strong focus on mentoring contributes to the success of this program. Additionally, UCOP offers a hiring incentive to departments for placing the fellows in tenure-track faculty positions.
  http://ppfp.ucop.edu/info/

SOLUTIONS: IDEAS FROM THE ROUNDTABLE

The following section identifies areas where presenters and participants suggested how faculty and administrators might focus their efforts to improve the experiences of Women of Color and increase their representation in the academy.

Strengthen the Pipeline

- **Understand Where Women of Color are Distributed in Undergraduate Programs**

  More than one presenter advocated for a better understanding of which programs undergraduate Women of Color are attracted to and why they are attracted to those programs. Such information would be helpful in understanding why they do not choose degrees in STEM. Of those who were initially interested in STEM degrees but switched to something else, it is important to know why they made that choice. Was it that they did not feel they could complete the STEM degree, or was the other field /program just more attractive? Additionally, Dr. Dosher encouraged SBS programs to emphasize those skills that are traditionally thought of as STEM-related. She argued that many of the

competencies and critical thinking required in STEM careers can also be taught in SBS programs at the undergraduate level.

Improving Climate, Promoting Persistence

- **Required Trainings**

  Educating faculty and administrators on implicit bias and White privilege may start laying the ground work for people to acknowledge these as real barriers for Women of Color and hopefully, to create the conditions for change. An audience member noted that sexual harassment training is required; should we do the same for these other issues?

- **Interventions That Reduce Self-Doubt and Increase Sense of Belonging**

  Dr. Seron felt that to address issues related to confidence, departments should create programming aimed at building confidence and increasing a sense of self-efficacy among Women of Color. This would be a good area for collaboration between STEM and SBS.

- **Mentoring**

  At all stages of the pipeline, mentoring is needed to support and guide Women of Color. Discussing the importance of mentoring, one participant commented, "… it gives you the opportunity for fitting in when you feel like you are drowning." Programs should support students to find mentors outside of their immediate departments and look to national professional associations or other universities and colleges.

- **Systematic Accountability**

  Dr. Conrad insisted that institutions must start to create and implement real accountability structures regarding diversity. Research has shown that diversity trainings and diversity administrators have not proven to make much of a difference. Responsibility for organizational diversity must be linked to real consequences.

- **Rewarding Translational Research**

  Many participants mentioned the importance of translational research in attracting Women of Color to STEM and academia in general. Specifically, the Academic Personnel Manual (APM) should be used as a guide or revised to better recognize the importance of translational research and reward those scholars whose work is targeted on improving society. Dr. Washington commented that the research and work in many STEM fields has enormous implications for solving some of society's most pressing concerns. However, research and scholarship are often far removed from the communities that benefit from the research.

MORE RESEARCH NEEDED

Over the course of the day, presenters and attendees mentioned many areas where additional research is needed. The following are suggestions for what is needed from future research:

1. Collect data on race *and* gender in order to address issues of intersectionality.

2. Evaluate the effectiveness of mentoring programs. What strategies and structures work, and why?

3. Examine longitudinal studies of academic choices.

4. Examine how psychological factors affect academic performance and decision making for Women of Color (climate, stereotype threat, solo status, etc.).

5. Evaluation and metrics of success need large numbers. The challenge is dealing with "small n's."

6. Examine stereotypes and biases from the perspective of dominant groups. What interventions and strategies could be created?

7. Research and document the science of broadening participation:

    • Why it is important?
    • Build a body of evidence.
    • Develop effective strategies.
    • Rigorously evaluate outcomes.
    • How does diversity lead to better science?

8. What is the role of families for Women of Color? Historically, Women of Color have had different labor market participation than White women; how does this affect Women of Color in academia?

9. Explore career trajectories, promotion rates, and time allocation. Is there a "service burden"?

10. Examine the experiences of Women of Color who are graduate students.

11. Disaggregate research along sub-disciplines and sub-fields.

12. Explore how Women of Color successfully navigate the pipeline from undergraduate to faculty positions. What fosters resiliency in Women of Color?

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Report authored by Kelly Ward.
Selected photos courtesy of Anna Everett.

FOR MORE INFORMATION, PLEASE CONTACT:

The Office of Academic Personnel
University of California Office of the President
Tel. (510) 987-9479
www.ucop.edu/ucadvance