That Broaden Participation in Research Careers

A conference to facilitate exchange and disseminate hypothesis-based research on interventions that broaden participation in science related careers.

7–9 May 2009  » Bethesda, MD

www.understandinginterventions.org

This conference is supported by a NIGMS MARC grant to the American Society for Cell Biology (ASCB) 5T36GM008622-12 and organized by the American Association for the Advancement of Science.
PLANNING COMMITTEE

CO-CHAIR
Anthony L. DePass
American Society for Cell Biology
Long Island University-Brooklyn
Brooklyn, New York
adepass@liu.edu

CO-CHAIR
Daryl E. Chubin
AAAS Capacity Center
Washington, D.C.
dchubin@aaas.org

VICE-CHAIR
Linda Blockus
AAAS Capacity Center
Washington, D.C.
lblockus@aaas.org
University of Missouri
Columbia, Missouri
blockusl@missouri.edu

COMMITTEE MEMBERS
Renato Aguilera
University of Texas at El Paso
El Paso, Texas
raguilera@utep.edu

Martin M. Chemers
University of California,
Santa Cruz, California
mchemers@ucsc.edu

Adam Fagen
National Academy of Sciences
Washington, D.C.
afagen@nas.edu

Rachel Ivie
American Institute of Physics
College Park, Maryland
rivie@aip.org

Anne MacLachlan
University of California
Berkeley, California
maclach@berkeley.edu

Rick McGee
Northwestern University
Chicago, Illinois
R-mcgee@northwestern.edu

Laura Robles
American Society for Cell Biology
California State University,
Dominguez Hills
Carson, California
lrobles@csudh.edu

Rhonda Vonshay Sharpe
University of Vermont
Burlington, Vermont
rsharpe@uvm.edu

Merna Villarejo
University of California
Davis, California
mrvillarejo@ucdavis.edu

This conference is organized by the Center for Advancing Science & Engineering Capacity at the American Association for the Advancement of Science (AAAS). Support to organize the conference is funded by a grant from the National Institutes of General Medical Sciences’ Minority Access to Research Careers program to the Minority Affairs Committee of the American Society for Cell Biology (ASCB) and subcontracted to AAAS (grant number 5T36GM08622-12). Several members of the ASCB Minority Affairs Committee have served on the planning committee.

The committee deeply appreciates the AAAS staff support provided by Sabira Mohamed, Cathy Ledec, Betty Calinger, Paula Tilli, Stuart Greenwell, Sandra Audia, and Cursillia Fenwick. We also wish to thank Deborah McCall, Sr. Manager, Minority Affairs, and Joan Goldberg, Executive Director ASCB.
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CONFEREE BACKGROUND

Historically, programs aimed at increasing participation by underrepresented minorities (URMs) have been dominated by intuitive approaches with minimal dependence on the research literature. The irony is that such programs are often developed and implemented by scientists who would never consider such an approach appropriate in other aspects of their work. While a growing body of research literature exists on the efficacy of STEM interventions and initiatives, from K-12 through faculty development, it is dispersed across several disciplines and lacks readily identifiable and utilized outlets that practitioners can access and use to inform their program design. Additionally, research scholars approach the issues from a wide variety of disciplinary backgrounds including psychology, sociology, economics, education, career development, and counseling.

Practitioners and researchers alike share a concern for ensuring a prepared and plentiful research workforce. Organized by the National Academies, the 1st Understanding Interventions Conference addressed the needs of the biomedical research and training community interested in increasing the number of underrepresented minority students at the undergraduate and graduate levels. We learned that many of the same barriers and successes, as well as the theoretical framework for understanding them, extend beyond biomedicine to other natural and physical sciences, computing, mathematics and engineering (i.e., STEM) disciplines. The workshop also introduced some of the methodological approaches favored by researchers in this arena. A summary of the workshop may be downloaded from http://www.nationalacademies.org/moreworkshop.

The 2nd Understanding Interventions Conference illustrated how research on minority students can also be successfully applied or adapted for other underrepresented groups, including women, first-generation and low-income students, immigrants, and students with disabilities. (All registrants will receive a copy of the 2nd conference report, which is available online.) Interventions and initiatives must also extend beyond the undergraduate and graduate levels, address critical transition points for new PhDs and post-doctoral fellows, and guide new professors as they advance through the faculty ranks.

On May 7-9, 2009, the 3rd Conference on Understanding Interventions will bring together program directors of interventions and initiatives designed to increase the number of STEM PhDs and scholars who conduct empirical research that illuminates the constellation of issues around educating and developing a diverse STEM workforce. Workshops, sessions, and posters will communicate effective strategies from successful STEM programs, present results from hypothesis-based research studies, and synthesize the translation of research into practice. The conference schedule is designed to encourage interaction between practitioners and research scholars and to develop multidisciplinary partnerships. We are especially interested in engaging graduate students seeking meaningful dissertation topics in behavioral/social science and education fields.

A continuing goal of these conferences is to introduce practitioners to the differences between program evaluation and research on intervention programs. In recent years, funding agency requirements for programs aimed at broadening participation in STEM fields have driven the evaluation content of projects. Evaluations, though important in assessing the degree of accomplishment relative to program aims, are limited in providing a broader examination of an intervention. This conference recognizes the value of evaluation, yet represents a counterpoint: experts seeking opportunities for collaboration, and outlets for disseminating interventions research. By bringing together the various segments of the research and training community, we seek to demonstrate how they inform and enrich one another.

Research by scholars in the social, behavioral and economic sciences augments evaluation approaches by facilitating discussions of paradigms, methodologies, and differing views on what is considered “good” research. Many funding opportunities originate in agencies with cultures that are more reflective of research as conducted in the life and physical sciences. These cultures appear in contrast to what is at times accepted in areas relevant to the study of interventions within the social and behavioral sciences. By bringing together the various segments of the research and training community, we seek to demonstrate how they inform and enrich one another.

Indeed, the goal of the 3rd Understanding Interventions Conference is to synthesize this “information exchange” between the “what” and the “why”—explain observed processes and outcomes of intervention efforts.

Daryl E. Chubin  Anthony L. DePass

Conference Chairpersons
TRAVEL AWARD PROGRAM RECIPIENTS

Jacqueline N. Aldridge
University of Delaware

Jason T. Black
Florida A&M University

Miriam E. Bucheli
Harvard Medical School

Kathleen Cargill
The College of St. Scholastica

Sabrina Fontaine
Florida A&M University

JeRone Gant
Florida A&M University

Megan L. Grunert
Purdue University

Elena Hernández
University of Washington

Allison Kang
University of Washington

Margaret Mwenda
University of Iowa

Lara C. Perez-Felkner
University of Chicago

Michael A. Preston
University of Arkansas for Medical Sciences

Tina M. Roberts
University of Missouri

Alberto I. Roca
University of California, Irvine

Brian J. Rybarczyk
University of North Carolina, Chapel Hill

Nelson E. Soto
Indiana University-Purdue University Indianapolis

Yu Tao
Georgia Institute of Technology

Ralhuca Teodorescu
George Washington University

Etta Ward
Indiana University-Purdue University Indianapolis

Lisa Watrous
Michigan Technological University

Garen S. Wolff
Wayne State School of Medicine

Maynard Yates
Florida A&M University

Monica J. Young
Syracuse University
AGENDA

THURSDAY, MAY 7, 2009

12:30 p.m. – 6:30 p.m.  Registration Open (FOYER H)

3:00 p.m. – 5:30 p.m.  Concurrent Workshops and Effective Strategies Panels

EFFECTIVE STRATEGIES PANELS AND SESSIONS • 3:00 p.m. – 4:15 p.m.

Deciding what works: A 7-step model for evaluating strategic programming to increase numbers of underrepresented groups in STEM fields (SALON F)
Linda P. Thurston, Kansas State University
Jan Middendorf, Kansas State University

Using technology to make your program more effective (BROOKSIDE A)
Moderator: Lisa Frehill, Commission on Professionals in Science and Technology

Making your website more effective: Broadening participation through networking and recruitment via the web
Liv Detrick, Institute for Broadening Participation

Brave New World: How to connect with college students in the age of the Internet Generation
Elena M. Hernández, University of Washington
Allison Kang, University of Washington

Ethical Considerations in Tracking Student/Alumni Progress on Facebook and LinkedIn
Lisa A. Peterson, University of Washington
Allison Kang, University of Washington

Involving graduate students in K-12 outreach efforts (BROOKSIDE B)
Moderator: Daphne Y. Rainey, National Science Foundation

Teacher Training Internship: A graduate course that serves as a link between graduate students/research faculty, and local high school students
Nicholas A. Ingoglia, University of Medicine & Dentistry of New Jersey

K-12 Minority Outreach Fellowship: Bridging generations among minority scientists
C. Brooke Bruthers, American Physiological Society
The STARS Alliance at FAMU: Broadening Participation in Computing Through Recruiting, Bridging and Retention
Sabrina L. Fontaine, Florida A&M University
JeRone Gant, Florida A&M University
Maynard Yates, Florida A&M University
Jason T. Black, Florida A&M University

CONCURRENT WORKSHOPS • 3:30 p.m. – 5:30 p.m.

The NSF ADVANCE program: Strategies to increase the participation and advancement of women in academic science and engineering careers (FOREST GLEN)
Jessie DeAro, National Science Foundation
Anne Fischer, National Science Foundation
Kelly Mack, National Science Foundation
Graciela Narcho, National Science Foundation
Joan Peckham, National Science Foundation
Tanja Pietrass, National Science Foundation

NCWIT program in a box: Surveying climate to improve undergraduate retention (LINDEN OAK)
Joanne Cohoon, National Center for Women & Information Technology

Putting theory to work: Developing careers in science & engineering (OAKLEY)
Angela Byars-Winston, University of Wisconsin-Madison
Lori Bakken, University of Wisconsin-Madison

EFFECTIVE STRATEGIES PANELS AND SESSIONS • 4:30 p.m. – 5:45 p.m.

Broadening participation in undergraduate research: Principles and strategies for designing inclusive programs (BROOKSIDE A)
Jodi Wesemann, American Chemical Society & Council on Undergraduate Research

Retaining students in STEM fields: A research-based perspective (BROOKSIDE B)
Watson Scott Swail, The Educational Policy Institute

Strategies and skills for advanced PhD candidates (SALON F)
Moderator: Laura Robles, California State University, Domínguez Hills

Sealing the holes in the middle of the pipeline: An intervention for 3rd & 4th year PhD students
Heather P. Tarleton, University of California, Los Angeles
Dissertation House: Graduate innovation in PhD completion and retention
Wendy Y. Carter, University of Maryland, Baltimore County

Preserving the professoriate by broadening participation in STEM research careers through collaborative preparing future faculty programs
Etta M. Ward, Indiana University-Purdue University, Indianapolis
Nelson Soto, Indiana University-Purdue University, Indianapolis

6:00 p.m. – 8:00 p.m. Opening Reception (SALON B/C)

FRIDAY, MAY 8, 2009

7:00 a.m. – 10:00 a.m. Registration Open (FOYER H)

7:30 a.m. – 8:30 a.m. Breakfast Buffet (SALON E)

8:30 a.m. – 9:00 a.m. Welcome and Opening Remarks: The State of the Community (SALON E)
Speakers: Daryl E. Chubin, American Association for the Advancement of Science
Anthony L. DePass, Long Island University, Brooklyn

9:00 a.m. – 10:30 a.m. Plenary Session I: Exploring self-efficacy as a key to student success: Research and practice (SALON E)
Moderator: Clifton Poodry, National Institutes of Health
Panelists: John Matsui, University of California, Berkeley
Martin Chemers, University of California, Santa Cruz
Kellina Craig-Henderson, National Science Foundation

10:30 a.m. – 10:45 a.m. Break

10:45 a.m. – 11:45 a.m. Plenary Session II: Large Scale Interventions for Systemic Transformation (SALON E)
Moderator: Anthony L. DePass, Long Island University, Brooklyn
Panelists: Michael Nettles, Educational Testing Service
Robert Layne, University of Massachusetts Medical School

11:45 a.m. – 12:15 a.m. Break

12:15 a.m. – 1:45 p.m. Lunch & Keynote Luncheon Speaker (SALON E)
Navigating the Legal Landscape to Champion Successful Program
Moderator: Daryl E. Chubin, American Association for the Advancement of Science
Speaker: Jamie Lewis Keith, Vice President and General Counsel, University of Florida
Respondent: Wanda E. Ward, National Science Foundation

Ms. Keith will review and share some wisdom from an AAAS Project that provides General Counsels, Provosts and other senior academic administrators at the research universities with resources on specific, effective and legally sustainable approaches to achieving greater diversity within faculties, as well as in graduate and undergraduate student bodies. The project, in which AAU is participating, seeks to foster a common understanding and productive partnerships by the legal and academic policy leaders at research universities to advance campus diversity initiatives. The project focuses on STEM fields and what can be done legally to champion and sustain effective programs. Funding for the project is provided by the Alfred P. Sloan Foundation and the National Science Foundation.

2:00 p.m. – 3:30 p.m. Concurrent Oral Sessions and Effective Strategies Panels

RESEARCH SESSIONS

Graduate program data collection & evaluation (SALON F)
Moderator: Rachel Ivie, American Institute of Physics

Evaluation, design and data from the 10-campus UC AGEP
Colette Patt, University of California, Berkeley

Study of the Efficacy of Obtaining a Research Master's Degree as a Step to a PhD
Frank T. Bayliss, San Francisco State University

The role of identity and belonging in career decision-making (BROOKSIDE A/B)
Moderator: Renato Aguilera, University of Texas, El Paso

Developing the identity of a scientist: Situative learning theory as a framework for apprenticing hispanics into scientific research
Sarah T. Hug, University of Colorado at Boulder
Heather Thiry, University of Colorado at Boulder

The Choices black STEM students make: Graduate school versus industry
Dawn G. Williams, Howard University
Lorraine N. Fleming, Howard University
EFFECTIVE STRATEGIES PANELS

The power of groups: Building community among students
(FOREST GLEN)
Moderator: David Asai, Howard Hughes Medical Institute

Harvard College’s Program for Research in Science and Engineering (PRISE)
Gregory A. Llacer, Harvard University

Investing in diversity: The effects of an integrated approach to summer undergraduate research internships on program participants
Ana M. Corbacho, University of California, Davis

The research experience: creating a vertical networking community from freshmen to faculty
Brian H. Booton, University of Missouri

Enhancing academic performance of undergraduates (GLEN ECHO)
Moderator: Adam Fagen, The National Academies

Investigation of Facilitated Study Groups, Past and Future
Kenneth A. Rath, SageFox Consulting Group

Peer-Led Team Learning and Success in Freshman Level Chemistry Courses
Subhash C. Bhatia, Morehouse College

Undergraduate academic experience for first-year engineering students through a summer bridge program
Jacqueline Hodge, Texas A&M University

Pre-college outreach activities: Teacher, parent, and role model influences (OAKLEY)
Moderator: Deborah Harmon Hines, University of Massachusetts Medical School

AHETEMS: Providing a foundation for educational excellence in STEM
Gary A. Cruz, AHETEMS, Inc.

Decoding classroom dynamics using H.F.R.T. to develop a triad of interventions that engage and retain minority 5th-12th grade students in STEM Fields
Garen Wolff, Wayne State University School of Medicine
Post-Translational Modification of a High School Mentorship Program
Rob W. Rockhold, University of Mississippi Medical Center

3:30 p.m. – 3:45 p.m.  Break

3:45 p.m. – 5:15 p.m.  Plenary Session III: Staying on path: A conversation about undergraduate STEM degree attainment (SALON E)
Moderator: Watson Scott Swail, The Educational Policy Institute
Panelists: Marie-Elena Reyes, Frida Kahlo Institute
Alan Peterfreund, SageFox Consulting Group
Janice Cuny, National Science Foundation

5:30 p.m. – 7:30 p.m.  Poster Session, Reception & Resource Fair (SALON G/H)

SUNDAY, MAY 9, 2009

8:00 a.m. – 9:15 a.m.  Breakfast & Plenary Session IV: Communication and dissemination beyond the scholarly literature (SALON E)
Moderator: Nancy Hensel, Council on Undergraduate Research
Panelists: Scott Jaschik, Inside Higher Ed
Frank Matthews, Diverse Issues in Higher Education (invited)

9:30 a.m. – 10:30 a.m.  Concurrent Oral Sessions and Effective Strategies Panels

RESEARCH SESSIONS

Informing the career decisions of new PhDs (BROOKSIDE A)
Moderator: Alberto I. Roca, University of California, Irvine

Career Choices of Women in Chemistry: Understanding motivations, rewards, and challenges
Megan L. Grunert, Purdue University

Aligning Postdoctoral Training with the Academic Professorate: Altering the traditional paradigm to increase diversity in the sciences
Brian J. Rybarczyk, University of North Carolina, Chapel Hill

Underrepresentation: The role of faculty, peers, and process (SALON F)
Moderator: James Stith, (retired) American Institute of Physics
**Insights from Underrepresented Minorities in Physics**
Sharon Fries-Britt, University of Maryland, College Park
Toyia K. Younger, University of Maryland, College Park
Wendell D. Hall, University of Maryland, College Park

**Fostering Minority Scientists: The Role of Belonging and Goal Orientation**
Anna Woodcock, Purdue University

**Social and cultural capital: Helping minority students excel**
(BROOKSIDE B)
Moderator: Tuajuanda Jordan, Howard Hughes Medical Institute

**Trust Matters: Social Capital, Self Motivation, and Diversity in the Biomedical Sciences**
Robert K. Ream, University of California, Riverside

**More than getting us through: Cultural capital enrichment of underrepresented minority undergraduates**
Brian D. Veazey, University of California, Davis

**EFFECTIVE STRATEGIES PANELS**

**Enhancing the undergraduate experience** (FOREST GLEN)
Moderator: Rhonda Vonshay Sharpe, University of Vermont

**Discipline-specific workshops: Becoming a researcher**
Elizabeth Bizot, Computing Research Association

**Preparing the Next Generation of STEM Professionals through International Research Experiences: Evidence of success!**
Carol Bender, University of Arizona

**Building student research competence: Two models**
(GLEN ECHO)
Moderator: Anne MacLachlan, University of California, Berkeley

**The Affinity Research Group Model: Creating and maintaining effective research teams**
Ann Q. Gates, University of Texas at El Paso

**Enhancing the Talent Pool: a Multi-Institutional Approach**
Valerie Wilson, Brown University, Leadership Alliance
10:30 a.m. – 10:45 a.m. Break

10:45 a.m. – 12:15 p.m. Plenary Session Panel V: Institutionalizing success on campus: Understanding what works (SALON E)
Moderator: Roosevelt Johnson, American Association for the Advancement of Science/National Science Foundation
Panelists: Michael Leibowitz, UMDNJ Robert Wood Johnson Medical School
Cinda-Sue Davis, University of Michigan
Kenneth I. Maton, University of Maryland Baltimore County

12:15 p.m. – 1:00 p.m. Wrap Up in final Plenary Session: Future Directions (SALON E)
Speakers: Anthony L. DePass, Long Island University, Brooklyn
Daryl E. Chubin, American Association for the Advancement of Science

1:00 p.m. Box Lunches/Departure (SALON E)
HOTEL FLOOR PLAN
Poster Location

All posters will be located in Salon G/H on the main floor of the Bethesda Marriott. Posters are ordered alphabetically by first author's last name.

Poster Setup

Posters may be setup starting at 12:00 p.m. (noon) Thursday, May 7, 2009. Place your poster on the half side of the board below your final poster number. The maximum size allocated for each poster is 4’ x 4’. Each side of the board will hold two 4’ x 4’ posters. Be sure to use a type size and font that will be easily readable. Poster pins will be provided. No electrical or multi-media displays. Do not move the boards or your poster number.

Poster Display Times

Posters will be displayed all day Friday, May 8. Photographing, video taping, or recording of any kind of the posters will be PROHIBITED unless a poster author is present and provides specific permission.

Poster Session and Reception

A poster/exhibitor session and reception will take place on May 8, from 7:00 – 7:30 p.m.

Poster Removal

All posters must be removed by 12:00 p.m. (noon), Saturday, May 9, 2009. Posters not removed will be discarded.
PRECOLLEGE (K-12)

**P13. SC LIFE, Clemson University’s HHMI Project: The first ten years — 1998-2008**
Alix G. Darden, Oklahoma University Health Science Center
Barbara Speziale, Clemson University

**P18. An Integrated Model for STEM Student Development at Winston Salem State University and Wake Forest University School of Medicine**
Jill J. Harp, Winston Salem State University
Morris Clarke, Winston Salem State University
Donna Durham-Pierre, Winston Salem State University
Azeez Aileru, Winston Salem State University
Abdul Mohammed, Winston Salem State University
Ann Lambros, Wake Forest University Baptist Medical Center

**P32. Impact of High School Students Participation in a Research Intensive Program on their Science Confidence and Interest in STEM Careers**
Michelle R. McCombs, University of California, Davis
Jodie Galosy, University of California, Davis
Ken Peterson, Portland State University
Marco Molinaro, University of California, Davis

**P59. The Maine Pathways and Connection to STEM Project**
Susie Valaitis, Institute for Broadening Participation
Chris Cash, Institute for Broadening Participation
Allyson Fauver, Institute for Broadening Participation
Reba Fowler, Institute for Broadening Participation

UNDERGRADUATE

**P02. What if I don’t have at least a 3.0? Academic Support for Underrepresented Minority Students Who Major in the Sciences**
Jacqueline N. Aldridge, University of Delaware
Harold B. White III, University of Delaware
David C. White, University of Delaware

**P03. Revealing, Understanding, and Surviving the Dilemmas of Becoming a Research Scientist**
Natalie C. Becker, University of California, Riverside

**P04. Strategies, Principles and Challenges Facing Computing and Information Technology in Minority Serving Institutions**
Mohsen Beheshti, California State University, Dominguez
Richard A. Aló, University of Houston-Downtown

**P05. Developing Communities of Scholars: Critical to Undergraduate Research Programs**
Carol Bender, University of Arizona

**P06. Explaining success in mentored research interventions: A strength-based social psychological approach**
Phillip J. Bowman, University of Michigan
Angela Ebreo, University of Michigan

**P07. Preliminary Support for the Mechanisms Enhancing Scholarly Achievement (MESA) Model: Understanding Interventions Encouraging Minorities to Pursue Research Careers**
Carrie Jo Braden, University of Texas Health Science Center at San Antonio
M. Danet Lapiz-Bluhm, University of Texas Health Science Center at San Antonio

**P08. The Undergraduate Research Experience: A Developmental Approach to Program Design for Research-Intensive Universities**
Brian J. Buchwitz, University of Washington
Barbara T. Wakimoto, University of Washington

**P09. Building Alliances: How Institutional Research and Program Leaders Can Collaborate to Measure Outcomes and Impact**
Denise Carrejo, University of Texas at El Paso
Bereket Weldeslassie, University of Texas at El Paso
Roy Mathew, University of Texas at El Paso

**P10. The Effect of On-Campus, Academic Year, Research Experiences on STEM Ph.D. Attainment of Meyerhoff Scholarship Program Participants**
Frances D. Carter, University of Maryland, Baltimore County
Marvin B. Mandell, University of Maryland, Baltimore County
Kenneth I. Maton, University of Maryland, Baltimore County
P11. Saving T.O.M.: A problem-based approach to preparing community college students for research internships and STEM careers
Ana M. Corbacho, University of California, Davis
Jodie A. Galosy, University of California, Davis
Michelle R. McCombs, University of California, Davis
Marco Molinaro, University of California, Davis

P12. CCWinter Program: Access to First Research Experiences for Community College Students
Ana M. Corbacho, University of California, Davis
Jodie A. Galosy, University of California, Davis
Michelle R. McCombs, University of California, Davis
Marco Molinaro, University of California, Davis

P14. Comparing Collaborative Research and Apprenticeship Models in Designing Undergraduate Summer Programs
Melissa K. Demetrakisopolou, Institute for Biomedical Philosophy
John Pecore, Georgia State University
Shari L. Britner, Bradley University
Laura Carruth, Georgia State University
Robert L. DeHaan, Emory University
Karen L. Falkenberg, Concept Catalysts, Inc.
Phillip E. Gagne, Georgia State University
Christopher T. Goode, Georgia State University
Brian A. Williams, Georgia State University
Kyle J. Frantz, Georgia State University

P15. The power of doing: How research experience contributes towards minority student integration into the scientific community
Mica Estrada-Hollenbeck, California State University, San Marcos
Maria Aguilar, California State University, San Marcos
Anna Woodcock, Purdue University
Paul Hernandez, University of Connecticut
P. Wesley Schultz, California State University, San Marcos

P16. Programming, Physics, and Fun: An Honest Introduction to Computer Science
Eric A. Freudenthal, University of Texas at El Paso
Alexandria Ogrey, University of Texas at El Paso
Mary K. Roy, University of Texas at El Paso
Ann Q. Gates, University of Texas at El Paso

P17. Assessment of the Learning Goals of the Leadership Alliance National Symposium
Medeva Ghee, Brown University, Leadership Alliance
Liza Caragia-Lo, Harvard University
Karen Ball, Brown University, Leadership Alliance
Valerie Wilson, Brown University, Leadership Alliance

P21. Using intensive analysis of primary literature as a cost-effective way to stimulate student interest in research careers: Expanding the C.R.E.A.T.E. approach to multiple campuses and diverse student cohorts
Sally G. Hoskins, The City College of New York
Leslie M. Stevens, University of Texas, Austin

P22. Improving the Rate of Success for Underrepresented Racial Minorities in STEM Fields: Insights from a National Project
Syliva Hurtado, University of California, Los Angeles
Mitchell Chang, University of California, Los Angeles
Christopher Newman, University of California, Los Angeles

P23. FOCUS (First Opportunity Continuance for Undergraduate STEM) Project
Lethia Jackson, Bowie State University
Velma Latson, Bowie State University

P24. The Role of Undergraduate Research Programs in Minority Students’ Scientific Efficacy
Allison Kang, University of Washington, Genomics Outreach for Minorites
Jessica Yellin, University of Washington Center for Instructional Development and Research

P27. The Effects of Racial, Ethnic and Gender Identities on College Women in IT-related Majors
Eileen Trauth, Pennsylvania State University

P28. Interventions to Enhance Research and Scholarly Achievements in Undergraduate Nursing Students
M. Danet Lapiz-Bluhm, University of Texas Health Science Center at San Antonio
Carrie Jo Braden, University of Texas Health Science Center at San Antonio
P29. Undergraduate Research Education and Training Program (URGREAT): A holistic successful intervention in a Hispanic Puerto Rican setting
Lilliam Lizardi, Universidad del Este
Karol Malave, Universidad del Este
Sandra Gonzalez, Universidad del Este

P34. Evaluating EAST
Babette Moeller, Education Development Center
Peter Tierney-Fife, Education Development Center

P35. Bridge to Scientific Literacy, Quantitative Literacy and Scientific Research
Lycurgus L. Muldrow, Morehouse College
Jeffrey Porterfield, Morehouse College
John H. Hall, Jr., Morehouse College

P36. Program Evaluation: Research & Mentoring Experiences of Undergraduates in a STEM Intervention Program
Margaret N. Mwenda, University of Iowa

P37. Twenty-five years of success: A longitudinal study of a successful STEM program and a pilot project to institutionalize its success
Camellia M. Okpodu, Norfolk State University
Arlene P. Maclin, Norfolk State University

P39. An NIH Scholars Program for Undergraduate Training of Underrepresented Minorities in Biomedical Engineering
Phillip D. Payton, The City College of New York
Maria Ong, Harvard University
Sheldon Weinbaum, The City College of New York

P40. Broadening Access to Diverse Students through Research Experiences at Hope College as a Pathway to STEM Education and Careers
Karen Nordell Pearson, Hope College
Moses Lee, Hope College
Kathy Winnett-Murray, Hope College
Kenneth Brown, Hope College
Herbert L. Dershem, Hope College

P44. Underrepresented Minorities Pathways to Genomic Science
Hector Rivera, Southern Methodist University
Debra Murray, Baylor College of Medicine

P45. Examining the Impact of Critical Events on Undergraduates: Career Decisions to Become Research Scientists
Tina M. Roberts, University of Missouri
Marcelle A. Siegel, University of Missouri
Linda Blockus, University of Missouri

P48. Enhancing undergraduate academic and research experiences through a collaboration between S-STEM and the McNair Scholars Program
Jennifer Rosato, The College of St. Scholastica
Kathleen M. Cargill, The College of St. Scholastica

P51. Bring your Own Cassava to the Teaching Lab: Research-Based Laboratory Module Implementation in Upper-Division Cell Biology and Genetics Laboratory Courses at a Minority-Serving Institution
Jean Seda, University of Puerto Rico, Mayaguez
Milly Montero, University of Puerto Rico, Mayaguez
Dimuth Siritunga, University of Puerto Rico, Mayaguez
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Po1. Pathways to broaden participation in research: our current strategies and what we have learned
Oludurotimi Adetunji, The Ohio State University
Anne Carey, The Ohio State University

The participation of underrepresented minority groups in sciences is one of the challenges facing our nation in the Science, Technology, Engineering and Mathematics (STEM) initiatives. This has become a growing concern considering the changing demography of United States towards a more ethnically diverse society. The number of racial/ethnic minorities is increasing while the number of non-Hispanic white is almost constant (1). Therefore, the US needs to train all its citizens including those who are members of the growing demography: Hispanic, Asian, African-American and Native Americans in the STEM fields. This is important to our nation's security and economic needs. To remain competitive on the world stage and in the global economy, the US should also have a workforce that is literate, well trained and educated in science, math, engineering and technology. The Colleges of Biological, and of Mathematical and Physical Sciences at The Ohio State University are fully committed to diversity at all levels, and we specifically seek opportunities to broaden the participation of underrepresented minority student in research through our on-going outreach initiative to K-12 STEM groups, with large underrepresented minority students, and to undergraduate students. We will discuss current measures and proposed strategies that we are employing in Biological, and Mathematical and Physical Sciences at Ohio State to broaden participation in research. These include on-going targeted recruitment efforts of women and underrepresented minority students into our graduate programs, and our effective and coordinated collaboration efforts with the University's Director for Graduate Student Recruitment and Diversity Initiatives and PI's of funded research on identification and recruiting prospective women and underrepresented students to research groups. We will also report on the influence that college supported diversity organizations – Women in Math and Science and The Society of Black Scientists – are having on our women and underrepresented minority students, and the opportunity for undergraduate research and research dissemination activities such as the college and university run research forums. Finally, we will summarize what we have learned and the potential impact that our current intervention activities can have in promoting and broadened research diversity at all levels.

Po2. What if I don't have at least a 3.0? Academic Support for Underrepresented Minority Students Who Major in the Sciences
Jacqueline N. Aldridge, University of Delaware
Harold B. White III, University of Delaware
David C. White, University of Delaware

Many academic programs that support underrepresented minority students in the sciences are selective based on having a minimum 3.0 grade point average. While it is important for students to obtain competitive GPA's for advance academic pursuits, many students who aspire to pursue science careers do not start out with “B” averages in their courses. Many of them are border-line between a “C” and a “B”, and as a result, may not have the opportunity to participate in academic support programs, thus inhibiting their potential to become better students.

Because of the highly selective entrance standards of such programs, there is potentially a greater pool of talented students who are not being targeted to pursue science careers. In realizing this, the Network of Undergraduate Collaborative Learning Experiences for Underrepresented Scholars (NUCLEUS) program at the University of Delaware specifically targets students who have earned at least a 2.75 GPA. This GPA entrance requirement makes the NUCLEUS program unique because it provides an ordinary average student the opportunity to develop: an identity as a science major, a level of self-confidence, and an ability to improve academic qualifications to become competitive candidates for graduate and professional school. Students who join the program are not at the very top of the standard GPA scale, nor at the extreme bottom. Nonetheless, NUCLEUS is designed to meet students where they are by helping them identify their weaknesses and strengths, while discovering limitless possibilities of what they can achieve in the biomedical sciences.

Since 1993, the Howard Hughes Medical Institute's Undergraduate Biological Sciences Education Initiative has supported the mission of NUCLEUS that is designed to recruit, retain and graduate academically talented African-American, Latino, Native-American and Asian students majoring in science disciplines at UD. NUCLEUS seeks to increase the ethnic repre-
sentation and cultural diversity in the sciences, while providing an environment that encourages academic achievement, leadership and service.

Over the years, students participating in NUCLEUS initiatives have been provided with the following services: supplemental academic advisement and monitoring, tutorial support, academic and professional development workshops, peer and professional mentoring programs. These layers of support help students who may not begin their academic career as competitive as other students, but eventually realize their potential as future scientists. NUCLEUS has been successful in helping students cultivate their membership in a community of scholars of like-minded individuals pursuing similar academic and career pathways.

**OR01. Study of the Efficacy of Obtaining a Research Master’s Degree as a Step to a PhD**

Frank T. Bayliss, San Francisco State University
Carlos Gutierrez, California State University, Los Angeles
Alan Peterfreund, SageFox Associates
Ken Rath, SageFox Associates

Data on PhD completion rates in STEM disciplines from the University of California (UC) campuses indicate that the California State University (CSU) system is an important source of PhD students, particularly those from underrepresented (URM) groups. Moreover, it appears that master’s students in biology, biochemistry and chemistry, particularly those from certain institutions such as San Francisco State University (SFSU) and CSU Los Angeles (CSULA), which have mature student development programs, are as likely to complete PhDs as students accepted directly from their undergraduate education into PhD programs despite having, on average, lower indicators of success such as GRE scores and undergraduate GPAs. This study aims to test the hypothesis that completing a research master’s degree at a CSU master’s-only program is not only not a detriment to achieving a PhD within a reasonable length of time, but that it instead enhances the chance of receiving a PhD, other factors being equal. In addition, we aim to examine other factors in terms of their importance for receiving a PhD and to examine whether their importance differs between students who use a master’s as a stepping-stone to the PhD and those who start directly in a PhD program.

**Po03. Revealing, Understanding, and Surviving the Dilemmas of Becoming a Research Scientist**

Natalie C. Becker, University of California, Riverside

The proposed presentation will explore findings derived from multi-method research on a long-standing federally-funded program designed to increase the number and competitiveness of underrepresented minorities pursuing graduate studies and research careers in the sciences. To make sense of seemingly contradictory behaviors exhibited by students participating in the program, we applied the construct of an educational dilemma (Lampert, 1985) in our cultural analysis of the intervention at two comparative sites – a research university and a comprehensive university. In so doing, our study uncovered a set of dilemmas, sociocultural processes in which people confront a choice between equally valued but contradictory options, that we argue was produced by this particular educational intervention and then necessarily confronted by participating students and faculty.

The presentation will develop three specific dilemmas: 1) the dilemma between representing oneself as either an honor student who has earned a scholarship or a student from an underrepresented minority group who needs assistance; 2) the dilemma between embracing and applying either the formal scientific knowledge imparted by the program or more informal experiential knowledge acquired through lived daily life; and 3) the dilemma between either maintaining local kinship ties or participating in an international network of scientists. An interpretive analysis of these three examples will reveal the processes through which seemingly straightforward educational solutions or interventions can create a complex set of unintended but very real consequences for student and faculty participants and how the participants in our study coped with or managed these dilemmas (Lampert, 1985) as they navigated through the program.

Cultural analyses of educational dilemmas offer a unique perspective on educational interventions. Rather than suggesting how to craft perfect solutions for our educational challenges, the construct of an educational dilemma suggests the possibility that all interventions will produce real and consequential choices between equally valued and contradictory options for student participants. As educators, researchers, and policymakers we should be better equipped to perceive or even anticipate the dilemmas that these programs produce for students and have in place policies and practices that help them to manage the dilemmas (Lampert, 1985) they will inevitably encounter in their pursuit of successful research careers in the sciences.


**Po04. Strategies, Principles and Challenges Facing Computing and Information Technology in Minority Serving Institutions**

Mohsen Beheshti, California State University, Dominguez Hills
Richard A. Aló, University of Houston-Downtown
A major national problem in the US is the under- representation of its major minority and ethnic groups in the fields of Science, Technology, Engineering and Mathematics (STEM). In particular women and the Hispanic, Afro American, Native American and Native Pacific Islanders are and have been traditionally underrepresented in STEM and more so in computing and information technology. This paper addresses the Challenges in American Higher Education as we move to improve the disparity existing in the obtaining of Bachelors, Masters and Doctoral degrees in the fields of computing and information technology. This disparity is alarming as the representation of Anglos receiving these degrees is significantly higher (200 to 300%) than those received by these minorities. The Computing Alliance of Hispanic Serving Institutions (CAHSI) a consortium of 7 institutions focused on the recruitment, retention, and advancement of Hispanics in computing, is implementing and promoting the development of recruitment and retention mechanisms to attract other majors to the field of Computer Science and persuasion to graduate studies. Computer Science has lost roughly 50% of its majors in the last 5 years. As part of this effort, the member institutions have introduced different interventions that are intended to increase number of under-represented students in computing. CAHSI is creating a repository for support materials for dissemination of each of the implementations and collecting data to determine the success of the approaches. This paper discusses how Computing Alliance of Hispanic Serving Institutions are implementing “best practices” to improve the situation.

The Computing Alliance for Hispanic Serving Institutions (CAHSI) is a consortium of seven institutions that is committed to increasing the number of Hispanics who earn baccalaureate and advanced degrees in computing: California State University at Dominguez Hills (CSUDH), Florida International University (FIU), New Mexico State University (NMSU), Texas A&M-Corpus Christi (TAMUCC), University of Houston-Downtown (UHD), University of Puerto Rico-Mayaguez (UPRM), and the University of Texas at El Paso (UTEP). CAHSI is implementing a variety of interventions supporting students at critical stages of the academic pipeline. These interventions have been chosen to address key causes of under-representation of Hispanics in computing. Two of interventions listed below are the focus of this abstract.

Recruitment through CS-0: Increasing student familiarity with and motivation to study computer science, provide confidence and encouragement for pursuing a CS major. CS-0 is a three-unit course in introduction to computer programming and concepts designed to better prepare students for success in computer science. The CS-0 courses are realized differently at each institution implementing the course, which will permit comparative analysis of methods and produce ideas for customizing or adapting for other universities. Generally speaking, students with little to no prior background in computing enroll in the course. They are provided with the opportunity to learn the basics of programming concepts and develop problem solving and systematic reasoning skills while becoming familiar with a programming environment.

Retention through Peer-Led Team Learning (PLTL): Developing a sense of community and belonging among students while providing meaningful, timely academic support. PLTL provides academic and social support to CS students in gatekeeper courses, or the courses that tend to deter students from remaining in the major. As a part of PLTL, peer leaders provide timely assistance to students for concepts that the students have identified as unclear or difficult. The process requires the instructor to adjust lectures accordingly and the peer leader to conduct a session to address the concerns. Peer tutoring consists of faculty-supervised, one-on-one tutoring by students who have successfully completed and excelled in the course. Peer tutors provide direct assistance with the course concepts, programming, and other assignments in a manner accessible to the student.

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OR02. Preparing the Next Generation of STEM Professionals through International Research Experiences: Evidence of success!
Carol Bender, University of Arizona

The National Science Board reminds us that “the conduct of science, intrinsically global, has become increasingly important to addressing critical global issues.” Our (US) participation in international S & E collaborations and partnerships is increasingly important as a means of keeping abreast of important new insights and discoveries in science and engineering (1). It is incumbent upon educators to provide opportunities for STEM undergraduate students to be exposed to the international scientific community as a means of preparing them to contribute to the solution of problems that require both scientific knowledge and cultural sensitivity. Yet, relatively few STEM majors participate in study abroad programs (16.4% of American students studying abroad in 2005/06 were STEM majors), Moreover, many students, particularly minority students underrepresented in STEM fields, lack the
financial means to study abroad. According to the Open Doors Report issued by the Institute for International Education in 2005/06, 10.7% of American students studying abroad were Hispanic, Native American, African American, or Multiracial (2).

In 1993, the NIH Fogarty International Center in conjunction with the (then) Office of Research on Minority Health, proposed to address these problems through Minority International Research Training (MIRT) grants to support minority students doing research abroad. The University of Arizona (UA) initiated the Biomedical Research Abroad: Vistas Open! (BRAVO!) program in 1992 to send undergraduates abroad to do research. We applied successfully for a MIRT grant and have had continuous funding from MIRT (now MHIRT) since 1993.

This presentation will provide data on the BRAVO! program’s record of supporting minority students, primarily undergraduates, in mentored but independent research experiences in other countries, supported by MIRT/MHIRT grants. Evaluative data will be presented demonstrating the cultural and disciplinary gains students have achieved relative to other types of programs offering science students international experiences (3). Data on the program’s record of sending students on to research careers will be presented. Means that others can use to replicate this program will be discussed.


Po5. Developing Communities of Scholars: Critical to Undergraduate Research Programs
Carol Bender, University of Arizona

Research experience has become an essential part of undergraduate STEM students’ college experience, but activities to supplement the research experience are also necessary. STEM students should develop an understanding of the ethical practice of science, they need to acquire skill in presenting their work in a variety of ways to a wide range of audiences, and they need to understand that as STEM professionals they have a special obligation to share what they know with the public.

At the University of Arizona (UA), a large public institution with an enrollment of 38,000 students, the Undergraduate Biology Research Program (UBRP) has had twenty years of experience in creating community among undergraduate researchers. Nearly 1,700 students have been part of UBRP and the program has had an impact on undergraduate researchers campus wide. UBRP is diverse. Fifty-seven percent of UBRP students are female and 43% are male; 60% are Caucasian, 17% are Asian, 14% are Hispanic, 5% are Native American, 3% are African American, and 1% are Pacific Islander.

Most students are UA undergraduates, but 10% are from other institutions. UBRP supports 140 students at a time and they can choose to work with any of 240 faculty mentors spread across 43 departments, 8 colleges, and several off campus sites. Eighty-three percent of these undergraduates spend a year or more in UBRP and as a result many have published and presented their work at off-campus scientific conferences.

While mentored, independent research is central to our program, we offer a variety of activities designed to introduce students to the study and practice of STEM disciplines from discussion of the impact of politics on funding of science, to the importance of communicating about science to the public, to the importance of networking with one’s peers and colleagues. Many of the ways we create community are used across undergraduate research programs - a website, a listserv, a monthly electronic newsletter written by the participants - however, we have instituted some novel offerings, making the most of opportunities available at our institution and in our geographic location in the desert Southwest.

UBRP community building activities can be classified into several overlapping categories: skill building (workshops on how to read the primary literature, how to write a scientific paper, how to make a scientific poster, how to give a scientific talk); career development (career panels featuring program alumni and others in diverse professions that draw on their scientific background, resume writing workshops, networking opportunities, scientific seminars, small group discussions); social and cultural awareness (an annual off campus ethics retreat, service trips to Nogales, Sonora to participate in sustainability activities, participation in the annual saguaro fruit harvest with members of the Tohono O’odham Tribe); and outreach (Penpals project with local under-resourced middle school; marching as model organisms in a 4th of July parade; volunteering to do science activities with local precollege students; sending press releases to their home town paper about their research). Community building can be significantly enhanced by a student advisory group. The UBRP ambassadors meet twice a month. Their involvement in planning and implementing activities creates a sense of program ownership. Having a room were UBRP students can congregate informally is also valuable. They have dubbed the lounge “The Helicase” (where
scientists come to unwind). In short, communities of undergraduate researchers will become the communities of scientists of tomorrow. It is imperative that they feel connected to each other and to the larger society.

**OR03. Peer-Led Team Learning and Success in Freshman Level Chemistry Courses**
Subhash C. Bhatia, Morehouse College
Lance W. Shipman, Morehouse College

The general chemistry course has been a gate-keeper course at Morehouse College for many years. The retention rate and success rate in the first semester has ranged from 50-55%. The initial observations indicated that the “quantitative literacy” and problem solving ability among students may be the major factors. The Peer-Led Team Learning (PLTL) has been implemented at many different types of colleges and universities. The impact of PLTL in the general chemistry and organic chemistry courses is well documented in the chemical education literature. The PLTL activities were initiated for the first semester general chemistry course in Fall 2004 to address the low retention and success rates in this course. The PLTL activities were implemented for all students enrolled in the fall semester and extended to the second semester during Fall 2005 semester. The material utilized for PLTL was adopted from the available material and modified to be suitable for our courses. The modifications in PLTL material were also made to reflect the sequence of topics as covered in our courses. In addition to the PLTL, we have also implemented guided-inquiry pedagogy and computer assisted experiments in the general chemistry lab courses. Implementation of PLTL, guided-inquiry labs, and tutoring has resulted in an increase in the retention and success rate in the general chemistry courses. The largest decrease was observed in the number of withdrawals from the course. Impact of the PLTL on the retention, success, and grade distribution will be discussed. The other possible intervention strategies will also be presented. The uniqueness of general chemistry course at Morehouse, the profiles of students, the details of implementation, the results of students surveys, and the implications for the similar institutions will be presented. We wish to thank the Peer Leaders and Federal agencies for their support. Part of this work was presented at the 235th ACS National Meeting in 2008.

**OR04. Discipline-Specific Workshops: Becoming a researcher**
Elizabeth B. Bizot, Computing Research Association
Margaret Martonosi, Princeton University
Juan Gilbert, Auburn University

Discipline-specific workshops (DSWs) are one- or two-day events that combine career mentoring for members of underrepresented groups with technical presentations by experts in a subfield of computing. The aim is three-fold: to increase technical knowledge of the discipline, to increase enthusiasm for the discipline, and to provide participants with discipline-specific career knowledge about succeeding as a researcher in that field. Ten DSW events have been held since the program began in 2006, funded by NSF through a Broadening Participation in Computing grant to the Computing Research Association Committee on the Status of Women and the Coalition to Diversity Computing. Three more events are scheduled for later in 2009. Some are stand-alone workshops and some are attached to a conference in the discipline; some target graduate students and some include undergraduates. Not only are the events successful in encouraging the individuals who attend to continue their research and degree plans, they also engage senior-level researchers who may not have previously been involved in diversity activities, and they prompt discipline-based organizations such as conferences and SIGs to consider institutionalizing similar programs. The poster will cover organizing and evaluating a DSW, with lessons learned so far.

**OR05. The research experience: Creating a vertical networking community from freshmen to faculty**
Brian H. Booton, University of Missouri
Linda Blockus, University of Missouri

The University of Missouri’s EXPRESS (Exposure to Research for Science Students) program is designed as an “on ramp” opportunity for college freshmen and sophomore minority students. The program provides paid research experiences in faculty labs, peer mentoring, and weekly group meetings as interventions to increase the number of students pursuing graduate degrees with particular emphasis in the area of biomedical research. This NIH IMSD program currently funds 38 students. The current group for the 2008-09 academic year consists of 25 freshmen, 12 sophomores and one transfer student (27 women, 11 men; 35 African American, 2 Hispanic, 1 Native American). The most common declared major for the students is Biology (23), but other majors include Animal Sciences (4), Biochemistry (4), Psychology (2), Chemistry (1), Philosophy (1), and Undeclared (3).

Central to our program is the development of a supportive community of peers. New approaches to developing community have evolved over the life of the program. Besides working approximately 10-15 hours per week in their labs, students attend an hour-long weekly meeting with all EXPRESS students. Weekly meetings are multi-faceted in their purpose. While many meetings provide specific program-related content (i.e. how to find a faculty mentor, developing
lab skills, how to read a scientific paper, etc), other meetings have a specific goal of building community. Through data collected via formal focus groups from previous cohorts, qualitative statements indicated that while students desired a certain amount of academic-related meetings, they also considered “community building” just as important, if not more important, to the programmatic aspect of EXPRESS. With these goals in mind, approximately a third of weekly meetings this academic year have been focused with this aforementioned objective. Group activities have included: a “nature of science” endeavor where assigned “scientists” must make observations about a “new civilization” that they have discovered, a campus photo scavenger hunt, using Mr. Potato Head as a communication exercise to eventually talk about the important of communication within one’s assigned research laboratory to name a few. The sense of community within this year’s group is manifested by the formation of informal study groups, the spontaneous gathering of students going to the residence halls as a group to eat dinner after our meetings, to the lounge areas outside of our office becoming a “social hangout” for many students. Overall, participants this year have cited “building friendships” and “making connections” with other minority students pursuing science degrees as one of the most valuable aspects of the program.

The community building is also multi-generational by design. Four upper-class undergraduate students are designated as Peer Mentors and hold bi-weekly one-on-one meetings with each EXPRESS student. Additionally, informal socials have been held between the undergraduate EXPRESS students and the minority graduate students in the Life Sciences.

The minority graduate students have now even formed their own group (Nexus Graduate Association). Post-docs new to the university are also linked to this group. The graduate students meet monthly and professional development seminars, along with social activities. They held a retreat this past fall as well as organized a social with their faculty mentors. In addition, minority graduate students have served on panels at EXPRESS meetings to discuss their academic careers and perspectives as minority students pursuing an advanced degree in the Life Sciences.

Furthermore, a monthly newsletter for minority scientists on campus helps to build connections among undergraduates, graduates, faculty and staff. The current distribution list for the newsletter includes over 250 minority students, faculty and staff. Student accomplishments are highlighted, various minority programs are showcased, and relevant minority on- and off-campus opportunities are announced.

On a campus of 28,000 undergraduate and graduate students, our freshmen class this year included a minority enrollment of 422 (7.3% of this year’s class). While this number represented a 20% increase from last year, the overall campus environment provides unique challenges for minorities to “find their niche” on our campus. Building community is one way that students feel more connected to their college experience. This intervention strategy has widespread ramifications for retention and matriculation efforts on our campus and particularly for students in the science disciplines. We believe this aspect of our program is especially important given that the Life Science curriculum at the University of Missouri is spread over five colleges and ten departments. Given this breadth, we believe the success of our program and ultimately of our students depend on the ability and willingness of our staff and faculty leaders to work purposefully in building community.

Po6. Explaining success in mentored research interventions: A strength-based social psychological approach
Phillip J. Bowman, University of Michigan
Angela Ebreo, University of Michigan

Undergraduate research programs have demonstrated significant efficacy in increasing the number of students who enter graduate studies and embark upon research careers. Studies indicate that program participation can have positive effects on a range of academic and career development outcomes (Cole, 1995; Gum, et al., 2007; Seymour, Hunter, Laursen & Deantoni, 2004). One underlying assumption is that all participants who are provided with the formal opportunity to engage in a mentored research experience will receive similar benefits. However, program benefits for UMS may be systematically restricted by SES and/or race-related obstacles (i.e. Bowman, 2006). Therefore, an implicit assumption that “formal program activities benefit all” may be problematic for some UMS and innovative strategies may also need to reinforce and mobilize informal support and related social psychological strengths to boost program benefits. For example, UMS may be differentially influenced by both non-normative role impediments (academic preparation, family poverty, psychosocial stress, etc.), and adaptive resources to cope with such role impediments (informal support, self-efficacy, motivation, etc.). A related assumption is that formal faculty mentoring and other structured activities are sufficient to explain successful program outcomes. However, success of UMS in such programs may not only be dependent on formal activities but also informal support and other resources that facilitate adaptive coping with role difficulties.

We present a strength-based role strain and adaptation model that can be used to examine two major assumptions that underlie mentored research opportu-
nity interventions, at any level in the academic pipeline. First, successful outcomes among UMS participants may be impeded by student role strain including objective role difficulty (i.e. academic preparation) as well as risky cognitive appraisals (i.e. role conflict, overload, ambiguity, and discouragement). Second, despite such student role strain, a more comprehensive program agenda can promote greater success among students by combining formal faculty-centered mentoring activities with adaptive strategies to systematically promote informal support (i.e. staff, peers, family) and social-cognitive strengths (i.e. personal efficacy, engagement orientations).

The presentation ends with a discussion of possibilities surrounding the development of a Strength-based Assessment System to guide more comprehensive strategies within undergraduate mentored research interventions during critical transition stages (i.e. middle-to-high school, high school-to-college, undergraduate-graduate school, college-to-professional career). A better understanding of UMS role difficulties and their adaptive social psychological strengths can help to guide more comprehensive and innovative strategies to improve success in pipeline programs, and in turn, promote diversity within educational and career fields.

Po7. Preliminary Support for the Mechanisms Enhancing Scholarly Achievement (MESA) Model: Understanding Interventions Encouraging Minorities to Pursue Research Careers

Carrie Jo Braden, University of Texas Health Science Center at San Antonio
M. Danet Lapiz-Bluhm, University of Texas Health Science Center at San Antonio

One of the distinctions between program evaluation and research is that research provides a test of the assumptions and hypotheses that form a base for intervention strategies. The purpose of this presentation is to share preliminary findings that represent initial support for the validity of the Mechanisms Enhancing Scholarly Achievement (MESA) model variables and relationships in “capturing” essential elements of students’ learned experience during initial pursuit of research careers. The MESA Model, based on learning theory assumptions, consists of six learning process variables: 1) Motivator Direction & Strength, 2) Interpersonal Risks, 3) Team Psychological Safety, 4) Learned Resourcefulness and Research Self-Efficacy, 5) Team Reflexivity, and 5) Scholarly Productivity and Career Path. Motivator Direction & Strength, defined as the level of action-focused commitment to participate in clinical research science that improves the health of others, satisfies a desire for intellectually stimulating work, and provides a source for personal recognition and authority in one’s field operates as the stimulus to enter a research career development learning frame. Hypothesis 1: Undergraduate nursing students who are enrolled in Research Scholars’ Program courses and graduate nursing students who are enrolled in a core theory course will have greater Motivator Direction & Strength than undergraduate nursing students enrolled in a core introduction to research course. Scholarly Productivity & Career Path, defined as the level of individual research productivity and continuing clinical science career planning, is the primary outcome of the learned process depicted in the MESA model. Hypothesis 2: Undergraduate nursing students who are enrolled in Research Scholars’ Program courses and graduate students who are enrolled in a core theory course will have greater Scholarly Productivity & Career Path than undergraduate nursing students enrolled in a core introduction to research course.

Forty-four nursing students enrolled in Research Scholars’ Program courses or a core graduate theory course and 68 undergraduate students enrolled in a core introduction to research course completed the MESA questionnaire that provide self-reported levels of the MESA variables. Internal consistency reliability ranged from a = .70 to a = .92 for individual variable measures. Independent t-tests were completed to assess group differences on total scale scores. Hypotheses 1 and 2 were supported. Motivator Direction & Strength (t = 6.0, df 100.5, p = .0001) and Scholarly Productivity and Career Path (t = 3.3, df 54.4, p = .0001) mean scores for students enrolled in the Research Scholars Program and core theory courses were higher than mean scores for students enrolled in the introduction to research course. These initial data support the learning theory assumed base of the MESA model. The stimulus to entering a research career development learning frame is stronger for those who have had consciousness levels raised about the power of research to make a difference in the health of others, the potential of research to be stimulating work and, recognition that research can help one establish authority in one’s field.

OR06. K-12 Minority Outreach Fellowship: Bridging generations among minority scientists

C. Brooke Bruther, American Physiological Society
Martin Frank, American Physiological Society
Marsha Lakes Matyas, American Physiological Society

The APS K-12 Minority Outreach Fellowship cultivates partnerships between minority physiologists and K-12 teachers and students. Activities foster communication between minority trainees (graduate and postdoctoral students) and middle/high school students.
Since the program’s official inception in 2006, Outreach Fellows have reached almost 800 students in five states in schools and learning centers. Presentations range from large to small groups and included demonstrations on topics such as: blood flow and oxygen delivery changes from rest to exercise; the relationship of exercise to hypertension and heart disease; the importance of exercise to human health; the scientific method; careers in physiology, and diversity among scientists. Program impacts have been positive and are assessed through pre/post surveys and fellow reflections.

Po8. The Undergraduate Research Experience: A Developmental Approach to Program Design for Research-Intensive Universities

Brian J. Buchwitz, University of Washington
Barbara T. Wakimoto, University of Washington

Undergraduate research programs at colleges and universities vary widely in structure, criteria used to select participants, and type and duration of program support. Our aim is to design a program that is best suited for students and faculty mentors at large, research-intensive universities. Here we describe the design and assessment of the University of Washington-Howard Hughes Medical Institute Integrative Research Internship Program (UW-HHMI IRIP). The UW-HHMI IRIP differs substantially from the more common summer-only undergraduate research programs in its intentionally developmental and integrative approach. Key features include: selection of a diverse cohort of students who have had little or no previous research experience; a required seminar course to facilitate introduction to research culture and broaden students appreciation of different types of research fields in biology; and an extended period of support that includes part-time research for two academic quarters preceding full-time research in summer. To assess our program, we are using two national surveys, the Survey of Undergraduate Research Experiences (SURE II) and the Undergraduate Research Student Self-Assessment survey (URSSA) which report gains as perceived by the undergraduate researchers. We show that UW-HHMI IRIP participants report higher than average learning gains in 20 of the 21 areas measured by SURE II. To compare student gains as evaluated by faculty mentors, we are testing a new mentor survey developed through a collaboration between our HHMI program and those at Montana State University, Oregon State University, and University of Montana. Overall, our results indicate that the UW-HHMI IRIP is providing beginning undergraduate researchers with meaningful research experience and encouraging retention in research for at least one additional academic year.

Or07. Putting Theory to Work: Developing careers in science and engineering

Angela Byars-Winston, University of Wisconsin-Madison
Lori Bakken, University of Wisconsin-Madison

What factors are involved in making decisions and choosing to study science, technology, engineering, and mathematics (STEM)? The discipline of vocational psychology has a rich history dedicated to the scientific examination of career development. Over the last 100 years, vocational psychologists have advanced numerous theories with extensive empirical support to explain the psychological, social, and environmental factors that give rise to personal interests, choices, performance, persistence, and satisfaction in academic and career pursuits.

This workshop will provide substantive overview of career theory and concepts relevant to advancing career development in STEM and is organized into two parts: (1) introduction to and review of theoretical and empirically-supported career concepts especially relevant to STEM fields, with particular attention to the utility of social cognitive career theory and (2) description and examples of strategies for applying career theory to advancing students’ career development. The workshop will be co-facilitated by a vocational psychologist and a continuing and vocational educator, both with extensive intervention and program development experiences in STEM.

The workshop will be conducted in an interactive format providing participants the opportunity to experience and apply material presented both individually and in small group discussions. Data from studies of underrepresented STEM populations at the undergraduate, graduate, and post-doctoral levels will be presented focusing on influences of cognitive and cultural factors on their academic and career development. Strategies for increasing STEM career interests, commitment to research, reinforcing STEM students’ beliefs in their academic abilities, and reducing perceived academic barriers at the individual, department, and institutional levels will be discussed and practiced in this session.

Participants will leave the workshop with a packet of intervention strategies and useful resources to reinforce the workshop content. Participants who work to encourage students’ pursuit of science careers will benefit from this workshop by understanding important concepts on which to focus their efforts. This workshop is open to all faculty, staff, and students. Anyone who is interested in career development in STEM is encouraged to attend.
P09. Building Alliances: How Institutional Research and Program Leaders Can Collaborate to Measure Outcomes and Impact

Denise Carrejo, University of Texas at El Paso
Bereket Weldeslassie, University of Texas at El Paso
Roy Mathew, University of Texas at El Paso

At a large public institution in the Southwest, institutional researchers and evaluators worked with the program director of the university’s RISE program to develop an infrastructure of evaluation that could examine the impact of RISE and similar programs aimed at preparing undergraduate students for doctoral research in the biomedical sciences. This evaluation and research approach is aimed at the mutual goals of program - and institutional-level evaluation that determines the extent to which a program’s goals were met and informs planning and decision-making about practices that enhance success for all students.

In the case of the RISE program evaluation, the institutional researchers used a closely matched comparison group to measure the success of the program in a quasi-experimental design using longitudinal data from student cohorts since the inception of the RISE program in 2004. In one particular first-year student seminar, students with an identified interest in science gain experience learning concepts in microbiology, learn to critically read published scientific journal articles, and give a presentation before they are selected for participation in RISE as a funded student. The comparison group for each RISE program cohort was identified as those students from the first-year seminar who were not selected for the RISE program (“non-RISE”). Program participants demonstrated: 1) higher mean GPAs, 2) higher mean semester credit hours attempted, and 3) higher mean semester credit hours earned, in analyses that compared them with similarly-prepared undergraduates who were not in RISE.

For the institutional researchers, an important consideration in assessing differences in the performance of RISE and non-RISE students is the use of appropriate statistical controls. The researchers wanted to examine whether any observed differences in the academic performance of the two groups within each cohort could be attributed to the RISE program, rather than to other factors, such as differences in pre-college preparation, for instance. Previous longitudinal analysis on the first-year student population at this institution indicates that the university serves three unique groups of undergraduate students that can be defined by their risk of departure from college (Carrejo, Weldeslassie, and Mathew, 2008). The risk classification score is calculated using factors such as academic preparation variables (e.g., high school rank) and demographic variables (e.g., household income level). Using the scoring model for risk developed for the institutional-level analysis, the evaluation team found that the RISE program serves students from all three risk classifications. Across all years, 10.8% of RISE students were found to be in the high risk group, 8.1% were in the medium risk group, and 46% were in the low risk group. After controlling for risk level, RISE students still have significantly higher GPAs than the non-RISE students.

Although many features of the RISE program were designed to promote success for aspiring scientists, many also are documented to promote success among all undergraduate students, especially historically underrepresented groups, according to literature in higher education (see for example, Kuh, et al., 2005 and Kuh, et al., 2007). The first-year seminar, involvement in ongoing research activities with faculty and graduate students, the opportunity to present research and receive recognition, and the chance to hear about careers opportunities help contribute to participants’ success. New approaches to evaluation that incorporate a synthesis of research and evidence-based practices are helping to yield information about how RISE might be further improved, and how effective practices in RISE could be adopted in other student support programs. Most importantly, the presentation will demonstrate how collaborative relationships between institutional researchers and program directors can facilitate the aims of individual programs and inform planning and decision-making at the institutional level.

P10. The Effect of On-Campus, Academic Year, Research Experiences on STEM Ph.D. Attainment of Meyerhoff Scholarship

Frances D. Carter, University of Maryland, Baltimore County
Marvin B. Mandell, University of Maryland, Baltimore County
Kenneth I. Maton, University of Maryland, Baltimore County

The shortage of underrepresented minorities in science, technology, engineering and mathematics (STEM) research careers is attracting increased attention from policymakers. Numerous programs intended to increase the participation of underrepresented minorities in STEM research careers have been implemented to address this problem. A key component in many of these programs is providing undergraduate research opportunities to program participants. However, little is known regarding the impact of participation in undergraduate research on pursuit and attainment of a STEM PhD.

We will examine the effect of participation in on-campus, academic year research on attainment of a STEM PhD. Two definitions of on-campus, academic
year research are considered. Under the first definition, a student is considered to have participated in on-campus, academic year research if he or she participated in UMBC’s annual undergraduate research symposium, completed at least one research course for credit or participated in the MARC/U-STAR program. Under the second definition a student is considered to have participated in on-campus, academic year research if he or she completed at least two research courses for credit or participated in MARC/U-STAR. These two forms of on-campus, academic year research are more intensive and longer-lasting than other forms and, therefore, expected to have a larger impact.

Our estimates will be obtained by applying propensity score methods to data from six cohorts of African-American participants (n=184) in UMBC’s Meyerhoff Scholarship Program. The set of pretreatment variables used to estimate propensity scores will include: participation in summer research following the student’s freshman, sophomore, junior, and senior year of college, respectively; gender; ethnicity; category of major declared as a freshman; parental education; math SAT score; high school GPA; research experience prior to entering college; and research excitement. A variety of algorithms, including nearest-neighbor (n=3 and n=4) with caliper matching, radius matching, kernel matching, and subclassification and regression, will be used to estimate the effect of participation in on-campus, academic year research on attainment of a STEM PhD. For each algorithm except subclassification and regression, a range of bandwidths and calipers are considered. For each algorithm and caliper/bandwidth, the quality of the resulting balance between the matched treatment and control groups will be examined.

ORo8. Dissertation House: Graduate innovation in PhD completion and retention
Wendy Y. Carter, University of Maryland, Baltimore County
Renetta G. Tull, University of Maryland, Baltimore County
Janet C. Rutledge, University of Maryland, Baltimore County

The Dissertation House (DH) at the University of Maryland Baltimore County (UMBC), is designed to help students who are stuck in that dreaded “All But Dissertation” phase known as A.B.D. Specifically the Dissertation House is designed to facilitate students’ progression through the doctoral dissertation process by providing the professional consultation, guidance, and support necessary for scholarly research and writing. The Dissertation House project is based on the successful Scholar’s Retreat by Dr. Sonia K. Foss at the University of Colorado at Denver (Featured in an article by Scott Smallwood (2004) “A Week at Camp Disserta-

tion,” The Chronicle of Higher Education, July 16, 2004). PROMISE: Maryland’s Alliance for Graduate Education and the Professoriate, one of the nation’s 21 AGEP programs funded by the National Science Foundation, adapted some of Dr. Foss’ methods and incorporated them into strategies that UMBC’s Dissertation Coach, Dr. Wendy Carter (PhD Completion Project Coordinator), uses in her “TA-DA! Thesis and Dissertation Accomplished - Finally Finished” books and software. Dr. Carter’s materials are used throughout the US (Website: http://www.tadafinallyfinished.com/)

The first successful pilot of the PROMISE Dissertation House was held at the PROMISE Community Building Retreat at the Coolfont Conference Center in Maryland. Based on the success of these PROMISE Dissertation House experiences, the successes experienced by students who have worked with Dr. Carter, and drawing upon the experience of Dr. Foss and the staff at the University of Colorado at Denver, the “Dissertation House - On Campus” a week-long event (9 am-5 pm), began in the summer of 2007 and continues to every winter break and summer semester.

Graduate students are asked to apply to attend a Dissertation House, by submitting a brief one page summary that describes the project that they wish to accomplish during the Dissertation House period. The application process is designed to garner some information about the students beforehand, so that when they arrive, the facilitators are able to address and eliminate some their hurdles to writing their theses or dissertations. At the end of the Dissertation House experience students are asked to fill out an evaluation.

Although priority is given to graduating students, students at various stages in the completion process benefit from attending the Dissertation House. One student who was at the beginning of the process wrote, “I did not have a clear idea of what my topic would be, I now have a clear topic and main question.” Another one writes, “I didn’t know where to begin with my dissertation; now I have direction using the road map Dr. Carter helped me to develop.” Other students who are further along come to the Dissertation House to reinvigorate their enthusiasm for their research by learning how to set measurable goals and celebrate the small successes daily. When asked about amount of the progress made during the Dissertation House, one student writes, “I got to complete 4 goals out of 6 in one day.” After being stuck for the past two months, this student writes, “It was good to see others struggling and I started making more realistic expectations for myself. The advice was invaluable.” Even when a student was not able to make any progress “because of committee
members” she still mentioned, “It’s helpful to have all DH members meeting together in one place.” Our overall results indicate that students agree that having Dissertation House is a good use of funding. When asked directly if “having the Dissertation House is a good use of funding?” one student in particular writes, “providing funding for a dissertation house was a great idea. The outcome of ensuring all PhD students that participated in the program will complete their dissertation is priceless.” Another writes, “I was able to do in one day of DH what would have taken me at least a whole week to accomplish.” This student sums up this retention effort best, “It helped us to speed up and clarify our thinking so we can finish ASAP ‘an investment in our progress.’”

OR09. NCWIT Program in a Box: Surveying climate to improve undergraduate retention

Joanne Cohoon, National Center for Women & Information Technology
Lecia Barker, University of Texas, Austin and National Center for Women and Information Technology

The National Center for Women and Information Technology (NCWIT) is a coalition of more than 120 prominent academic institutions, corporations, government agencies, and non-profits working to increase women’s participation in information technology (IT). NCWIT exists to identify the reasons for the gender imbalance in computing, identify the research and interventions that best attract, retain, and advance women, leverage existing effective efforts, and build a united national platform for accelerated progress. As a way of leveraging effective efforts, NCWIT offers “in-a-Box” programs: turnkey solutions for promoting gender equity in computing. Each “Box” program is designed for use by IT educators and practitioners, and it supplies all the components necessary for quick and strategic action. Users simply download resources from the NCWIT website to “unpack” a Box and customize it for local use.

During our workshop, our focus will be on the Program in a Box: Student Experience of the Major Survey (SEM). This resource facilitates evidence-based planning for student retention. It provides a survey and associated materials for assessing, interpreting, tracking, and improving the climate of undergraduate computing departments to improve retention. Box components also include directions for conducting the survey and for getting human subjects approval; department-specific analysis and recommendations; templates for presenting results to your faculty and students; and suggestions for sharing the results and taking positive action. SEM survey questions are based on research findings about conditions that promote or inhibit women's retention in computing majors. Items cover gender differences in programming experience and reactions to grades, student-student and student-faculty interactions, curriculum and meaningful assignments, racism and sexism, and more. Data on these important indicators can then be linked to male and female undergraduates’ commitment to the major as a way of identifying the most important targets for intervention.

Workshop participants will learn about the various resources available from NCWIT, and they will examine closely the SEM Box and each of its components. Example reports will be reviewed and potential responses will be discussed. Participants also will plan customization of the SEM for the needs of their own departments and disciplines, and they will discuss indicators that could measure the impact of actions taken in response to SEM findings. Copies of other NCWIT resources will be provided as well.

P11. Saving T.O.M.: A problem-based approach to preparing community college students for research internships and STEM careers

Ana M. Corbacho, University of California, Davis
Jodie A. Galosy, University of California, Davis
Michelle R. McCombs, University of California, Davis
Marco Molinaro, University of California, Davis

A diverse group of nineteen community college students participated in a study to evaluate the efficacy of a guided biochemistry research experience on the acquisition of content knowledge, the development of problem solving skills, and how these correlate with the students' interest in further pursuing a STEM career.

The activity, “Saving T.O.M.,” presents an authentic and contextualized scientific problem that challenges and motivates students to recover a valuable protein from contaminated samples. The solution to the problem requires the development of skills in basic wet lab techniques, simple protocol design, data analysis, and graphic/written/oral communication. Students work in diverse teams (3-4 students per group) organized by considering multiple factors (i.e. different learning styles, home institutions, science majors, lab skills level, leadership skills, ethnicity and gender). The students research and determine the methods needed to solve the problem within the limits of available resources. The instructor serves as a facilitator and refrains from providing the students with answers unless absolutely necessary.

Progress was assessed by how well students developed experimental and analytical skills rather than solely by the knowledge they acquired. The design of the activity scenario created a situation where the contribution of every team member was valued and necessary. Proficiency in any particular discipline was
not enough to find the solution to the complex problem; students had to pool knowledge and skills from different fields, and think outside the box in resourceful ways.

Analysis of data collected through a portfolio of evaluation instruments (survey questionnaires, free-writes, and personal statements) showed significant gains in confidence and problem solving skills, independent of their level at the beginning of the program. Moreover, students reported an increase in their likelihood to consider research science as a future career. In summary, participation in a problem-based research activity with a design that deliberately emphasizes diverse, interdisciplinary interactions has great promise as a successful strategy for raising confidence and stimulating further pursuit of a career in STEM fields. The results from this study suggest a promising approach for preparing community college students for in-depth internship experiences and successful transfer to research institutions.

**P12. CCWinter Program: Access to First Research Experiences for Community College Students**

Ana M. Corbacho, University of California, Davis
Jodie A. Galosy, University of California, Davis
Michelle R. McCombs, University of California, Davis
Marco Molinaro, University of California, Davis

Workshop attendees will learn about a unique program designed to engage Community College (CC) students in an initial guided scientific research experience and kindle their interest in pursuing undergraduate research internships and STEM research careers. The two-week (80 h) CCWinter Program provides a combination of intense research and professional development opportunities. The program includes: (1) a Scientific Research Project-Based Activity (80% time) that provides a stimulating environment for students to become familiar with basic scientific procedures (i.e. wet lab skills, data analysis and protocol design), gain exposure to teamwork/mentor situations, improve critical thinking, and develop written/oral communication skills, and (2) a Professional Identity Development Component (20% time) with activities that address career opportunities/challenges and promote the development of teamwork, collaboration, and a supportive community. Key to this component are activities offering a fun, fresh, and non-confrontational opportunity to address diversity issues –broadened to include stereotypes related to college institutions, majors, scientific disciplines and professions – as shared responsibilities.

The CCWinter program has been offered for the past two years through the Center for Biophotonics Science and Technology at the University of California Davis. Evaluation results show that CCWinter participants demonstrate statistically significant gains in their research skills, sense of competence in performing basic laboratory procedures, successful pursuit of extended internships, and commitment to a science career. Given that community college (CC) is the pathway for a majority of underrepresented (UR) students, attracting CC students into STEM fields has powerful potential for diversifying and strengthening our science and technology workforce. The CCWinter program supports the concept that engaging community college students in an intensive preparatory research experience leverages their capacity to engage in summer research programs and persist in STEM career pathways.

The poster will provide an overview of the CCWinter program, mini-demonstrations of program activities, and discussion of evaluation methods and tools. The workshop agenda will provide ample time for participants to discuss how the CCWinter program can be adapted to varied contexts. Workshop attendees also will receive online access to CCWinter program materials, evaluation instruments, and resources for supporting CC students’ interest and engagement with STEM research careers.

**OR10. Investing in diversity: The effects of an integrated approach to summer undergraduate research internships on program participants**

Ana M. Corbacho, University of California, Davis
Jodie A. Galosy, University of California, Davis
Michelle R. McCombs, University of California, Davis
Marco Molinaro, University of California, Davis

In this presentation, we will address how attention to diversity in an undergraduate science research internship program impacts participants’ positive evaluation of the program, engagement with science research, and interest in STEM careers. Since 2002, The Center for Biophotonics Science and Technology (CBST) at the University of California Davis has sponsored a summer undergraduate science research internship program. Like many other internship programs, students are paired with mentors in research laboratories for 8-12 weeks. The interns assist in the labs in various ways and many develop their own line of research guided by their mentors. One of the unique features of the CBST program since 2007, however, is explicit attention to diversity as a resource for academic, social, and professional identity development. It is important to note that the CBST internship program does not use diversity as a proxy for minority or underrepresented, as is often the case. Rather, diversity is used to signify a broad mix of characteristics and qualities that includes gender, race/ethnicity, socio-economic status, family background, interests, major, career goals, educational
institution, work experience, accomplishments, and challenges. Program recruitment, application, selection, and learning opportunities are designed to create and capitalize on a diverse group of interns.

Analyses of participants’ personal statements written after program completion and evaluation questionnaires indicate that interns develop awareness and appreciation for diversity through a set of activities that explicitly address diversity from a variety of angles. Evaluation results also suggest that these activities, in turn, support interns’ academic, social, and professional development in ways likely to increase their persistence through a STEM career pathway. The activities include a first week “intensive” where students develop a supportive community and prepare for their internships, followed by ongoing weekly professional development sessions.

The presentation will focus on the CBST program’s recruitment, application, and selection process and how these strategies consistently result in a diverse cohort of interns. Presenters also will discuss program activities that emphasize diversity as a resource and evidence that explains how these activities impact the interns’ development of self-confidence, engagement with science research, and interest in STEM careers.

OR11. AHETEMS: Providing a foundation for educational excellence in STEM
Gary A. Cruz, AHETEMS, Inc.

The under representation of underrepresented minorities in the science, technology, engineering and mathematics (STEM) workforce can be attributed to a “pipeline” issue. Indicators point to lack of adequate financial support, cultural capital, minority role models, and mentors as some of the reasons minorities are not completing bachelor’s degrees and pursuing advanced degrees in STEM (Mayo, Murguia and Padilla, 1995; Sonnert & Holton, 1995; Seymour and Hewitt, 1997; Grandy, 1998; Leslie, McClure, and Oaxaca, 1998; Bonous-Hammrarth, 2000). In order to maintain its status as the world’s most productive economy, our nation must fully engage the potential and talents of its entire citizenry.

To that extent, the Advancing Hispanic Excellence in Technology, Engineering, Math and Science Foundation (AHETEMS), a partnership extension of the Society of Hispanic Professional Engineers (SHPE), was created to develop informal science education and enrichment programs to recruit, retain, and graduate Hispanic students throughout the pre-college doctorate STEM pathway. AHETEMS’ educational programs, partnerships and initiatives have acquired a broad-based consistency throughout the country. Its efforts are built upon a theoretical model, which incorporates role-modeling, parental involvement (Perna & Titus, 2002), agency (Noguera, 2003), cultural capital (Bourdieu & Passeron, 1977), student engagement (Astin, 1984; Mayo, Murguia & Padilla, 1995; Tinto, 1987), sense of belonging (Hurtado & Carter, 1997), and mentoring (Brown & DeCoster, 1982; Kram, 1983; Adams, 1993).

Pre-college initiatives focus on infusing cultural capital and agency through encouragement and motivation with college student, professional engineer role-models, and parents. College initiatives focus on engaging the student in the university experience through scholarships, internships, competitions, and networking, and helping them to create a collective learning and living environment. Graduate students are provided mentoring and professional development through a network which builds teaching and research collaborations with other graduate students and Latino/a faculty. Among the most notable programs include the AHETEMS Scholarship Program, SHPE Jr. Chapters Programs, AHETEMS Pre-College Symposia, AHETEMS Summer Camps, Regional Science Bowls, Noches De Ciencias, MUST Scholars Program, AHETEMS Graduate Institute, and AHTEM Teacher Program.

Over the past four years, AHETEMS has directly served over 5,000 middle school and high school students and indirectly informed countless of other families through media, community events, and its bilingual publications. Each year, AHETEMS hosts close to 1,000 middle school and high school students at its Pre-College Symposia, which is the largest, national conference for Hispanic pre-college students interested in STEM. The regional science bowls, in partnership with the US Department of Energy has grown from one regional with 8 teams of 40 students to 128 teams at 8 regional sites hosting over 600 students. This year, the scholarship applicant pool has increased by over 25%, compared to the same time period last year. The summer camps have hosted over 83 high school students, with plans in summer 2009 to implement a two-week camp for elementary Hispanic students in Chicago.

At the collegiate level, AHETEMS has partnership with SHPE, Inc. to provide academic support and enrichment via its network of over 250 student chapters at 2-year and 4-year Hispanic Serving Institutions and majority institution. A menu of competitive federal and corporate internships has supported over 250 students. In addition, technical and academic competitions are afforded to students to compete during the national SHPE Conference. Therein, graduate students are also provided specialized training during the AHETEMS Graduate Institute.

This workshop intends to highlight the best practices in sustaining similar programs and building a pipeline for the next generation of Hispanic technical talent.
SC LIFE, Clemson University’s HHMI Project: The First Ten Years – 1998-2008

Alix G. Darden, Oklahoma University Health Science Center
Barbara Speziale, Clemson University

SC LIFE, a HHMI funded program, has been ongoing since 1998 starting as an outreach program targeting MS students and MS/HS teachers. It has grown to support the best and brightest students through research internships; motivate all South Carolina (SC) students to be scientifically literate through a variety of programs; and supports continuing teacher education through courses and classroom materials. SC LIFE has helped Clemson to build a science pipeline for South Carolina, adding funding and programs to serve students from middle school through college and to prepare them for graduate school. The network has been established and sustains a continually growing, improving and overlapping series of teaching and research opportunities.

SC LIFE is highly successful by many measurements. Educational materials for classroom use are produced that are in demand and are used. The SC State Department of Education recommends SC LIFE as a preferred source for high-quality life sciences enrichment. HS and undergraduate students engaged in research are presenting their research at disciplinary meetings and publishing their work. Individual program assessments, including self-report surveys, provide us with the quality control for the facets of the network and inform us of the utility and application of the various programs. The factors that contribute a student's interest in science and convince them to go into a career in science are numerous. Some scientists will cite that one influential teacher, outreach activity, science project, etc. had the most impact. Others will acknowledge a variety of factors. Equally important, there are also many factors which have been documented to cause students to dislike science and turn from careers in science. Thus programs that attempt to promote scientific literacy and interest in science careers need to be multi-faceted and take into account what is known. Practicing scientists at a major state institution are critical to these programs and logically serve as a pipeline to support by providing the expertise in content, current issues, application skills, enthusiasm, resources etc. We will describe the impact of one such program, SC LIFE.

The NSF ADVANCE Program: Strategies to increase the participation and advancement of women in academic science and engineering careers

Jessie DeAro, National Science Foundation

Anne Fischer, National Science Foundation
Kelly Mack, National Science Foundation
Graciela Narch, National Science Foundation

The goal of the ADVANCE program at the National Science Foundation is to increase the participation and advancement of women in academic science, technology, engineering, and mathematics (STEM) careers, thereby contributing to the development of a more diverse science and engineering workforce. The ADVANCE Institutional Transformation (IT) component supports projects that implement innovative strategies for systemic organizational change at institutions of higher education to transform institutional practices and climate. This workshop will begin with an overview of organizational change as a strategy for increasing diversity in academic STEM faculty and leadership positions. Although the ADVANCE program focuses on gender, awardees report that these strategies also positively impact other underrepresented groups in the STEM disciplines. The workshop will then introduce strategies that ADVANCE IT awardees have demonstrated as essential to create a more equitable environment for women faculty, many of which can be incorporated into ongoing strategic planning efforts and implemented by existing institutional and administrative offices and positions. Promising strategies include:

- Review of the social science literature on organizational change, implicit and explicit bias, work-life issues, accumulated disadvantage, and other research findings related to the underrepresentation of women in STEM academics;
- Collection and analysis of institutional data, via surveys and focus groups, in order to identify the specific needs of faculty and gather basic institutional data;
- Review and revision of institutional policies, procedures, and practices that impact academic careers, such as recruitment, equitable workload distribution, tenure and promotion;
- Adaptation and innovation of key strategies to support faculty development;
- Communication and transparency within the institution about the data analysis and the results of policy, procedure, and practice reviews and revisions; and
- Monitoring and revision of any changes and activities, over time, as a means of evaluating the institutional impact of accomplished milestones and coordinating mid-course adjustments as needed.

The workshop will also include specific examples of organizational change strategies and the resulting impacts of those strategies from various ADVANCE IT awardees. Example outcomes reported by awardees include: a more equitable environment for women as
well as changed STEM departmental culture; reduced faculty attrition; increased institutional competitiveness for recruiting highly qualified STEM faculty; increased faculty job satisfaction; and positive impact of an enhanced academic culture beyond the STEM disciplines.

**P14. Comparing Collaborative Research and Apprenticeship Models in Designing Undergraduate Summer Programs**

Melissa K. Demetrikopoulos, Institute for Biomedical Philosophy
John Pecore, Georgia State University
Shari L. Britner, Bradley University
Laura Carruth, Georgia State University
Robert L. DeHaan, Emory University
Karen L. Falkenberg, Concept Catalysts, Inc.
Phillip E. Gagne, Georgia State University
Christopher T. Goode, Georgia State University
Brian A. Williams, Georgia State University
Kyle J. Frantz, Georgia State University

Undergraduate science majors may be retained and attracted to scientific careers by exposure to basic laboratory research. A summer research experience as an apprentice in a scientist's laboratory can be effective in this regard, but the pool of willing scientists is often too limited to accommodate large numbers of students in such environments. This project uses a 10-week summer research program based at Georgia State University in Atlanta to test the hypothesis that a collaborative learning experience in a dedicated teaching laboratory requiring fewer research science mentors will positively affect student outcomes to the same or greater degree than traditional research apprenticeships. The content area emphasized in our summer research program is neuroscience; however, outcomes could be applied to other research disciplines. Our pilot study indicated both models were successful in elevating attitudes toward neuroscience and confidence with neuroscience concepts and research skills. Outcomes were similar across models, except for designing experiments, which suggested an enhancement of the summer research experience through the collaborative model. A lack of robust differences between ethnicity/race, gender, or program model groups suggested that participants with diverse backgrounds and different program experiences made similar learning gains. To replicate and extend these promising results, we designed an education research study that will produce empirical data comparing the collaborative learning model with the traditional summer research apprenticeship in its ability to maximize outcomes for undergraduate researchers. Every year for four years, approximately 40 undergraduate student participants will be recruited from institutions nationwide, with particular emphasis on recruiting students from underrepresented groups. Both quantitative and qualitative assessment tools are being adapted or developed to measure program-related changes in science self-efficacy, mastery of neuroscience concepts, and long-term retention in research-related career paths. Self-efficacy surveys will measure student beliefs about their abilities to study science, conduct scientific research, and succeed in science-related careers. Mastery quizzes will measure acquisition of basic science content knowledge and process skills. Laboratory observations, participant and mentor interviews, focus group discussions, and assessment of research presentations will measure how, why, and for which participant subgroups the summer research programs are effective. Long-term follow-up will be conducted yearly through 2016 to determine impact of the two research experiences on long-term achievement and career decisions, with achievement defined as course grades and standardized pre-professional test scores, and career decisions defined as choice of science-related courses, majors, pre-professional tests, and post-baccalaureate academic or professional positions. By the end of the project, components of undergraduate research programs that foster the progress of a diverse student population toward careers in biomedical and behavioral research will be identified.

**OR13. Making your Website More Effective: Broadening participation through networking and Recruitment via the Web**

Liv Detrick, Institute for Broadening Participation
Dana Saywell, Institute for Broadening Participation
Susie Valaitis, Institute for Broadening Participation
Chris Brehme, Institute for Broadening Participation

The web has become a primary tool not only for students researching programs, summer research opportunities, and funding resources, but also for faculty and staff seeking to network with others pursuing diversity in science, technology, engineering, and mathematics (STEM) education. The Institute for Broadening Participation (IBP) is a non-profit organization whose staff has worked with National Science Foundation programs since 2001 to assist the foundation to support diversity in its STEM education programs and to increase networking between funded programs seeking to increase the diversity in their projects. IBP has developed a successful model for increasing the participation of underrepresented minorities in STEM that involves a unique combination of web-based tools paired with virtual and face-to-face outreach. The first part of this workshop will focus on website content basics and will provide a checklist of elements for making a website more effective in attracting students and answering students' questions. The second part will focus on
P15. The power of doing: How research experience contributes towards minority student integration into the scientific community

Mica Estrada-Hollenbeck, California State University, San Marcos
Maria Aguilar, California State University, San Marcos
Anna Woodcock, Purdue University
Paul Hernandez, University of Connecticut
P. Wesley Schultz, California State University, San Marcos

The academic pipeline that science students follow from high school through a doctoral degree and into a scientific career is leakier for minority students than non-minority students, such that proportionately fewer minorities than non-minorities ultimately pursue scientific careers (US Census, 2000). Building on our previous findings that participation in the RISE program is related to increased intention to pursue a scientific career and that one of the key attributes of the programs mediating this effect is attaining research experience (Schultz, et al., 2008), we explore why research experience is such a powerful attribute of the RISE program. Specifically, we analyze how research experience contributes towards the integration of students into the scientific community. Kelman (1958, 2006) suggests that integration into a social system can occur on three levels — through compliance, identification, or internalization. We modify his theory slightly and look at capability, identification and internalization. Drawing on data from a national quasi-experimental field study of over 1400 minority science students, we tested if three measures of integration — scientific self-efficacy (the feeling one is capable of doing scientific work), identification as a scientist, and internalization of scientific community values — each mediates the relationship between (a) research experience and intention to pursue a scientific career and (b) research experience and engagement of scientific career benefiting behaviors (e.g. attending conference, publishing, giving presentations, applying to graduate school, etc.). The results indicate that while all variables mediate the aforementioned relationships, there are important differences in the mediation patterns to consider. Of the three mediators, identification as a scientist most strongly accounts for the research experience effect on intention to pursue a scientific career. However, with regards to engaging in scientific career benefiting behaviors, self-efficacy was the strongest mediator. Overall, we conclude that research experience is a powerful attribute of minority training programs because it integrates students into the scientific community on three levels. However, the predictive power of capability, identification and internalization varies depending upon how integration is measured — whether through intention or behavior. A brief discussion of how intention and career benefiting behaviors may be related to future measures of actual career choice and academic perseverance will be provided.

OR14. The STARS Alliance at FAMU: Broadening participation in computing through recruiting, bridging and retention

Sabrina L. Fontaine, Florida A&M University
Jerone Gant, Florida A&M University
Maynard Yates, Florida A&M University
Jason T. Black, Florida A&M University

The mission of the STARS (Students & Technology in Academia, Research & Service) Alliance is to increase the participation of women, underrepresented minorities, and persons with disabilities in computing disciplines through multi-faceted interventions focused on the influx and progression of students from middle school through graduate school in programs that lead to computing careers. The Alliance is organized as a national constellation of regional stars that include research universities, minority and women's universities and colleges, K-12 educators, industry, professional organizations, and community groups. The Florida STAR consists of Florida A&M University, Florida State University, the University of South Florida, and Landmark College (Vermont), who all focus on: 1) Recruiting underrepresented minorities to enroll in computing disciplines; 2) Retaining such students through academic, professional and career support programs; and 3) Bridging toward careers by providing leadership training for participating students to develop the computer science professionals of tomorrow. STARS accomplishes these objectives through the use of the Student Leadership Corps (SLC), which is a collection of undergraduate and graduate students at FAMU who work to foster an extended student community among academia, industry and the community through civic engagement, mentoring, professional development and research experiences. FAMU currently has 9 undergraduate and 4 graduate SLC members, whom are required to work five (5) hours per week toward the project, and receive a stipend of $500 per semester of participation in the project (through 2 years of participation). Each
summer concludes the yearly cycle of the project, and culminates with the annual STARS Celebration, which is held at one of the member institutions. The Celebration is a time for all SLC students and faculty from Alliance schools to come together for one week to discuss ways to enhance and strengthen the program, as well as plan for the upcoming year. Students are also engaged in workshops and seminars designed to strengthen their leadership and research abilities, and further build a sense of commitment to the project and to IT. This work will describe several projects underway at FAMU and conducted by the FAMU STARS SLC: 1) Culturally-Situated Design Tools (CSDT), where students from FAMU visit middle schools for after-school sessions twice a week to demonstrate that several math and science concepts are infused into things that are a part of their culture (such as breakdancing, graffiti, braiding hair and basket weaving), using software tools developed for the project; 2) TRI-IT Program, where FAMU SLC members work with local high school girls twice a week and provide workshops designed to strengthen their interest in computer science and technology (including a 1 week summer program where lesson plans are taught by the STARS SLC members); 3) High School Blitzes, where SLC members talk to high school students about college, careers in CS and IT, and fun topics in CS, such as robotics and mobile computing; 4) Dorm Storms, where STARS students visit campus dorms and talk to students about why they should consider CIS as a major (focus is on undecided majors); and 5) Community College Partnerships, where FAMU STARS students and faculty visit the colleges to talk to potential transfers about FAMU and careers in CS and IT. The CSDT and TRI-IT program also involve pre- and post-test studies, as well as surveys designed to examine student satisfaction with content and motivation toward CS and IT. Results of these students are currently being collected and analyzed and will be published at a later date.

**P16. Programming, Physics, and Fun: An Honest Introduction to Computer Science**
Eric A. Freudenthal, University of Texas at El Paso
Alexandria Ogrey, University of Texas at El Paso
Mary K. Roy, University of Texas at El Paso
Ann Q. Gates, University of Texas at El Paso

Consider the misguided things teenagers do when they first consider the possibility of dating. They focus on smooth ‘pickup’ lines and acting ‘cool’ rather than earnestly seeking mutual interests. In response to recent enrollment drops in computer science programs, many advocates are taking a similar path: They recruit students with engaging courses that hide CS’s relationship to mathematical concepts. Some are creating attractive introductory ‘computer’ courses that focus on the social component of interface design and ignore programming altogether. Although these courses are engaging and teach important skills, they do not strengthen skills in mathematics - which are crucial for success in computer science programs, and in other STEM careers. Furthermore, students are perceptive, and like Hansel and Gretel who saw the oven and recognized the witch’s intentions, they can read degree plans and will recognize that intimidating math and science courses are in their future.

Calculus and classical physics are layered upon each other and understanding is communicated through the composition of complex concepts. Due to this dense layering of abstractions, the cognitive distance between concrete experience and coursework is large. Rather than treating mathematics as a liability that must be hidden from potential suitors, we seize the opportunity to use introductory programming as a vehicle to present mathematics and physical laws from an intuitive and engaging perspective that appears to strengthen interest in, and understanding of technical content.

Our freshman course, which would also be suitable for high school students, leverages computer programming’s accessibility to engage students in the construction of simple time-based simulators that expose underlying principles and create concrete and easily understood examples that mimic and explain familiar phenomena. Thus, by using computation to ‘concretize’ mathematical abstraction, we expose computation’s “best side,” and by doing so, hope to creatively engage and retain entering college students with the potential to enjoy creative and productive careers in computer science and other STEM areas.

**OR15. Insights from Underrepresented Minorities in Physics**
Sharon Fries-Britt, University of Maryland, College Park
Toyia K. Younger, University of Maryland, College Park
Wendell D. Hall, University of Maryland, College Park

Several national reports highlight a growing concern about the erosion of science and technology education in the United States (NACME 2008; NSB 2007; NAS, 2005). The focus on STEM fields has resulted in a call for colleges and universities, as well as national organizations to address several challenges including limited undergraduate interest in science and engineering majors and significant student attrition among those students choosing to pursue careers STEM fields.

Despite the changing demographics in the United States minority students have been identified as nearly non-existent in STEM fields. While African American, American Indians and Latinos make up over 30% of the undergraduate student population in the coun-
try, less than 12% of baccalaureate degrees in STEM fields are awarded to underrepresented populations (NACME, 2008). Additionally, despite the increase in women and underrepresented minorities pursuing graduate degrees in STEM fields, their participation is still significantly less than their white and international counterparts and they often have higher attrition rates, particularly in doctoral programs depending on the discipline (NAS, 2005; NSF 2000). These data suggest that significant work must occur to increase the interest of minority students in STEM fields and to ultimately develop their expertise and talent.

Equally important is the need to understand the experiences of students who are already enrolled in STEM fields. We know from previous research that the nature of the first two years of undergraduate study in science, technology, engineering and mathematics (STEM) fields as overly competitive and unfriendly, particularly toward women and racial/ethnic minorities (Lewis, 2003; Seymour & Hewitt, 1997; Hall & Post-Kramer, 1987). These uncooperative learning communities contribute to students’ decisions to leave STEM fields and those who persist often study in isolation and typically have little interaction with their faculty, teaching assistants, or peers outside of the classroom (Seymour & Hewitt, 1997).

This presentation will summarize a five year study (2004-2008) with the National Society of Black and Hispanic Physicists (NSBP & NSHP). The purpose of the research is to understand the academic, social and racial experiences of minorities who are succeeding in Physics. Several key questions guided the project:

1. What academic and social factors identified in the literature (e.g. faculty, peers, family, finances) are important to minority student success apply to the experiences of minority students majoring in physics?
2. In what ways did minority students in physics characterize their experience?
3. What perceptions did students have about their interactions with faculty in and outside of the classroom?
4. Did race contribute to their motivation to succeed?
5. How did their academic experiences shape their sense of self?

We utilized concepts across a broad range of theories and bodies of research to build a framework for this study. First we turned to the college retention and college impact literature (Astin, 1993; Pascarella, 1980; Tinto, 1993) which informs our understanding of factors that matter in student success in college. Next we turned to the literature on minorities in science and engineering (NACME, 2008; Busch-Vishniac and Jarosz, 2004; Cabrera, Colbeck & Terenzini, 2001; Seymour & Hewitt, 1997) which identifies a number of barriers that impact minority student success. We then employed several psychological concepts like self-efficacy (Bandura, 1987) and attribution theory (Fishbein and Ajzen, 1975) to help inform our understanding of individual behaviors and perceptions. The growing research on minority high achievers (Fries-Britt & Griffin, 2008; Griffin, 2006; Harper, 2005; Fries-Britt & Turner, 2002; Fries-Britt, 1998; Hrabowski, Maton & Greif, 1998, 2002) offered yet another dimension and way of understanding factors that impact successful students.

Data collection occurred annually at the joint meeting of the National Association of Black Physicists and the National Association of Hispanic Physicists. The study included 110 students of which 65% are males and 35% females. Undergraduates and graduate students participated in the study although the majority of the students were undergraduates. The students in our sample attended different kinds of higher education institutions, private and public, predominately White, historically Black as well as Hispanic Serving Institutions from different parts of the country.

Based on the review of the literature we were able to identify a number of factors (e.g. family, peers, faculty interaction, academic experiences, finances, racial experiences, stereotypes, proving process, proving process and self-efficacy) that help to inform the design of the study and the interview protocol. The findings presented in this session will be organized around interactions with faculty, the role of peers and proving process.

**OR16. The Affinity Research Group Model: Creating and maintaining effective research teams**

Ann Q. Gates, University of Texas at El Paso

Undergraduate research is a well-known approach to integrate knowledge and provide practice of the skills critical to business, industry, and government, in particular, refinement of cognitive and interpersonal skills, enhancement of personal growth, and inculcation of intellectual and management habits. While a common practice is to recruit and involve the most visibly successful students, this results in lowering the number of promising students who can benefit from research experiences. To extend the research experience to a broader range of students, particularly students from underrepresented groups, UTEP successfully developed and implemented the Affinity Research Group (ARG) model that provides students with opportunities to learn, use, and integrate the knowledge and skills that are required for research with those required for cooperative work. The model creates an integrated research environment in which a collective of diverse students and faculty contribute to the research effort. Through the ARG model, faculty mentors create and sustain a cooperative environment that explicitly develops skills...
to make students successful in research, academe, and the workforce. As a result, students and faculty, in particular those from underrepresented groups, can reach higher levels of productivity and achievement. Through NSF CCLI funding and IEEE Computer Society Seed funding, the investigators have published an ARG handbook (www.computer.org/arg). The objectives of the presentation are to: become aware of the key components of an ARG, engage in ARG activities, and reflect on how one can introduce ARG practices into a research group.

P17. Assessment of the Learning Goals of the Leadership Alliance National Symposium

Medeva Ghee, Brown University, Leadership Alliance
Liza Cariaga-Lo, Harvard University
Karen Ball, Brown University, Leadership Alliance
Valerie Wilson, Brown University, Leadership Alliance

Presentations at research conferences forge the link between experimentation and analysis and in the process, expand and reinforce the knowledge students acquire during their research projects. The Leadership Alliance, a national academic consortium, provides a comprehensive summer research experience that incorporates a summer symposium as the culminating event. The symposium provides a research presentation stage and networking/mentoring venue primarily for undergraduates from underrepresented and underserved populations. Students hone their presentation skills at the symposium in a supportive environment that equips them to become competitive at larger, discipline-specific conferences. Further, the size of the conference (450-500 persons) allows a variety of exposures within a context of a knowable network of trainees and mentors all along the academic pathway. This report presents results of the student’s satisfaction with the value-added benefits of a research conference that incorporates professional development and networking opportunities for undergraduates.

The Leadership Alliance symposium was designed with three specific learning goals: 1) enhancing research presentation skills; 2) provision of professional development workshops; and, 3) access to Leadership Alliance alumni as role models. The undergraduate symposium participants were surveyed to determine whether these learning goals of the symposium were met. Data for this study were derived from a survey questionnaire administered onsite to undergraduates who participated in the Leadership Alliance symposium in years 2004-2008. The questionnaire is designed to collect quantitative data on participation rates and assess student satisfaction on the elements of the symposium. Student satisfaction was assessed by the rating each student gave to a symposium program element on a 5-point Likert scale that ranged from a high of “very valuable” to a low of “of no value.” Satisfaction was defined as the sum of the percent of respondents rating the element in the top two categories of “very valuable” and “valuable.”

From 2004 -2008, a total of 1516 undergraduates participated in the Leadership Alliance symposium; of these, 1015 students completed and returned the surveys resulting in an average response rate of 67%. For the first learning goal related to research presentation, it should be noted that, on average 92% of undergraduate symposium participants made a presentation of which 67% were oral and 37% were poster presentations. In rating this experience, 87% of respondents rated the oral presentations as “very valuable” or “valuable” and 79% rated the poster presentation at the same level. The two professional development workshops on the “Graduate School Application Process” and the “Graduate School Experience” each received an average student satisfaction of 70%. Similarly, the third learning goal - provision of role models - resulted in a student satisfaction of 70%. These data indicate that the incorporation of career-building workshops and opportunities for scientific communication among peers and senior level scholars is of significant value to students. Thus, the Leadership Alliance National Symposium is a validated model of workshops and resources that serves an integral role in the professional development of students as scientists and researchers.


Megan L. Grunert, Purdue University
George M. Bodner, Purdue University

This research study examines the career choices of women in chemistry to better understand the motivations and reasoning behind these decisions. The goals of this study are to better understand the choices women in chemistry make with regards to career, to identify rewards and obstacles associated with available career choices in chemistry, and to compare graduate students’ perceptions of careers with the descriptions of women in those careers. Eight women graduate students in chemistry from two different institutions participated in a series of three interviews with the researcher. These interviews examined their chosen career path, their perceptions of available career options, their values about work-personal life balance, and their experiences as women in a graduate chemistry program. Women faculty members were also interviewed and asked to reflect on their career choices and provide insight into their lifestyle as academic chemists. Ten faculty members were interviewed, six from three different research-intensive universities and four from three different primarily undergraduate
teaching institutions. All interviews were transcribed verbatim and subsequently analyzed using the qualitative methods of thematic analysis and the constant comparative method (Miles & Huberman, 1994).

Preliminary analysis shows that women graduate students have negative perceptions of the research professor lifestyle at large universities. They feel there is little to no balance between work and personal life. Further, they think that it is nearly impossible to balance this type of career with having children and raising a family. Careers at primarily undergraduate teaching schools, at government labs, and in industry were viewed much more favorably. These findings add a depth of understanding to the numerous studies showing women’s tendency to favor academic careers at teaching institutions over research institutions (see Bentley & Adamson, 2003; Kuck, Marzabadi, Nolan, & Buckner, 2004; Kulis, Scicote, & Collins, 2002; Sears, 2003).

Women faculty members at large research institutions report deciding on their careers fairly early on in their graduate studies. They pursued this path even though they recognized the challenges associated with this career. Many of these participants felt regret about the amount of time they spent with their families or the age at which they started their families. Their primary motivation for continuing in their career was the intellectual freedom they experienced, followed by being able to work with students and help them develop into independent researchers. In contrast, the faculty members from smaller teaching institutions tended to choose their career after negative experiences with research in either a university or industry setting. They felt rewarded and fulfilled by teaching and working with students, rather than through chemical research. They valued the flexibility of their schedules and the ownership they had over their teaching and the research they did with undergraduates.

The findings from this study offer suggestions for future interventions with graduate students, as well as faculty recruitment at research-intensive institutions. Women graduate students felt that women faculty in their department were not positive role models with respect to balancing a career with a family. They also did not see or value the intellectual freedom associated with this career or the rewards of working as an advisor to graduate students. Candid conversations or mentoring relationships outside of the advisor-advisee dynamic could shed insight into what life is really like as a faculty member at these institutions. Hiring and benefits packages at research institutions could also be modified with the addition of family-friendly benefits and policies, including maternity leave, on-site childcare, flexible tenure clocks, and clear departmental expectations for work schedules, to appeal to more women.

**P18. An Integrated Model for STEM Student Development at Winston Salem State University and Wake Forest University School of Medicine**

Jill J. Harp, Winston Salem State University
Morris Clarke, Winston Salem State University
Donna Durham-Pierre, Winston Salem State University
Azeez Aileru, Winston Salem State University
Abdul Mohammed, Winston Salem State University
Ann Lambros, Wake Forest University Baptist Medical Center

Winston Salem State University, (WSSU), is a historical minority-serving liberal arts institution focused primarily on undergraduate education. The university has also had a distinguished record in undergraduate research and promoting community scientific outreach to K12 students through student development programs such as the Center for Excellence in Research Teaching and Learning, (CERTL), Health Careers Opportunity Program, (HCOP), Science Careers Enhancement Program, (SCEP), and SciTech. Hands-on activities and didactic enrichment in laboratory methodologies, presentation skills, and critical thinking have been the central learning objectives collaboratively developed by the partnering institutions. This history of these student centered summer programs involves an ongoing collaboration with Winston-Salem Forsyth County Schools, (WSFCS), area churches, and Wake Forest University School of Medicine, (WFUSM). Support for these programs emanated from NIH, NSF, HHMI, HRSA, Burroughs Wellcome Fund, and private/public partnerships (Idealliance, WSSU Foundation, WFUSM, and the Piedmont Triad Research Park, PTRP). Measurable outcomes used to assess program effectiveness include, but are not limited to, the number of students pursuing admissions into college and community college. Of the students matriculating at WSSU and WFUSM, the outcomes focus on numbers of students pursing degrees in nursing, biology, chemistry, mathematics, computer science, and clinical laboratory science. Five STEM faculty and departmental staff persons have joined forces to deliver and support these student enrichment activities, thus creating a model that enhances the training and mentoring of college and high school students to increase the pipeline of STEM graduates. Briefly, the model empowers students to take on leadership roles in training and mentoring other students. After certain aspects of the laboratory-based training have been completed, the students perform community outreach with middle school students in a research setting. Over 100 students have been impacted by this model in an attempt to steer students towards STEM careers. This model, along with its former successes and future directions in an age of limited funding will be discussed.
P19. FORWARD to Professorship: An Overview
Shelly Heller, George Washington University
Charlene Sorensen, Gallaudet University
Catherine Mavriplis, University of Ottawa

The Forward to Professorship mini-workshop is intended to map the road ahead as graduate students, post-docs and newly hired faculty navigate the way forward to a positive tenure outcome decision. The way forward is often one of multi-lane highways, high-occupancy lanes, miss-directions, exit-ramps and even potholes. There are three avenues that merge for a tenure-seeking academic: teaching, service and research. We highlight the needed skills, features and issues of each of these three topics and the role of mentors in these processes. Attention will be paid to negotiation skills and ideas on how to avoid over-commitment. Each topic will be augmented with a series of resources for participants to delve further into the topics on their own. This poster, created under an NSF ADVANCE grant, is adapted from a two and a half day workshop that has been presented 5 times at the national level and has been adapted and adopted by many institutions. Resources and materials from the previous workshops will be made available for deeper study of these topics.

OR18. Brave New World: How to connect with college students of the Internet generation
Elena M. Hernández, University of Washington
Allison Kang, University of Washington
Lisa Peterson, University of Washington
Lori Miller, University of Washington

The objective of this presentation is to demonstrate how the UW GenOM Project has successfully used Social Networking Systems like Facebook to communicate with students and build virtual, yet very real, communities. As a minority outreach program in the twenty-first century we face the difficult task of maintaining successful communication with college students of the Internet generation. Frequent and relevant communication with our students is vital to their success, as well as the success of our program. In this fast-paced Internet era, we must learn how to best position our program to be the most available to students. With Social Networking Systems such as Facebook, a whole new avenue of communication has been created. Hundreds of thousands of students use these sites on a daily basis to keep in touch with their peers (1). The high traffic on these sites make them the perfect venue for the UW GenOM Project, and other intervention programs, to market themselves to prospective students. At the same time, it also provides a convenient way to maintain contact with those already involved in the program.

Integration into these new “virtual communities” is imperative to the success of our programs. These sites allow interaction on an individual level, through instant and personal messaging. A students’ individual profile can also reveal a great deal of information about them, such as class schedules, jobs, internships, interests and activities (2, 3). These profiles are particularly helpful as a means to keep up with the changing lives of alumni.

Social Networking Sites allow for communication on a group level with the creation of group profiles. Once established, these group profiles form a centralized community where students can interact with other participants, find out about program events and keep up-to-date on one another’s progress. Aside from the communication aspect, these groups also provide an excellent venue for marketing. The groups a student belongs to are listed on their profiles, making them clearly visible to other potential participants. Posting on “Walls” rather than private messaging gives your program increased publicity. Intervention programs can increase participation by inviting students to program activities through Event pages that can include descriptions and photographs. These pages increase students’ awareness of your program events, display who is attending (or not), and increase attendance and success rate through both publicity and peer motivation.

We encourage other intervention programs to utilize Social Networking Sites like Facebook to build communities and communicate with program participants. Our poster will describe the many outlets of communication and how best to employ them to create a successful mode of communication between intervention programs and students. The implications of such usage will also be discussed, as the use of these sites can lead to unexplored ethical issues in terms of collecting and reporting program data (4).

OR19. Undergraduate Academic Experience for First-Year Engineering Students Through a Summer Bridge Program

Margaret Hobson, Texas A&M University
Jacqueline Hodge, Texas A&M University
Diane Hurtado, Texas A&M University
Natela Ostrovskaya, Texas A&M University

Research shows that first-time freshmen who are underprepared in mathematics struggle to have academic success in engineering programs. Data also indicate that minority students are overrepresented in this group of underprepared students. In Summer 2007, Learning to Excel in Engineering through Preparation (LEEP), a pilot program was introduced to proactively address this issue. While not a perfect measure of mathematics preparation, Math SAT (SATM) and ACT (ACTM) scores provide readily available indicators of students who are likely to be underprepared. SATM and ACTM scores were used to invite students to participate in LEEP the summer before they enrolled in engineering at Texas A&M University. The LEEP Program is a 5-week summer bridge program designed to improve the preparation of students who are entering as first-time freshmen in an engineering discipline in order to increase their academic success. The expected outcomes for LEEP students are:

- Gain knowledge and skills in math, physics, the design process and study skills
- Earn six hours of course credit (3 hours for University Core Curriculum)
- Meet industry representatives, faculty, current undergraduate/graduate students and University department staff
- Become acquainted with University facilities, services and housing
- Build relationships with other engineering students
- Obtain exposure to undergraduate research
- Understand the importance of engineering to society
- Participate in community service and recruiting activities

The program was piloted during the second summer session of 2007 and offered again in Summer 2008. Students eligible for the 2007 program had a score of 550 or below on the SATM section. For the incoming students in Fall 2008, the College of Engineering implemented an admission requirement of 550 on the SATM portion. Therefore, the eligibility requirements for the program were altered. The target group for the 2008 program was students who scored between 550 and 600 on their SATM section.

In the summer semesters of 2007 and 2008, a total of 69 students participated in the LEEP Program. Demographic information about students participating in LEEP each year as well as incoming engineering students with the targeted SATM scores who did not participate in LEEP was obtained. Students eligible but not participating were used as the comparison group for each cohort. Program participants were surveyed at the conclusion of the 2007 and 2008 programs. Survey data collected from the 2007 cohort was used to improve the 2008 program. First-year academic performance for the 2007 cohort and first semester performance data for the 2008 cohort and comparison groups were collected. The participants indicated that they were satisfied with the operation of the program and felt prepared for their ensuing fall semester. More detail about the LEEP Program participants’ feedback and performance during their first year in comparison to their peers who did not participate in the program will be presented.

P20. Living the Interaction: Women of Color in STEM Education and Careers

Apriel K. Hodari, National Society of Black Physicists
Maria (Mia) Ong, TERC

Interactional theory aims to develop an understanding of the ways in which salient, multiple identities, such as race and gender, function simultaneously to produce outcomes. Interactions may be studied at the macro level (e.g., capitalism, patriarchy), at the micro level (e.g., identity formation), or at the meso level, focusing on institutional dynamics within which race and gender are experienced together (Landry, 2006). Interactional theory is constructive when considering the status and unique experiences of US women of color in science, technology, engineering, and mathematics (STEM). Women of color, as a group, are often invisible in terms of representation and in terms of what is known about them. Underrepresented minority women (African Americans, Chicanas/Latinas, and Native Americans) received less than 6% of all PhDs awarded in STEM in 2005, yet in the same year, they made up more than 13% of the 15- to 44-year-old US population. Furthermore, most existing studies focus singularly on race or on gender. As a result, there is relatively little known about the education and life courses of women of color, how this group becomes interested in STEM, their systems of support, or much else which could be used to make careers in science more attractive to them. An interactional theory framework enables an understanding of why women of color are severely underrepresented in STEM relative to white women.
and all men, especially at advanced levels, as well as the achievement of a more complex understanding of the individual women of color, their communities, and the institutional factors that critically support them to achieve higher levels of advancement in STEM.

The Inside the Double Bind project (NSF/DRL # 0635577), led by Maria (Mia) Ong and Gary Orfield, brought together a national, multicultural research team of scholars to apply the interactional theory framework to over 100 empirical research studies conducted over the past 30 years on women of color in STEM. The literature was drawn from science, education, and other social science fields. The result was a synthesis that identified achievements, challenges, research gaps, and strategies that promote US-born African Americans, Asian Americans/Pacific Islanders, Chicanas/Latinas, Alaska Natives, and Native Americans.

In this presentation we will review highlights of findings we synthesized on women of color in STEM higher education and careers, including the roles that faculty, peers, social climate, intervention programs, and families play in the persistence of women of color in STEM. We will give priority to the effects of interventions intended to broaden the participation in STEM fields, whether they actually help or hinder women of color in practice. Included in our recommendations will be opportunities to fill existing research gaps.


**P21. Using intensive analysis of primary literature as a cost-effective way to stimulate student interest in research careers: Expanding the C.R.E.A.T.E. approach to multiple campuses and diverse student cohorts**

Sally G. Hoskins, The City College of New York
Leslie M. Stevens, University of Texas, Austin

C.R.E.A.T.E. (Consider, Read, Elucidate hypotheses, Analyze data, and Think of the next Experiment) is a guided method for effectively using journal articles, the real language of science, in the undergraduate classroom, aimed at demystifying the process of decoding scientific literature while at the same time revealing “who does science, and why?” Piloted at the City College of New York, a MSI, the CREATE approach increased students’ critical thinking ability, attitudes about science, enthusiasm for science, and interest in scientists as people. With ongoing support from NSF, we recently expanded the project by training a cohort of faculty from a diverse set of institutions (e.g. Queensborough Community College, Montclair State University, Hobart and William Smith College, Rowan University, Bard College, Columbia University) in using the approaches. Faculty implemented CREATE on their home campuses by choosing their own literature, and adapting the CREATE methods to existing courses in their own curricula. Faculty then taught their courses (ranging from senior capstone seminars to mid-level Biochemistry seminars or freshman “Introduction to Research” classes) using CREATE methodology. On each campus, students were assessed with same anonymous pre/post tests and surveys as in the original study at CCNY. Data analysis is ongoing, but first findings indicate that on all campuses, CREATE-trained students made significant gains in ability to read and understand scientific literature, interest in scientists as people, and interest in science research careers. Our results suggest that the CREATE method can be learned and taught by faculty at many types of institutions, applied in a variety of courses (ranging in this study from capstone seminars to introductory level lecture/lab classes), and that the CREATE approach can benefit diverse cohorts of students by stimulating both their understanding of science and their interest in research careers. The CREATE approach is a cost-effective and adaptable way to help students gain the skills they need to succeed in research careers, while at the same time stimulating the interest in science/scientists that is a prerequisite to entering training for such careers.

**OR20. Developing the Identity of a Scientist: Situative learning theory as a framework for apprenticing hispanics into scientific research**

Sarah T. Hug, University of Colorado at Boulder
Heather Thiry, University of Colorado at Boulder
Ann Gates, University of Texas at El Paso
Elsa Villa, University of Texas at El Paso
Kerry Kephart, University of Texas at El Paso

The lack of Hispanic role models as well as a lack of opportunity for students to participate in authentic research practice perpetuates a troublesome cycle of underrepresentation in computer science research careers. Situative learning theory is presented as a conceptual framework to examine the role of Affinity Research Groups (ARGs) in promoting the student retention and advancement goals of the Computing Alliance for Hispanic Institutions (CAHSI). ARGs are affording students opportunities to join in behaviors associated with high-level, scientific research practice. Through their collaborative work with more experienced researchers (other undergraduates, graduate students, staff, and faculty), ARG students have access to legitimate peripheral participation; in essence, they get a glimpse into the lives and work of research scientists as they perform some of the important tasks of research (Lave & Wenger, 1991).

In this presentation, we highlight the adherence of the Affinity Research Group model to situative learning
theory. Quantitative and qualitative survey data from 98 undergraduate and graduate students involved in research at 6 Hispanic-Serving Institutions show that ARG students made a variety of gains in developing professional research scientist identities from their research experience, including growth in confidence, increased interest in computer science, increased interest in graduate school attendance, and increases in communication, technical, and intellectual skills. Within the communities of scientific research practice, underrepresented minority students developed the habits of mind and dispositions necessary to enter a research career. The opportunity to engage in authentic research and work side-by-side with graduate students and faculty offers students invaluable educational benefits that cannot be gained in a traditional classroom.

**P22. Improving the Rate of Success for Underrepresented Racial Minorities in STEM Fields: Insights from a National Project**
Sylvia Hurtado, University of California, Los Angeles
Mitchell Chang, University of California, Los Angeles
Christopher Newman, University of California, Los Angeles

Both the National Institute of Health (NIH) and the National Science Foundation (NSF) have invested heavily in recent years to address the widely publicized “science crisis” facing our nation. They have also focused specifically on increasing the numbers of underrepresented racial minorities (URMs), particularly African Americans, Latinos, and Native Americans, in science-related fields.

The overall purpose of our research is to understand diversity in science and the principles of good practice in undergraduate science education that will improve the rate of Science, Technology, Engineering, and Mathematics (STEM) degree completion and advancement into graduate studies in related fields among URMs. Although students’ pre-college characteristics are important determinants of degree completion, research suggests that many talented students do not pursue scientific research careers (Seymour, 1992). In order to better understand what factors influence URMs’ success, the UCLA Higher Education Research Institute collected a targeted sample of college students who are majoring in biomedical and behavioral sciences and other STEM fields. These data were obtained through the Cooperative Institutional Research Program’s (CIRP) 2004 Freshman Survey (TFS) and the 2005 Your First College Year (YFCY) survey, which were administered during fall orientation and at the end of the freshman year. The baseline sample contains over 44,000 students who aspired for science degree at college entry (TFS), and subsequently a total of approximately 26,000 students from over 160 four-year institutions many of whom have NIH-funded science research programs that responded to the YFCY. Minority-Serving Institutions (MSI) and institutions with reputations for graduating large numbers of URM science baccalaureates were also recruited to intentionally examine issues of URM preparation in the sciences. Matched samples of science and non-science majors as well as URM and White and Asian students were included to allow the researchers to examine differences across academic fields and racial/ethnic groups.

Using this national dataset with the 2004 cohort as a baseline, we have sought to identify those conditions and practices within colleges and universities that increase retention in science and prepare students for graduate study and science related careers. This study is unique in that we will follow students longitudinally seven years after college entry, accounting for those who 1) engage or disengage from science in the first year of college, 2) complete or take more than four years to complete their undergraduate degrees, 3) pursue STEM-related jobs immediately after college, and 4) undertake additional academic preparation before applying to graduate or professional school. To our knowledge, no other project has the capacity to follow up a contemporary cohort of students longitudinally from such a wide variety of institutions as they move into graduate school or science/technology-related jobs.

In short, this poster will overview findings from the first four years of the project, which has included analyses of both quantitative and qualitative data. At the conclusion of the poster, we will briefly outline the research agenda for the next four years.

**OR21. Teacher Training Internship, a graduate course that serves as a link between graduate students/research faculty, and local high school students**
Nicholas A. Ingoglia, University of Medicine & Dentistry of New Jersey

In 2006, the graduate school at the Newark campus of the University of Medicine and Dentistry of New Jersey approved a graduate course, entitled Teacher Training Internship. This course (two or three credits, 60-90 hours) allows our masters and PhD students to go to local high schools to assist science teachers in the classroom and help HS students learn science and stimulate their interests in science careers. Our graduate students have all performed at a high level in college science courses, are frequently from similar ethnic backgrounds as the HS student, and in most cases are only five-ten years older than those students. These factors tend to facilitate their interaction with HS students. In this course, graduate students explain science concepts to HS students, assist in setting
up experiments for the science teacher, help grade papers and homework and generally support the science teacher in any way they can. This close tutorial relationship allows HS students to speak openly with our students about subjects ranging from their own lives and personal challenges, to seeking advice about their college applications and possible career choices. During the course, graduate students consult with the science teacher to identify HS students who excel academically and generally are excited about science. These students are chosen to visit our research labs, meet with our graduate students and research faculty and invited to participate in ongoing “shadowing” and summer research programs. The goal of this program is to first help HS students learn science and second to expose talented students (especially those from traditional underrepresented minority and economically disadvantaged groups) to biomedical research labs and to encourage them to consider careers in academia or industry.

While it is premature to present outcome data on this program, there are signs that this may be an effective approach to encouraging wider participation in biomedical science fields. First, graduate student participation has grown from two in 2006 to 10-15 per semester in 2008-2009. We attribute this rise to two factors: 1) word of mouth that this is a good course from former students and that they will get a lot out of it, and 2) for those in our master’s program who are hoping to attend medical or dental school, it is a way to simultaneously gain academic credit and do community outreach. Second, with the approval and encouragement of the superintendent of the Newark school system we originally offered this partnership to all of the schools in the Newark district. To our disappointment, only three of the schools followed up with us. Of the three, the most vibrant program is with Science Park HS (SPHS), a magnet science school that is situated across the street from our campus. The presence of our students in biology and chemistry classrooms has been so well received at SPHS that several new departments (the most recent is the math department) have requested our students in their classrooms as well. We hope that success with the program at SPHS will lead to other schools in the district requesting our students for their classrooms.

What is most satisfying about this course is that all participants benefit from it; our students get much needed teaching experience - most have reported that they have been emotionally affected by these HS students and that in some way, education will be part of their career plans; science teachers get much needed help in the classroom and frequently learn about emerging topics in biomedical science (stem cells, new treatments for cancer) from our students who are currently taking those courses; and most important, the HS students get help learning and succeeding in their science curriculum and frequently become personally connected with a student only a few years older, with whom they can identify, and who is in a science career path.

**P23. FOCUS (First Opportunity Continuance for Undergraduate STEM) Project**

Lethia Jackson, Bowie State University
Velma Latson, Bowie State University

Research suggests that alternative styles to instruction may be just as effective as the traditional classroom format for delivering instruction. For students in the STEM (Science, Technology, Engineering, Mathematics) disciplines, using alternative methods that augment the traditional University teaching style may help retain and increase the graduation rate for the STEM discipline. The First Opportunity Continuance for Undergraduate STEM project will offer workshops and interventions that will support peer-tutoring and small group collaborations to help students succeed in the completion of the core programming course within the Computer Science Department at Bowie State University.

**P24. The Role of Undergraduate Research Programs in Minority Students’ Scientific Efficacy**

Allison Kang, University of Washington, Genomics Outreach for Minorites
Jessica Yellin, University of Washington Center for Instructional Development and Research

This study investigates the role that undergraduate research programs (URPs) have on the scientific efficacy of ethnic minority students in college. Due to the historically low participation of students of color in science majors, minority outreach programs with an undergraduate research component have been established and are geared toward recruiting students from these underrepresented populations. Program evaluation data of several of these minority outreach programs suggest that positive experiences with undergraduate research are an important factor in retention, with students reporting that these mentored research experiences led them to major in STEM disciplines and pursue STEM careers. The few empirical studies of undergraduate research experiences within diversity outreach programs have found that effective research mentoring within these undergraduate research programs is key to recruiting and retaining URM students in the sciences. As a result, many URPs have been established to encourage undergraduates to develop a deeper understanding of what it takes to become a scientist or engineer.

Using semi-structured interviews with questionnaires and observations in both the minority outreach
The ADVANCE program at UNC Charlotte seeks to increase the recruitment, retention and advancement of female STEM faculty. ADVANCE initiatives aim to promote research opportunities, balance work life structures, increase mentoring, and increase women's participation in leadership positions within the university. One of the targeted interventions has been the Bonnie Cone fellowships. The aim of the Cone fellowships is to provide flexible financial support to allow STEM female faculty to identify and address those aspects of university life that may be obstacles to their success. Cone fellowships can enable faculty to visit other laboratories or institutions for research collaboration or mentoring. The fellowships may also facilitate attendance at conferences by subsidizing childcare; subsidize workshops for research, teaching or leadership development; and contribute to course buyouts to free up time to pursue research.

Since the 06-07 academic year, 26 Cone awards have been made, primarily to junior faculty. The immediacy of tenure lent urgency to the applications, and for the first two rounds of the Fellowship 13 of the 17 awardees were assistant professors. In the third round of the award cycle ADVANCE established a separate fund to cater specifically to mid-career STEM women, whose professional and family needs differ substantially from assistant professors. Using interviews and qualitative research techniques, this study investigated the effectiveness of the Cone fellowships on female STEM faculty's professional development. The results indicate that Bonnie Cone fellowships are contributing to the goals of the ADVANCE program in a variety of ways. They have led to increased mentoring, collaborations, conference attendance, exploration of new avenues of research, and publications. The Bonnie Cone awards have also provided seed money for research projects, the results of which will support applications to federal funding. Participants report that funds helped develop a pipeline of students into their laboratories, increasing the effectiveness of the faculty advisor in terms of mentoring, providing resources and collaborations for their students. In addition, what we have found is that there are qualitative differences between the professional satisfaction of assistant and associate professors in terms of resources, leadership opportunities, mentoring and integration into departmental and university affairs. The Bonnie Cone Fellowships' most impressive feature is its flexibility and thus its ability to meet the needs of female faculty in terms of a work-life balance which shifts according to both professional and personal life development of individual faculty members.

P25. Monitoring the Effects of Small Fellowships to STEM Female Faculty in terms of Professional Development and Work-Life Balance
Peta A. Katz, University of North Carolina at Charlotte

The ADVANCE program at UNC Charlotte seeks to increase the recruitment, retention and advancement of female STEM faculty. ADVANCE initiatives aim...
This project was designed to address cyber security demands by providing training and support for faculty from HBCUs who show promise for contributing to this area. This training was focused on the latest developments in information assurance and computer security with focus on data aggregation and secure distribution in sensor networks. The goals of the project were to (a) enhance the educational experiences of talented faculty scholars in information assurance and computer security and (b) develop a sustained consortium of universities which share academic and research experiences in information assurance and computer security research and education. To accomplish these goals, the project was designed to include two components: (i) a 2-week Summer Workshop component which includes lectures, visits to national labs, and development of a mini-grant proposal, and (ii) an Academic Year component which involves mentoring, work on grant proposals and other enhancement activities at the participants’ home institutions. Also, the annual conference was expected to serve as a consolidation of experience exchange and national dissemination. The results for participating faculty were positive. The project has led to increased grant and research activity among participants as well as increases in these activities among students and colleagues at their home institutions. The presentation will describe the specific interventions with a focus on what worked and what did not.

P27. The Effects of Racial, Ethnic and Gender Identities on College Women in IT-related Majors

Lynette M. Kvasny, Pennsylvania State University  
Eileen Trauth, Pennsylvania State University

The underrepresentation of women and minorities has been a longstanding problem in information technology (IT) related disciplines. While women of all backgrounds earn fewer bachelor’s degrees in IT than men, there are differences among women in terms of race and ethnicity. For instance, in 2001, African American women had the highest rates (46.4%) of computer science degrees awarded to African Americans of both sexes, as compared to their Asian (32.3%), Hispanic (30.8%), Native American (28.8%), and White (22.2%) female counterparts (National Science Foundation, 2001). These participation rates suggest that race and ethnicity are intimately bound up in considerations of female underrepresentation in IT-related disciplines. Our line of investigation is directed at understanding how the intersection of race, gender and ethnic identities shape the overall under representation of females enrolled in IT-related majors at the collegiate level. By focusing on within-gender variation, this research will provide more nuanced explanations of the underrepresentation of women in IT, and hence an improved ability to develop mitigation strategies.

P28. Interventions to Enhance Research and Scholarly Achievements in Undergraduate Nursing Students

M. Danet Lapiz-Bluhm, University of Texas Health Science Center at San Antonio  
Carrie Jo Braden, University of Texas Health Science Center at San Antonio

The nursing profession is currently plagued with critical issues including shortage of nurses, clinical nurse researchers, and nursing faculty, aging population of existing nurse educators, and translation and integration of evidence-based practice (EBP) research literature into the clinical setting. Thus, each enrolled undergraduate nursing student is a precious resource that could help alleviate these issues. This project was aimed to determine the effects of incorporating MESA (Mechanisms for Enhancing Scholarly Achievements)-based interventions across a population of undergraduate students enrolled in a nursing research course to promote EBP nursing research and careers in research. Early exposure to research may help nursing students to realize the importance of research as a powerful tool for discovering knowledge, and improving quality of patient care.

The MESA model specifies variables and relationships essential for pursuing a research career. The model provides a theory base for an integrated series of interventions designed to build interprofessional teams having minority graduate student members engaged in health disparities research. It specifies that factors such as Student Characteristics, Training Program Characteristics, Motivation Direction and Strength, Interpersonal Risks, Team Psychological Safety, Learned Resourcefulness, Research Self-Efficacy can be influenced by interventions that would facilitate understanding of the learning process for becoming a clinical research scientist. This study adapted the MESA model for undergraduate nursing students enrolled in a nursing research course. The MESA tool has been piloted (N = 159) with internal consistency reliability ranging from a = 0.78 to a = 0.97. A pilot study comparing research scholars vs. non research scholars undergraduate students showed a significant difference in scores associated with Motivation Direction and Strength (t=6.0, p < 0.001). The finding supports the notion that motivation interventions will be beneficial for cultivating the culture of research among students. Hence, the following interventions were incorporated to the nursing research undergraduate curriculum:

a) Participation in seminar series on active faculty research;
b) Motivation direction and strength interventions to develop personal research career goals;
c) Faculty mentor pool that link students with their
research and clinical exposure;

d) Research team building strategies to promote collaboration and healthy competition;

e) Individual capacity building towards research self-efficacy and essential cognitive skills;

f) Participation in team-based EBP research projects identified from the clinical sites;

g) Participation in a poster presentation of research project during a “Research Day”; and

h) Participation in making EBP-based recommendations in the clinical setting.

Students have now been actively engaged in research on discrepant clinical practices in their respective clinical sites. Attitudinal changes towards research seem to be emerging. Recommendations from student-initiated research will help translate EBP literature to the clinical setting, hence, potentially improving the quality of patient care. Future studies on the research career trajectories of these students are recommended.

P29. Undergraduate Research Education and Training Program (URGREAT): A holistic successful intervention in a Hispanic Puerto Rican setting

Lilliam Lizardi, Universidad del Este
Karla Malave, Universidad del Este
Sandra Gonzalez, Universidad del Este

Universidad del Este (UNE) is a Hispanic serving institution located at the northeast region of Puerto Rico. Established in 1949 as Puerto Rico Junior College, it evolved to UNE in 2002. It is a member of the Ana G. Mendez University System, collectively enrolling about 39,000 students, being the second largest private university system on the island. The goal of UNE’s URGREAT Program is to develop research capabilities at UNE by focusing on the development of a strong human, physical, academic and community infrastructure for conducting undergraduate research related to the biomedical and behavioral sciences. Program components are: a) Student Development that oversees a summer and academic year research program for undergraduates which includes an extensive enrichment program; b) Faculty Development geared toward changing UNE from a teaching institution to an undergraduate research institution; (c) Institutional and Outreach providing infrastructure capabilities for undergraduate research, biomedical research and careers awareness and motivation activities, where participating students develop social responsibility; and family and/or significant others involvement to encourage participants’ continued perseverance in completing a biomedical research career. The effectiveness of URGREAT was measured with a mixed method approach. Quantitative data was collected from surveys, program records and institutional data, and qualitative data from interviews with students, parents and/or significant others, and research mentors. Student success indicators are: a) retention of participants in biomedical science undergraduate programs, b) student GPA’s and c) number of students accepted in competitive summer internships, travel awards received for scientific meetings, poster and oral presentations, publications in peer reviewed scientific journals, and number of students entering graduate programs, compared to baseline data. Of a total of 39 participating students in 4 years, 15 graduated and the rest are in good academic standing and progressing as expected (100% retention). Of those graduated, 14 students are either in graduate school (53%), medical school (7%) or are occupying biomedical related positions in the pharmaceutical industry or in academia (33%). In the same period, 1 non-participant was accepted to an MS program. Eleven students (28%) participated in externally funded undergraduate research internships at research intensive institutions. Eight (21%) received competitive travel awards to present at scientific meetings. Four posters received awards in their area, including one at a national level. Two students were co-authors on peer-reviewed scientific publications. In a 5 year period the project sponsored a total of 48 oral and 93 posters presentations, at local and national scientific meetings, where all participants presented at least once. External evaluations demonstrate considerable change in student attitudes, overall knowledge and its’ application to practical experiences, and in their ability to articulate knowledge during research group meetings. Focal group findings indicated that students felt that they have improved their knowledge in science, research skills and preparedness for graduate studies, and the use of the English language. Seventy three percent perceived an in the support of increase in family/significant others as a result of attending the Outreach student-family activities. Surveys of participating parents and significant others showed that 80% or more considered that the Outreach student-family activities contributed to better understanding and better support system for students academic and undergraduate research endeavors, including their participation in internships outside Puerto Rico, and the importance this research has in their graduate study plans. The program also influenced non-participating students and curricular development with the creation of new bachelor degrees geared not only towards industry careers but also towards graduate studies.

OR22. Harvard College’s Program for Research in Science and Engineering (PRISE)

Gregory A. Llacer, Harvard University

The Harvard College Program for Research in Science and Engineering, PRISE, was established as a
stimulating, collegial, and diverse residential community for Harvard undergraduates conducting summer research in life science, physical science, applied science, mathematics, and engineering. A priority recommendation in the 2005 report of the Harvard faculty Task Force for Women in Science and Engineering, PRISE was designed especially to support and advance women and underrepresented minorities considering careers in the sciences.

PRISE is a 10-week program for approximately 120 undergraduate students working with Harvard faculty in relevant academic departments and research centers in the Faculty of Arts and Sciences, as well as program directors and principal investigators in the Harvard Medical School, the School of Public Health, affiliated research institutes and hospitals, and other academic and administrative units throughout the University. Originally funded as a three-year pilot by the Office of the Provost and independently evaluated by the Capacity Center for the American Association for the Advancement of Science, PRISE now is fully administered and operated by the administration of Harvard College and funded by the Faculty of Arts and Sciences.

Diversity in PRISE is characterized not only by gender and ethnicity, but also socioeconomic status, concentration (major), research field, class year, even academic success. A special, critical effort is made to provide monetary support for the summer savings obligations of term-time financial aid recipients through direct payment of their summer savings obligations. In addition, faculty (who present their research during the evenings in distinguished lectures and small-group chats, as well as join the fellows for dinner regularly), postdocs, and graduate students help to create a vibrant, engaged, and enthusiastic community of scholars. The program is rounded out by a range of professional development seminars and self-designed science and social activities, some open to the whole population of students, staff, and faculty conducting research at Harvard during the summer.

Over the past three years, data has been collected on the perspectives and experience of PRISE fellows as well as a control group consisting of other Harvard undergraduates who are conducting summer research but not affiliated with a specific program. In each of the cohorts evaluated, PRISE fellows show statistically greater concentration to their concentration choice, have more positive experiences in the laboratory, and value the interdisciplinary networks they create amongst themselves as they pursue their own research projects. Other significant data show the following: 97% of the participants found the PRISE experience compelling and enjoyable; most PRISE fellows plan on pursuing a Ph.D. in the sciences after graduation; more PRISE fellows felt integrated within their labs than the control group of undergraduates not affiliated with a program; and, faculty recognition of the value of PRISE is overwhelmingly positive.

P30. Linking Undergraduate and Graduate Education: A Holistic Approach to Enhancing Access to PhD Degrees and Increasing Faculty Diversity in STEM Disciplines
Kelly M. Mack, University of Maryland Eastern Shore
Orlando Taylor, Howard University

Recent evidence suggests that underrepresented minority students at the undergraduate and graduate levels comprise only 26.3% and 19.2%, respectively, of the nation's science and engineering degree recipients. These statistics are believed to contribute, in turn, to a significant lack of faculty diversity in the academy. Low faculty diversity serves as a major impediment to facilitating access and success of diverse students in higher education because of the varied roles that diverse faculty play as role models and mitigators of inferiority and superiority stereotypes. Approaches to attaining full access in higher education have focused on the baccalaureate level, yet far fewer have been reported for the doctoral and faculty levels despite the fact that the Ph.D. degree is the quintessential credential required for university faculty appointments. Efforts to address the underrepresentation of minorities in STEM disciplines at the undergraduate and graduate levels have focused on undergraduate preparation for graduate education with less emphasis on graduate school retention, PhD completion, prefaculty career development and post doctoral preparation. However, many of these strategies are typically disengaged from one another and only address singular components of a multiplicitous issue.

An alternative model has been developed between the University of Maryland Eastern Shore and Howard University (two historically black institutions with significant federal funding: AGEP, MARC, MBRS). The model utilizes a holistic approach toward achieving bi-directional connectedness, academic and personal, between undergraduate and graduate education. As a result of these strategies, undergraduate students associated with funded training programs have experienced a 30% greater success rate in persisting and graduating from connected graduate degree programs in the biomedical sciences. Further, over 60% of these students have pursued postdoctoral fellowships and/or faculty careers. Thus, undergraduate and graduate bi-directional connectivity may be an essential course of action for not only promoting equal access and success in higher education, but also achieving greater STEM PhD production and, ultimately, enhancing faculty diversity. Implications for the replication of this model at other minority and majority institutions will be discussed.
In the mid-1970s, the “cost” of becoming a scientist for women of color was detailed in the AAAS Report, The Double Bind: The Price of Being a Minority Woman in Science (Malcom, et al., 1976). Since this report, minority women remain disproportionately underrepresented in the science, technology, engineering and mathematics (STEM) disciplines. While 5.9% of recipients of STEM bachelor’s degrees are African American women, that number falls to 4.2% at the Master’s degree level, 2.6% at the PhD degree level, and less than 1% at the level of full professors (according to 2006 statistics by the National Science Foundation). Several accepted reasons for the paucity of women of color in the STEM disciplines include, but are not limited to: feelings of isolation, lack of appropriate role models in the academy and lack of emphasis on the role of health issues, in particular mental health issues in academic and career success.

The National Science Foundation (NSF), through its commitment to broadening participation of underrepresented groups in the STEM disciplines, supports several programs that focus on the professional development of minority undergraduate and graduate students and faculty, and women in science and engineering disciplines.

Three of these programs include HBCU-UP (Historically Black Colleges and Universities Undergraduate Program), AGEP (Alliance for Graduate Education and the Professoriate) and ADVANCE. HBCU-UP’s mission is to enhance the quality of undergraduate STEM education and research at HBCUs as a means to broaden participation in the Nation’s workforce. The program supports the important role that HBCUs play in increasing the numbers of underrepresented minorities that are well prepared for participation and leadership at every level of education and research in STEM. The AGEP Program is primarily focused on increasing the number of minorities who will enter the professoriate in STEM disciplines. Specific objectives of the AGEP Program are to develop and implement innovative models for recruiting, mentoring, retaining, and advancing minority students in doctoral programs; and develop effective strategies for identifying and supporting underrepresented minorities who want to pursue academic careers.

The ADVANCE Program, one of the few cross-directorate programs at the NSF, emphasizes the advancement of academic careers in the STEM disciplines for women faculty. ADVANCE, through its funding mechanisms, incorporates adaptation, implementation and dissemination of best practices in promoting the professional development of women faculty in the STEM disciplines, while also supporting cutting edge research efforts related to organizational change. This program also utilizes proven key elements of institutional transformation to ameliorate barriers to career development.

This poster details a cohesive continuum of best practices, as well as novel strategies and innovative mechanisms that can be utilized throughout all stages of academic development for women of color - at the undergraduate and graduate student level as well as at the faculty level. The roles that the three NSF programs mentioned above can play in this academic development will be outlined.

P32. Impact of High School Students Participation in a Research Intensive Program on their Science Confidence and Interest in STEM Careers
Michelle R. McCombs, University of California, Davis
Jodie Galosy, University of California, Davis
Ken Peterson, Portland State University
Marco Molinaro, University of California, Davis

The UC Davis Center for Biophotonics Science and Technology (CBST) has been working with the UC Davis Cancer Center and Sacramento High School since 2006 to develop a project designed to increase diversity in STEM fields by intervening at the high school level. The Continuing Umbrella of Research Experiences (CURE) program engages urban students in didactic and experiential learning experiences in basic and clinical sciences. In the first year of this two-year program, students are introduced to cancer science, clinical medicine, and Biophotonics research techniques and instrumentation. During the summer after the first year, students participate in a paid three-week laboratory intensive where they design and present their own research project. Year two student participants spend approximately 10 hours per week with a research mentor at a UC Davis Medical Center laboratory.

This presentation describes six case studies from the first cohort of CURE students who completed the research internships. Most of these students represent racial/ethnic groups typically underrepresented in STEM fields: two African American, two Hmong, one Latino, and one Vietnamese. Four of the students are male and two are female. All are from families with limited financial resources.

Results from interviews and surveys indicate that the students developed confidence and competence in science content and research skills. All six students plan to pursue a STEM related major upon entering college in fields that include engineering, chemistry, biology, biochemistry and medicine. Four of the six students intend to pursue either a PhD or an MD/PhD
in their field. While these students came to the program with an initial interest in science, they clearly credit CURE with solidifying their interest in a STEM career. The students identified several elements that contributed most significantly to their development: strong relationships with teachers and mentors, the focus on cancer research that provided a strong foundation in science, and educational opportunities and experiences traditionally reserved for college students. These findings suggest that integrated strategies, combining financial, academic, social and professional support - as recommended for undergraduate STEM minority interventions - can be equally effective at the high school level.

**P33. Needs Assessment as a Best Practice in Program Evaluation at SACNAS**

Jack I. Mills, Independent Evaluation Consultant

For 35 years, the Society for Advancement of Chicanos and Native Americans in Science (SACNAS) has provided strong national leadership in improving and expanding opportunities for underrepresented minorities (URMs) in the scientific workforce and academia; mentoring college students within science, mathematics, and engineering (STEM). SACNAS' programs include an annual national conference, college chapters, postdoc and leadership initiatives, distinctive publications and online resources. Over the past five years, program evaluation has become a critical strategic initiative for the Society as well.

Most program managers are familiar with evaluation as a tool to determine the short and long range impacts of interventions. The needs assessment is a “best practice” companion to other evaluation approaches. It is used to identify the factors in a scholars’ life that serve to either facilitate or hinder academic and career progress. Knowing a service recipient's profile of strengths and challenges can help program managers more specifically target interventions to meet their needs. In an ideal world, a thorough strengths and needs assessment would be conducted prior to design and delivery of services. As a practical matter, needs assessment can be conducted concurrently with a programmed intervention. The results of such an assessment are useful as a reality check on the “logic model” that describes how services being delivered through the intervention are logically related to program participants' needs and the outcomes the program is intended to produce.

This poster presentation will describe a mixed methods approach that SACNAS uses to differentiate various segments within the population of URM college students in STEM. Focus groups are useful for gathering a wealth of information, helping to clarify students' needs and expectations of program services. Furthermore, a method known as Q-sort can be used in the context of a focus group to understand students' needs in a more structured and systematic manner than more traditional qualitative approaches. A needs and assets survey offers another useful approach. For example, our analysis shows that students participating in comprehensive training programs such as MBRS-RISE or MARC enjoy statistically significant advantages when compared to students from similar backgrounds who do not participate in such programs.

Based on these and other findings, we are convinced that it is critical to systematically assess the needs of students we serve, to use this information to design programs and services that meet a differentiated set of needs, and to evaluate program outcomes within the context of the target group being served.

**P34. Evaluating EAST**

Babette Moeller, Education Development Center
Peter Tierney-Fife, Education Development Center

The Eastern Alliance in Science, Technology, Engineering, and Mathematics (EAST) works to increase the number and diversity of students with disabilities receiving degrees in science, technology, engineering, and mathematics (STEM) and ultimately entering STEM careers. Specifically, EAST seeks to: 1) improve the rates of participation, retention, and advancement of individuals with disabilities in STEM secondary and postsecondary education by coordinating and increasing the availability and accessibility of resources to students; 2) change academic and professional climates by increasing recognition of needs and abilities of individuals with disabilities; and 3) insure program sustainability by catalyzing, strengthening, and coordinating STEM activities.

To achieve these goals, EAST is offering a variety of activities including science and computing institutes and early college credit courses for high school students; learning communities seminars, undergraduate research fellowships, academic self-management and peer tutoring support, and student support teams for college students; and professional development for high school, college, and university science faculty. EAST recently was refunded by the National Science Foundation to continue its activities for the next 5 years. The purpose of this poster is to share the design and tools used for the evaluation of EAST 2. The evaluation plan includes formative and summative components, and is designed to address the following key questions:

1. What impact do EAST-2 activities have on students' attitudes and perceptions about STEM, enrollment and academic success (e.g., grades, persistence) in STEM courses or programs, and the transition into the STEM workforce?
2. What impact do EAST-2 activities have on the aggregate enrollment, retention, and graduation rates of students with disabilities in the STEM programs at USM?

We will conduct formative evaluation studies to document the successes and challenges of individual project activities and to assess their impact. The primary data source will be pre- and post-surveys administered to participants and facilitators of each project activity. The results of the formative research will be used to inform the continual refinement of the individual components that constitute the EAST pipeline. In order to get a better understanding of how individual components of the EAST pipeline contribute to overall outcomes for students with disabilities, the external evaluation team will compare results (such as STEM enrollment, grades, graduation rates, grades, transition to the workforce) for students with disabilities who participate in only a subset of the EAST activities, to results for students with disabilities who participate in the full pipeline of activities. We will draw on data collected with the EAST longitudinal data-tracking instrument and utilize both quantitative (regression analyses) and qualitative techniques (case studies) for the analyses.

The purpose of the summative evaluation is to assess EAST 2’s progress towards its goals and to document the overall impact of EAST 2 activities on participating students with disabilities. We will use a quasi-experimental design, comparing baseline data about student enrollment and academic performance from prior to or the beginning of the implementation period, and data from a matched control group of students who chose not to participate in EAST-2 activities. Data sources will include interviews, questionnaires (including the EAST Longitudinal Data Tracking instrument developed previously), records about enrollment, persistence, and academic performance to collect both qualitative and quantitative data about participants’ experience within the program and the goals they actually accomplished. Regression analyses will be conducted to examine if differences between the EAST-2 student groups and comparison groups are significant.

**P35. Bridge to Scientific Literacy, Quantitative Literacy and Scientific Research**

Lycurgus L. Muldrow, Morehouse College
Jeffrey Porterfield, Morehouse College
John H. Hall, Jr., Morehouse College

A Pre-Freshman Bridge Summer Program at Morehouse College was designed to develop an advanced level of scientific literacy among pre-freshmen science and mathematics majors with the goal of increasing the number of graduates who enter graduate school in pursuit of research careers. This innovative summer program incorporated a unique combination of components proven to increase success, build academic skills, provide exposure to the scientific method and specific research methodologies, and promote an enhanced interest in the pursuit of careers in science and research. In this six-week summer experience students participated in quantitative literacy workshops, guided inquiry laboratories, research seminars, scientific field trips, as well as personal and professional development activities. Quantitative literacy gave students practice in applying mathematics to a broad range of problems and assisted them in overcoming mathematical barriers in “gatekeeper” courses. Guided inquiry laboratories were conducted in robotics, materials science, bioinformatics and ecology. These inquiry based laboratories were designed to teach research laboratory skills and scientific processes in an active learning environment. Students developed hypotheses, designed experimental protocols, and then performed experiments to test their hypotheses. Students also participated in weekly field trips to scientific research facilities and attended dynamic research seminars presented by scientists, faculty and upper level students. The personal and professional development component of the program, designed to promote the pursuit of excellence, consisted of an inquiry based understanding of a scientist identity, lectures on careers in science, seminars on the nature of scientific research, resume writing, Living in the NowTM time management workshop and the Birkman Assessment behavioral tool that highlighted the students personal and professional interests and strengths.

General programmatic outcomes include the acquisition of practical research experience with all of the accompanying processes; such as, logical conceptualization, creative thinking, the integration of inquiry based skills, problem solving and team work. More specifically, after two years of programming, preliminary data suggest an enhanced academic performance and retention among summer participants in science “gatekeeper” courses as compared to the general population of students. Further, qualitative feedback from students upon soliciting their descriptions of the “strengths and benefits associated with the Summer Program experience” were consistently favorable. The externally contracted evaluator notes the following statements as reflective of the overall trend: “I have actually learned what a research scientist does,” “I have found a new understanding of how important research is,” “The program has opened my eyes to the world of science greatly.” “I was quite unsure how scientific research really works. Now I have a clear understanding.” “Overall I am stimulated by the challenge...” In essence, the Pre-Freshman Bridge Summer program expanded the student’s career possibilities and passion for the sciences. This summer program is funded by the HBCU-UP program at NSF.
P36. Program Evaluation: Research & Mentoring Experiences of Undergraduates in a STEM Intervention Program
Margaret N. Mwenda, University of Iowa

Program and project evaluations are conducted to determine the merit and worth of the program to the stakeholders, to establish the extent to which the program’s implementation adheres to the design, to improve a program curriculum, materials, and activities, and for accountability to program sponsors (Rossi, Lipsey, & Freeman, 2004). While the above evaluation goals are important, the overall health of a program rests on sound evaluation to gauge the value and impact of the program to the participants and other stakeholders. Using surveys, focus groups, and mixed methods, this poster will present at a large Research Institute at a Mid-western university, evaluation findings from 2005/06 to 2008/09 academic years for undergraduate students in a STEM intervention program. The poster will highlight the program’s components and activities, program participant characteristics, evaluation methods, and participants’ experiences in research and mentoring. A majority of the program participants are underrepresented undergraduate minority students from African American, American Indians and Native Alaskans, Asian/Pacific Islanders, and Hispanic background. In the past three years, a few White students have joined the program due to a change in the National Institute of Health’s recruitment policy to include non-underrepresented groups for the sake of achieving diversity. In all, 32 students participated in the 2004-05 evaluation, 21 in 2005/06, 23 in 2006/07, and 15 in 2007/08.

The primary data collection procedures employed for the annual evaluations were focus groups during the 2004/05 academic year, surveys for 2005/06, and mixed methods for 2006/07 and 2007/08 academic years respectively. For the latter procedure, the session started with students responding to paper/pencil survey questions followed immediately by a focus group discussion that requested students to elaborate or explain their responses to the survey questions. These sessions took place concurrently. The evaluation questions, which were developed in collaboration with program staff and directors, focused on five main themes: research experience, mentoring, academic advising, student development activities, financial support, and summer living-learning communities. This poster will focus on two questions, namely, those pertaining to research and mentoring. Survey data were analyzed using simple descriptive procedures to yield frequencies while focus group data were summarized along topical themes that coincided with the evaluation topics of research and mentoring.

Across all evaluations, there is evidence to show that the research and mentoring components of the program were highly rated by students across all cohorts. For instance, the survey findings in both the survey and mixed methods evaluations indicated that the research component was rated the most helpful in facilitating students’ college success, followed closely by mentoring. In addition, the findings revealed that a majority of the students perceived their research experience and mentoring to be very helpful in preparing them for graduate school. The open-ended questions in the survey and the focus group findings corroborate and elaborate these findings, indicating that benefits of research and mentoring include career role modeling by faculty and Primary Investigators, the provision of insights into research and science fields, knowledge of different career options, acquiring research skills, preparing for graduate school research, gaining insights into graduate school expectation, and gaining valuable experience in presenting at professional conferences. Although there was a consensus in the benefits of research and mentoring, some participants expressed concern and challenges. The challenges most cited by students in their research and mentoring experiences include pressure by mentors to perform, balancing research expectations and schedules with academic coursework, and busy schedules. Overall, there is overwhelming evidence across all cohorts, and consistent with findings from the four years of evaluation, that the research and mentoring components are perceived to be most beneficial in facilitating students’ college success and preparing them for graduate school as well as providing other benefits mentioned.

P37. Twenty-five years of success: A longitudinal study of a successful STEM program and a pilot project to institutionalize its success
Camellia M. Okpodu, Norfolk State University
Arlene P. Maclin, Norfolk State University

This poster combines the results from a longitudinal evaluation study of an honors program in science, technology engineering and mathematics (STEM) over a twenty-year period as well as the three-year implementation of a pilot integrated curriculum for freshmen students in engineering at Norfolk State University (NSU). A comprehensive formal evaluation of the NSU STEM honors program is called the Dozoretz National Institute for Mathematics and Applied Sciences (DNIMAS). The DNIMAS program admits students with high school GPAs of 3.2 and SAT scores in mathematics and verbal of 500 or better. There is considerable history of minority STEM enrichment programs that have largely reported success anecdotally and have not disseminated their findings in a manner that can help others to systematically adopt those educational strategies and philosophies.
advancement to academic careers. The Berkeley Edge and, within this community, a culture that encourages disciplinary community of URM STEM doctoral students in all STEM fields, except the social and behavioral sciences. Since 2006, Berkeley Edge has focused on infrastructure for increasing diversity at the graduate level, including a Graduate Diversity Program housed in the Office of the Vice Chancellor for Equity and Inclusion (VCIE), builds on this infrastructure. It is a crosscutting program that works at the graduate level in all STEM fields, except the social and behavioral sciences. Since 2006, Berkeley Edge has focused on interventions designed to increase both recruitment and long-term retention in academia of underrepresented minority graduate students and post-doctoral fellows. This presentation includes a discussion of the research that informed development of the retention and career advancement components of the program, a description of the program’s design, and observations about the pragmatic aspects of implementation. The presentation will also include a discussion of the approaches used to measure the program’s effectiveness.

UC Berkeley has one of the largest populations of URM STEM graduate students at any campus in the nation, yet it also has the capacity to increase the number of URM STEM students graduating with doctorates. UCB is a major contributor to the nation’s post-doctoral and faculty ranks, which highlights its importance as a site for increasing the number of URM scientists and engineers who earn PhDs. Berkeley has a long-standing infrastructure for increasing diversity at the graduate level, including a Graduate Diversity Program housed in the Office of the Vice Chancellor for Equity and Inclusion and nine full-time professional diversity officers, each with responsibility for a limited set of disciplines and departments, divided by broad field, and who report to academic deans: e.g., Biological Sciences; Mathematical and Physical Sciences so on. The Diversity Officers work, primarily, to increase the number of URM students in their respective academic areas.

The Berkeley Edge Program, which is supported by the National Science Foundation and the San Francisco-based nonprofit organization, The Level Playing Field Institute, builds on this infrastructure. It is a crosscutting program that works at the graduate level in all STEM fields, except the social and behavioral sciences. Since 2006, Berkeley Edge has focused on interventions designed to generate and sustain a multi-disciplinary community of URM STEM doctoral students and, within this community, a culture that encourages advancement to academic careers. The Berkeley Edge program also delivers a suite of professional development activities to the community of doctoral URM STEM scholars and post-doctoral fellows. More than half of all enrolled URM STEM PhD students participate in one or more Berkeley Edge activity per year and each broad field is represented among participants in proportion to its representation of URM students in the STEM fields on campus.

P38. Interventions to Increase STEM URM Advancement in Academia at the Graduate Level and Beyond: AGEP Program Design and Implementation at UC Berkeley

Colette E. Patt, University of California, Berkeley

The University of California, Berkeley’s (UCB) NSF-Alliance for Graduate Education and the Professoriate program (AGEP), The Berkeley Edge Program, focuses on interventions to increase both recruitment and long-term retention in academia of underrepresented minority graduate students and post-doctoral fellows. This presentation includes a discussion of the research that informed development of the retention and career advancement components of the program, a description of the program’s design, and observations about the pragmatic aspects of implementation. The presentation will also include a discussion of the approaches used to measure the program’s effectiveness.

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P39. An NIH Scholars Program for Undergraduate Training of Underrepresented Minorities in Biomedical Engineering

Phillip D. Payton, The City College of New York
Maria Ong, Harvard University
Sheldon Weinbaum, The City College of New York

In the fall of 2001, the Grove School of Engineering at City College New York received its first grant from NIH for minority undergraduate education in the life sciences. The grant was a special initiative by NHLBI to encourage minority UG students to pursue graduate education and research in the life sciences and was one of two such awards nationally. This grant was renewed in 2006 for five additional years and is now in its eighth year. There are several aspects of the grant that probably make it unique among programs with these general objectives. First, the program was restricted to a single department, biomedical engineering (BME), and the number of NIH scholars supported annually, 25, included virtually all high achieving underrepresented minority UG students who were either BME majors or other engineering majors who completed an UG concentration in BME. All students performed a BME-related research project in their junior and senior years. Second, the program was integrated into the New York Center for Biomedical Engineering, a consortium of currently eight private preeminent medical research institutions in New York City, where students could do research projects during the summer and school year. Third, and perhaps most important, a new intervention was initiated at the renewal of the grant in 2006. Every NIH scholar had their own personal, paid PhD mentor with whom they met on a weekly basis and access to PhD teaching assistants (TAs) who were assigned to all classes where significant numbers of students were having difficulty, with particular attention to pre-engineering courses in math and science. The latter resource was made available to all BME majors in the class.

It is the latter intervention which will be the primary focus of this poster, since it literally transformed the entire BME department by creating a strong, dense academic and research community. Since instituting the mentorship and TA programs, retention has increased from 70 to 95 percent, and the graduating class of NIH scholars has achieved a 3.5 GPA for each
of the last three years. Furthermore, the NIH program seems to have set a high bar for all BME students. The 2008 graduating class of 31 BME students had an average GPA of 3.3, very likely the highest recorded performance of such a group in the School of Engineering within recent memory. In addition to coursework, NIH scholars worked closely with PhD students on research projects and could leverage the PhD students’ networks to find faculty research advisors and to meet potential graduate school contacts. The intervention clearly benefited the PhD students, too: nearly all BME PhD students participated as either mentors or TAs, and they reported positive outcomes such as gaining teaching skills and enjoying playing a role in the growth of a young scholar. There is presently a waiting list of PhD students looking to be mentors and TAs. They are supervised by a lead mentor and lead TA, and all PhD students, starting this year, receive counseling on being mentors by trained mentoring counselors.

P40. Broadening Access to Diverse Students through Research Experiences at Hope College as a Pathway to STEM Education and Careers
Karen Nordell Pearson, Hope College
Moses Lee, Hope College
Kathy Winnett-Murray, Hope College
Kenneth Brown, Hope College
Herbert L. Dershem, Hope College

Building on Hope’s historic strength of student-faculty research collaborations, Hope has integrated four new programs into the traditional summer research offerings in order to provide meaningful and engaging educational opportunities for students new to scientific research. These four programs are the Howard Hughes Medical Institute (HHMI) Science Education (SciEd) Scholars, Research Experiences Across Cultures at Hope (REACH), STEM-ENGINES Undergraduate Research Collaborative and the Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM) Scholars. All of these programs are a direct outgrowth of strategic and coordinated planning in the Division of Natural and Applied Sciences and they constitute Hope’s comprehensive and connected approach to broadening participation by providing students in high school, two-year colleges, four-year colleges and pre-service teacher programs with meaningful research experiences in STEM disciplines. These programs also benefit from the widespread support of Hope students, faculty and administrators and by many partnering individuals and institutions.

Since the fall of 2004, 24 undergraduate science and math education majors have spent 10 weeks in the summer doing faculty-mentored research as Howard Hughes Medical Institute (HHMI) Science Education (SciEd) Scholars. Throughout the summer, the SciEd Scholars participate in traditional research and curriculum design projects, and interact informally with veteran local teachers who share helpful tips on classroom management, job searching, collaborative projects, and curriculum development.

The Research Experiences Across Cultures at Hope (REACH) program was created in the fall of 2005 and has involved a total of 29 area high school students in 5-week, faculty-mentored research projects in the summers of 2006-08. This program, presently supported by the HHMI, the NSF, the NIH, and internal sources, reserves at least half of the positions for non-Caucasian students and has involved 15 students from underrepresented groups. The goals of the REACH program are to engage high school students in significant, independent research projects that will encourage them to pursue STEM education in college and go on to careers in STEM fields. While we are interested in students with exceptional records in high school, we have found that this experience can be inspiring and transformative for students with a variety of educational experiences and expectations.

In the summer of 2006, Hope partnered with Harold Washington College to pilot a program now called the Undergraduate Research Collaborative (URC). Including that first summer, 12 students from two-year colleges in the Chicago area have come to Hope for a 10-week summer research experiences. This NSF-supported program aims to engage students from two-year colleges who are interested in pursuing four-year degrees in a STEM discipline, in research experiences that will help prepare them for the increased academic demands of most four-year colleges.

Most recently, Hope received NSF support for the Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM) Scholars. The S-STEM Scholars are recruited from two-year colleges and awarded up to $10,000 per year for two years to complete their STEM degrees at Hope. Hope has committed additional funding to support these Scholars for summer research projects in the STEM discipline of their choice. Six students completed the first year of this program and recruiting is strong for the group of S-STEM Scholars that will come to Hope in 2009.

Hope is committed to using this multi-pronged approach to provide exciting, rigorous, and productive research experiences to those not traditionally engaged in summer research in order to attract and retain diverse students to STEM education and careers. We are working to fully integrate these four programs into the structure and culture of our collective undergraduate research activities.
P41. Realizing the Potential for Diversity: Mechanisms for Closing Leaks in the STEM Pipeline
Lara C. Perez-Felkner, National Opinion Research Center

There has been a persistent gap between under-represented minorities and the majority population in participation and success in STEM careers. This presentation argues for the continued investment in improving diversity in STEM and proposes means to push research forward from known explanations to engineering studies to remedy the problem of persistent under-representation. This study synthesizes data from published empirical studies, federal program evaluation reports, publicly available federal education data, and an ongoing study by the author. From this synthesis of data and theory, the author presents key areas which are essential for interventions in the diversification of STEM research fields and models how these core areas affect leakages across the STEM pipeline. From this analysis, the author presents implications for new and existing intervention and means to disseminate understandings of these interventions to diverse but critical audiences.

OR23. Ethical Considerations in Tracking Student/Alumni Progress on Facebook and LinkedIn
Lisa A. Peterson, University of Washington
Allison Kang, University of Washington
Lori L. Miller, University of Washington
Elena Hernández, University of Washington

Many intervention programs that target under-represented minorities (URM) are funded by agencies that require long-term tracking (often 5-10 years post-degree) in addition to other assessment and evaluation activities. Internet technology and the various search features on the Internet have brought new ways of obtaining information on, and tracking progress of, student participants and alumni in intervention programs. Social networking sites (SNS) such as Facebook and LinkedIn have been shown to be effective tools for intervention programs to communicate with their students and build community (1, 2). Students provide a remarkable amount of personal and professional information on these sites, and previous research (3) has shown that the vast majority of this information is factual. Therefore, websites like Facebook and LinkedIn offer a rich source of data to those responsible for tracking student/alumni progress. However, this brings us to the dilemma of whether or not it is legal or ethical to use these SNS to obtain data and information from our students, and whether it is then legal or ethical to pass on that data to a third party (such as our funding agencies). The use of SNS brings up concerns about privacy/confidentiality, informed consent, and the protection of the identity of our ethnic minority students.

To illuminate these issues, our proposed workshop will begin with a description of the history and function of Facebook and LinkedIn. We will demonstrate how intervention programs can use these sites to communicate with students and/or alumni and build virtual communities. We will build on background from a variety of sources and discuss the legal issues found in the Fourth Amendment, Issues of student confidentiality through the Family Educational Rights and Privacy Act, the human rights and ethical aspects that are addressed by Institutional Review Boards, the regulation of internet traffic through the Federal Trade Commission, and the SNS’s own privacy statements and Terms of Service. Then, we will present a draft of guidelines that we have developed for intervention programs on obtaining data from SNS to track student/alumni progress. We invite workshop attendees to share their own experiences and concerns with SNS, and welcome feedback and discussion on our proposed ethical guidelines.


P42. Professional development as an intervention: PROFessors-in-training (PROF-it) better prepare future faculty for teaching
Judith K. Pollack, University of Maryland, Baltimore County
Alvin Starr, The Community College of Baltimore County, Essex Campus
Renetta G. Tull, University of Maryland, Baltimore County

Graduate students planning to enter academia may be competent in their research field, but often feel unprepared for teaching at the university level. This is especially true in STEM fields, where there may be a lack of emphasis on teaching experience during the graduate program. As a result they may have to learn on the job, which adds to their stress as junior faculty.
Another problem is that they may not have a faculty mentor to guide and give feedback during the early part of their career. PROFessors-in-training (PROF-it) is a program at the University of Maryland, Baltimore County (UMBC) which provides professional development training for these future faculty, with emphasis on developing teaching skills. This program is attended by graduate students in STEM (e.g., physics, math, engineering, biology, computer science), Humanities (e.g., history) and Social Sciences (e.g., psychology, sociology, public policy). Students attend PROF-it workshops on topics such as pedagogy and teaching skills, understanding different learning styles, developing a syllabus, and developing a grading rubric. As a practical follow up, UMBC has partnered with the Community College of Baltimore County (CCBC) to provide a teaching fellowship, where students trained through PROF-it can teach at CCBC under the guidance of a CCBC faculty mentor. Fellows take what they have learned through PROF-it and put it into practice in a real class. Fellows and mentors meet weekly, and twice during the semester mentors evaluate their Fellow’s teaching and provide feedback. PROF-it was started in 2006. Fellows have received helpful advice from seasoned faculty, are more comfortable teaching, and have more realistic expectations in class management. At least one student was offered a permanent position at CCBC at the end of his fellowship. We use feedback from Fellows to continually improve PROF-it programs.

P43. Diversity Improvements through Recruitment, Retention, and Advancement of Underrepresented Minority (URM) Faculty: The Role of Peer-Onsite-Distance (POD) Mentoring Model
Michael A. Preston, University of Arkansas for Medical Sciences
Beatrice Boateng, Arkansas Children’s Hospital
Billy R. Thomas, University of Arkansas for Medical Sciences
Ronda S. Henry-Tillman, University of Arkansas for Medical Sciences

Recruitment, retention, and advancement of more minority physicians that remain in academic medicine continues to be an overlooked component of institutional infrastructure at health professions institutions (HPI). Mentoring has been recognized as a potential catalyst to successful academia careers, and is particularly important to the career development of underrepresented minority (URM) faculty. Our goal is to assess the effectiveness of the Peer-Onsite-Distance (POD) Model five years after inception. A self-administered survey instrument collected information from URM faculty who are members of the Faculty Diversity and Community Outreach Program. Information included members’ current and past experience in career development activities, current level of need, level of interaction with mentor, types of mentoring issues addressed, and types of methods used to inform career discussions. The survey assessed the challenges of the program and solicited suggestions for improvement of the program.

Twenty-two URM at the University of Arkansas for Medical Sciences in the College of Medicine Department who are members of the Faculty Diversity and Community Outreach Program were studied. Results show the extremely important role played by mentors in the career development and promotion of URM junior faculty. In addition, the extent and nature of variation of the role of mentors across departments is highlighted. Since its inception, the POD has been expanded and enhanced to include the evaluation of focus group activities involving mentor:mentee pairs. Collectively, these findings suggest that the POD Model can serve as a vehicle for faculty engagement in career development of not only URM but ALL junior faculty and across departments.

Improvement in recruitment, retention, and advancement through mentoring may lead to career satisfaction, an increase in faculty retention, and greater productivity. Findings may be used to develop interventions to enhance diversity at the university level for the population studied. Finally, mentoring should be a required component of annual faculty evaluation as well as for promotion and tenure consideration. Diversity in the academia workforce requires vehicles for URM to engage in career development. The Peer-Onsite-Distance (POD) Model provides a promising model of engagement.

OR24. Investigation of Facilitated Study Groups, Past and Future
Kenneth A. Rath, SageFox Consulting Group
Alan R. Peterfreund, SageFox Consulting Group

Facilitated Study Groups (FSG), otherwise known as Supplemental Instruction workshops, workshops that support difficult courses and provide additional, non-remedial, and peer-centered learning experiences, are a common form of intervention used by numerous minority support programs. For the past ten years, across multiple campuses, we have examined FSGs through survey-based qualitative feedback on the workshops’ utility and impact and by the examination of institutional data to determine impacts on performance in the supported courses, on subsequent course-taking and performance, and on graduation rates. In common with the findings of many other studies, we found these workshops to promote a number of positive outcomes, most especially increasing performance in the supported classes, but also in terms of
increasing the pool of students who are able to succeed in STEM majors and ready to move on to graduate school. Examination of well over 100 individual workshops have demonstrated that there is considerable variation in outcomes. The efficacy of these workshops varies considerably by course, and analysis of student cohorts shows comparable variability among students of certain backgrounds, especially for underrepresented minorities. The research question moving forward is to try to understand the basis for these differences.

Future research will require the examination of a wide range of variables that may affect the outcomes associated with Facilitated Study Groups. These include the nature of the participating and non-participating students, the supported courses, and the workshops. Regarding the students, questions arise regarding the distribution of ages, majors, educational experiences, genders, and ethnicities. For the supported courses, pedagogy, assessment metrics, and content type must be examined. And, finally, the structure and pedagogy of the workshops must be taken into account, as well as the training and experience of the workshop facilitators.

This presentation will provide a broad overview of what we have already learned, both the general patterns across workshops and some of the differences between individual workshops. It will then lay out a research agenda for examining the thornier problem of why the workshops work differently in different situations, and which variables are the most critical determinants of outcomes.

**OR25. Trust Matters: Social Capital, Self Motivation, and Diversity in the Biomedical Sciences**

Robert K. Ream, University of California, Riverside
James Lewis, California State University, Riverside
Begona Echeverria, University of California, Riverside
Reba Page, University of California, Riverside

American science confronts a double-edged problem: the failure to produce a sufficient number of scientists to compete globally and enough underrepresented minority (URM) scientists to ensure the legitimacy of public investment in science here at home. An important part of the government’s evolving strategy at confronting these issues is renewed and substantial federal funding directed toward student recruitment and retention in STEM fields as well as increasing diversity within the biomedical workforce. Yet many programs designed to increase URM representation in the sciences have fallen short of expectations. Some critics argue that policies for helping minorities in science have rested disproportionately on assumptions about individual psychological dispositions to the relative neglect of the sociological environment, including social trust. This study employs longitudinal multisite survey data and structural equation modeling techniques to show that sociological aspects of undergraduate science education are linked to the dispositions of undergraduate science majors. By fortifying especially the formal components of sociocognition among undergraduate biomedical science majors, a long-standing federally-funded program proves to be educationally useful for URM scientists-in-training. Specifically, students’ self motivation is influenced by the trust the program nurtures among science majors and the agents who mentor them in formal university settings. Although mentoring programs have proliferated at college campuses throughout the country, prescribed mentor-protégé roles may not matter so much as the quality of a relationship. Little is known about the trust dynamics of mentor quality, however. Our findings suggest one important reason why trustworthiness is central to mentor excellence: because science majors’ appraisals of the trustworthiness of their mentors impacts students’ internalized dispositions. Trust not only begets trust—trust begets motivation. The program augments mentor-student trust in the near term and over the long run. The program proves less successful, however, at harnessing science majors’ informal friendship networks to boost motivation. Social life can (but is certainly not destined to) be psychologically beneficial when students are immersed in competitive, even zero-sum, educational environments. Our results suggest programmatic successes may be predicated not only on stringent selection and eligibility criteria, but also upon the strategic design of a social support system around each science major for the reason that relationships—and in particularly trustworthy relationships among college students and their university mentors—have the potential to bolster students’ self determination and motivation toward becoming novice researchers.

**P44. Underrepresented Minorities Pathways to Genomic Science**

Hector Rivera, Southern Methodist University
Debra Murray, Baylor College of Medicine

The Human Genome Sequencing Center (HGSC) at Baylor College of Medicine provides training opportunities for underrepresented minorities to interest them in a career in the genomic sciences. The HGSC provides exposure to genetic/genomic research and educational enhancement activities through a summer research program (HGSC-G/GREAT) and a post-baccalaureate program (HGSC-PGET). We report on our current efforts to study the impact of both programs in guiding underrepresented minority students into a scientific
programs that promote minority students to pursue faculty in the STEM disciplines. This situation motivates Alberto I. Roca, MinorityPostdoc.org postdoc talent pool: sacNas best practices more effectively retain students to the academic track. Undergraduate career choices, faculty may be able to events that more positively or more negatively affect positively affected by their critical event. By identifying graduates also indicated that their self-confidence on career choice depending on whether the event was different undergraduates, could have differing impacts finding that 39% of students event that occurred during the last four weeks of their summer, as well as a survey regarding a single critical experience for postdocs. Consequently, intervention experiences can have overlooked this invisible talent pool. In this report about underrepresented minority (URM) postdocs, I summarize available demographic information, outline relevant policy issues, and describe the best practices of SACNAS that serve as a model and resource for those stakeholders championing academic diversity.

The Nelson diversity survey (1) describes the disparity between female and minority student Ph.D. graduation rates and the lack of corresponding tenure track faculty in the STEM disciplines. However, the postdoctoral experience has become a prerequisite in many science disciplines. Thus, a fundamental question to resolve is whether there is an adequate supply of URM postdocs. I present URM demographic data from the 2005 Sigma Xi Postdoc Survey (2) and complementary internal institutional surveys conducted by either local postdoctoral associations or administrative offices responsible for postdocs. The average percentages of URM postdocs in the domestic postdoc population are the following: 3% African American, 4% Hispanic, and 0.5% Native American. Using estimates of the total U.S. postdoc population (3, 4) and assuming that approximately half of U.S. postdocs are foreign (3), then the total number of minority postdocs ranges from about 2000 to 3300.

In 2004, I co-chaired a National Academies COSEPUP session on postdoctoral diversity (5). We outlined policy issues related to the minority postdoctoral experience. Many of these issues are similar for minorities at every career stage although some are peculiar to the postdoctoral stage. For example, can affirmative action ideals and policies be applied to non-advertised postdoc positions? The most competitive and lucrative postdoctoral training experiences are created by an informal, mutual agreement between the prospective candidate and the advisor thereby circumventing the typical employee recruitment process.

SACNAS has over 30 years of experience promoting the advancement of Hispanic and Native American students towards the completion of a science doctoral education. I led the creation of a Postdoc Committee to extend the successful SACNAS model to the career development needs of postdocs. The Committee's inaugural event was the 2004 Minority Postdoc Summit. At the SACNAS annual conference, the Committee has organized career development workshops, an exhibi-
tion booth, and a reception for postdocs to network with recruiters (6). Significantly, the 2008 conference hosted a poster session that for the first time allowed postdocs to present their research. Thus, faculty, diversity officers, equity advisors, and other stakeholders can recruit minority postdoctoral candidates using this unique event. Importantly, I have developed a contact database of several hundred minority postdocs. Therefore, scholars at the Understanding Interventions conference could take advantage of these resources for engaging the minority postdoctoral population. Activities of the SACNAS Postdoc Committee are documented at my website, www.minoritypostdoc.org.

In summary, a National Academy report described postdocs as the “invisible university” because of their critical, but unrecognized, contributions to academia (7). Today, the status of postdocs in general has improved. However many diversity efforts in academia have overlooked the minority postdocs in the STEM pipeline. The accomplishments of the SACNAS Postdoc Committee ensure that minority postdocs will be an invisible solution no more.

References

P47. The Professional Portal Track: An Alternative Academic Path to Foster Health Care to Underserved Populations

Rob W. Rockhold, University of Mississippi Medical Center
Steve Watson, University of Mississippi Medical Center
Helen Turner, University of Mississippi Medical Center

The Professional Portal Track (PPT) is a two-year Master of Science degree program at the University of Mississippi Medical Center (UMMC) School of Graduate Studies in the Health Sciences that trains students from underrepresented groups for academic biomedical careers. In addition, it can provide alternative pathways for entry into medicine and dentistry training of students from areas underserved by health care. Predicated on the hypothesis that recruitment of underrepresented students and those from rural backgrounds will result in a greater proportion who achieve academic or professional terminal degrees and who return to deliver health care to underserved areas, the PPT program also provides a unique academic path to medical or dental school admission. Students are recruited who document a rural residence or fall within federal guidelines for economically or educationally disadvantaged backgrounds. All students must initially apply to and have been found academically non-competitive for regular admission, but in whom admissions committees recognize humanistic characteristics highly desirable in a health care professional. Each student must achieve individualized academic benchmarks during PPT training that include performance above the medical student mean in a first year medical school biochemistry course. If successful, a student achieves direct admission into medical or dental school. Begun in 2004, the sixth class will matriculate in August 2009. Thirty-four students (92%) have graduated, of whom 68% are female and 56% are from a group underrepresented in health care.

Sixteen PPT graduates (47%) have exceeded the respective mean score in direct competition with regularly enrolled first year medical students. Of graduates, 77% demonstrate improved standardized test (MCAT or DAT) scores. A majority of graduates (77%) state a preference for establishing a practice in an underserved areas, with 50% indicating a location with a population of 10,000 or less. Sixteen (62%) of those whose preference was the medical track and seven (87.5%) in the dental track have been accepted into the professional school of their choice. Overall, 68% of matriculated students have achieved their primary goal into professional training. All graduates entering UMMC professional training remain enrolled in good standing. An eight additional graduates have entered professional terminal degree training at other institutions. Thus, a total of 88% of all graduates have now entered professional training. The PPT program identifies, nurtures and successfully prepares students from disadvantaged backgrounds for entry into medical and dental school training. (Supported in part by an award from the Mississippi Institute for the Improvement of Geographic Minority Health Disparities)
OR26. Post-Translational Modification of a High School Mentorship Program
Rob W. Rockhold, University of Mississippi Medical Center
Donna Sullivan, University of Mississippi Medical Center
Susan Bender, Jim Hill High School
Cindy Cook, Puckett High School
Kathy McKone, Bogue Chitto High School
Jeff Stokes, Murrah High School
Base Pair, a mentoring program that pairs public high school students and teachers with medical center research faculty, is hypothesized to promote higher education advancement and biomedical career choice. Students are recruited from an urban district with an 85% free and reduced lunch program population. Approximately 60% are African-American and 60% are female. Each student engages in research during regular class schedules and receives credit towards graduation. Most students participate for three semesters. Teachers participate in summer training and receive continuing education credits. Begun in 1992, 133 students and over 40 teachers have completed the program. Base Pair students have generated over 150 published scientific citations. All students (100%) began a higher education experience, compared to a national average of 76%. Of the 74 who have completed college to date, 45 (61%) have completed or are in an advanced degree (MD, PhD, JD, MS, BSN) program. Overall, 47% of Base Pair graduates who have completed college are engaged in a science career or career path. Teachers have generated over 20 published scientific citations and, following training, have a 74% success rate with teacher-initiated applications from independent external funding agencies. Training for teachers has resulted in formation of related programs that have extended Base Pair influence across the largest urban school district in the state and into under-resourced rural schools. Bringing the common philosophy of embedding biomedical scientific exploration within the high school curriculum, the Student Oriented Academic Research (SOAR) and Rural Biomedical Initiative (RBI) outreach components have been specifically modified by teacher participants to meet individual needs in a process analogous to post-translational gene product modification. Dramatic increases in high levels of achievement in regional, state and international science fair performance by students have followed. The most recent outgrowth, the Muse of Fire project, involves students in advanced biomedical training focusing on an endemic southeastern insect pest, Solenopsis invicta, the red imported fire ant. A series of five inquiry-based lesson plans have been developed from that training for wide-spread dissemination to secondary schools. The Base Pair program has exerted a meaningful impact on urban and rural science education and advancement of a diverse population of students into biomedical career paths. (Supported by awards from the Howard Hughes Medical Institute)

P48. Enhancing undergraduate academic and research experiences through a collaboration between S-STEM and the McNair Scholars Program
Jennifer Rosato, The College of St. Scholastica
Kathleen M. Cargill, The College of St. Scholastica
S-STEM and the McNair Scholars Program at The College of St. Scholastica (Duluth, MN) collaborate to create more opportunities for academic enrichment including local, regional or national research sites. Scholarships in Science, Technology, Engineering and Mathematics (S-STEM) is an NSF-funded scholarship and mentoring program that has been ongoing for 8 years (2001-2009), serving 74 scholars. S-STEM provides annual scholarships, faculty mentors and training for students to enter graduate school or the workforce within the STEM fields. McNair is a USD-funded graduate school preparatory program, which provides allowances, faculty mentoring and research opportunities. In its 14th year, it has enrolled 224 undergraduate students and currently has a 63% persistence rate into graduate school. Thirty McNair scholars will have completed research in a STEM field from between 1996 and 2009.

Successes include: all students who completed research in S-STEM or McNair graduated on time; increased student participation in poster sessions; increased participation in GRE prep classes; and all enrolled in graduate school or were employed within their field. Effective strategies contributing to students’ success include: cross linking websites to reduce duplication of information; referring students between programs; combining graduate school skills-building seminars; assisting students who apply to research programs; visiting graduate schools; attending discipline-specific conferences (e.g., ACS, MICS, SACNAS); and presenting research at the National Conferences for Undergraduate Research (NCUR). S-STEM and McNair collaborate effectively to promote a culture of academic achievement, increasing students’ information about their need for and the availability of opportunities for experiential learning.

OR27. Evaluation Design and Data from the 10-Campus UC AGEP
Abram Rosenblatt, University of California, San Francisco
Colette E. Patt, University of California, Berkeley

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The University of California (UC) Alliance for Graduate Education and the Professoriate (AGEP) is the largest of the AGEP programs nationally. Evaluating the UC AGEP initiative is of national importance, yet it is challenging for a number of reasons. These include the broad scope of programs underway across the ten campuses, the size and variation contained within the UC campus system, the range of external factors that impact underrepresented minority (URM) recruitment and retention in the science, technology, engineering and mathematics (STEM) fields including proposition 209, and the reality that the evaluation process began subsequent to the development of programs.

To work within these parameters, a multi-method approach to evaluation has been developed that utilizes both campus level and system wide information. At the system level, uniform data pertaining to URM STEM applicants, enrollees, academic progression, and academic placement are examined for the system as a whole and for each individual campus. These data are examined over time with trends by year tracked and compared across campuses. In addition, UC wide and campus wide data will be compared over time to external universities that are similar to UC as a whole or to specific campuses within the UC system. This creates essentially a multiple time series approach to evaluating impact.

Second, campus level data is also examined using logic models to link programs to short, intermediate, and long term outcomes. These data a campus specific and focus on evaluating whether specific programs at a campus achieved their objectives. The logic model approach can both guide the development of programs as well as guide the collection of evaluation data. This presentation will provide the design of the evaluation, individual campus logic models, and preliminary data deriving from systemwide and campus level evaluation strategies.

**OR28. Aligning Postdoctoral Training with the Academic Professorate: Altering the Traditional Paradigm to Increase Diversity in the Sciences**

Brian J. Rybarczyk, University of North Carolina, Chapel Hill
Leslie Lerea, University of North Carolina, Chapel Hill
Kay Lund, University of North Carolina, Chapel Hill
Linda Dykstra, University of North Carolina, Chapel Hill
Dawayne Whittington, Strategic Evaluations, Inc.

Postdoctoral training would be improved by creating programs that provide both traditional research training along with preparation for the multiple roles and responsibilities of an academic career path. The Seeding Postdoctoral Innovators in Research and Education (SPIRE), funded by the National Institute of General Medical Sciences (NIGMS) IRACDA initiative, is an integrative postdoctoral fellowship program that combines research training, hands-on teaching experience, and professional development. The program involves a partnership between the University of North Carolina at Chapel Hill and Minority Serving Institutions (MSIs) in North Carolina. The objectives of this program are 1) to prepare individuals for research/academic careers in the biomedical sciences and 2) to have a continuing impact at the MSIs through the exchange that takes place as the postdoctoral scholars develop teaching expertise and share their knowledge in the sciences with the faculty and students at the MSIs. To determine the success of the SPIRE program, we undertook a longitudinal study that examined 22 measures of academic productivity. Data from SPIRE postdoctoral scholars were compared to postdoctoral scholars who were not part of the SPIRE program, but who were drawn from the same university. Results showed that SPIRE postdoctoral scholars were equally productive as the comparison group in of the category of scientific publications and demonstrated significantly higher productivity rates in categories of courses taught, scientific seminars presented, engagement in professional development, and service related contributions. Results also revealed favorable impacts on undergraduate education at the MSIs, including the number of students taught, number and types of courses taught, and in extensive student mentorship. The SPIRE postdoctoral scholars were three times more likely to obtain a tenure-track faculty position as compared to a national sample of postdoctoral scholars who had the same length of time in postdoctoral training. Moreover, many of the faculty positions obtained by the SPIRE scholars were at MSIs, suggesting that these scholars were likely to have a long-term impact on student education at MSIs. Taken together, this postdoctoral training model provides scholars with the skills required to function as independent researchers, research-oriented teachers and committed mentors for undergraduate students in the sciences. In the process, the MSIs receive continued benefit through long-term interactions, and modifications in curriculum and infrastructure. The diversity of the science community is being expanded by the enhanced interest in science careers among the undergraduate students at the MSIs who have been exposed to a vibrant, active learning experience in collaboration with the SPIRE program.

**P49. Successful Collaborations: What works when a primarily White University collaborates with a Historically Black University in a research project**

Denise Scott, Howard University
Lori L. Bakken, University of Wisconsin-Madison
Gail Coover, University of Wisconsin-Madison
Collaborations among primarily White universities and Historically Black universities are often very challenging and unsuccessful. Cultural differences between vastly diverse institutions quite often impede the conduct of fruitful research projects. The authors present a theoretical overview of attributes that contribute to successful collaborations among diverse cultures and provide an example of a successful 2-day research training program that has been sustained for nearly a decade. Mutually beneficial collaborations among PWUs and HBCUs are important for training more diverse research scientists who are adequately prepared to address our nation’s healthcare needs.

**P50. Undergraduate Origins of Leadership Alliance Doctoral Scholars**

Pamela Scott-Johnson, Morgan State University  
Lousie Hainline, Brooklyn College  
Medeva Ghee, Brown University, Leadership Alliance  
Valerie Wilson, Brown University, Leadership Alliance

The undergraduate origins of underrepresented minorities who receive PhDs is a topical issue. Prior to the 1990’s minority-serving institutions of all types were the principal undergraduate institutions of origin for most minority students who went on to receive doctoral degrees, especially in the science and engineering (S&E) disciplines. With the advent of increased minority student enrollment at major institutions, data continues to be analyzed to determine the contribution and relative proportion of this broader base of institutions to the production of minority PhDs. The flagship summer undergraduate research program of the Leadership Alliance, a national academic consortium, is the summer undergraduate early identification program (SR-EIP). Originally, participants in the SR-EIP undergraduate program were limited to Alliance institutions; however, since 1997, students from any US institution were eligible to participate. Since inception in 1993, More than 60% of students who have participated in the SR-EIP have entered into graduate training, with PhD training accounting for 26% of this total. The Leadership Alliance has tracked the training progression of its participants. By the end of 2008, more than 120 SR-EIP alumni have successfully completed their PhDs. This preliminary study analyzed the undergraduate origins of the Leadership Alliance doctoral scholars in various disciplines from the 1993-1997 and 1998-2008 time periods.

The two questions examined were: What are the undergraduate origins of doctoral scholars in the various disciplines? Since the expansion of the SR-EIP eligibility criteria, has there been a change in the undergraduate origin of the doctoral scholars, especially in the STEM disciplines? Data for this study were derived from the demographic information on 124 former SR-EIP scholars who have received PhDs by December 2008. Institutions of origin data were examined for the entire cohort (Group A; n=124), for those who participated in the SR-EIP in and before summer 1997, and who completed their BS by 1998 (Group B; n=54) and those who participated in the SR-EIP in summer 1998 and beyond (Group C; n=70). For the entire group, the institutions of origins were nearly evenly divided among HBCUs (31%), HSIs (29%) and Majority White Institutions (35%), with MSI only represented by 5% of the doctoral cohorts. For those doctoral recipients who were undergraduate participants in the SR-EIP in the early years (prior to 1997), the distribution among institutions of origin are HBCUs 43%; HSIs 7%; majority White - 41% and MSI - 9%. In contrast, the distribution among those in the SR-EIP after 1997 is: 23% HBCUs, 46% HSIs, 30% Majority White, and 1% MSIs. This suggests that the origins of minorities who go onto earn doctoral degrees has dispersed among a variety of institutions. However, the undergraduate origins of students earning doctorates in the life science indicates that HBCUs and HSIs are still the primary source of these students (Group B = 77%; Group C=80%). Other variations with respect to fields of study are also evident within this cohort. Minority serving institutions, especially HBCUs and HSIs, continue to play an important role in the production of students who go on to earn doctoral degrees, especially in the life sciences. Studies among other multi-institutional consortia should be undertaken.

**P51. Bring your Own Cassava to the Teaching Lab: Research-Based Laboratory Module Implementation in Upper-Division Cell Biology and Genetics Laboratory Courses at a Minority-Serving Institution**

Jean Seda, University of Puerto Rico, Mayaguez  
Milly Montero, University of Puerto Rico, Mayaguez  
Dimuth Siritsuenga, University of Puerto Rico, Mayaguez  
Franklin Carrero-Martinez, University of Puerto Rico, Mayaguez

Cassava, an economically important crop, is a staple food in Africa, Asia, South and Central America. Despite wide consumption in the Caribbean region, the genetic diversity is poorly understood and basic cellular characterization as it relates to starch and amylase content has not been performed. Lab modules, broadly entitled “Bring Your Own Cassava” (BYOC), are being implemented in upper division genetics and cell biology courses. Students are contributing to an ongoing research project on cassava lineage and nutrient components by assessing the genetic diversity of cassava from Puerto Rico. Since students in these courses come...
from all over the island, we ask students to bring their own cassava tissues from plants found close to their homes. This increases the varieties the course is likely to assay while providing experience in record keeping and sample handling techniques. Students enrolled in the Genetics lab course apply modern molecular biology techniques to evaluate the genetic make up of their own samples. Analysis includes DNA extraction followed by PCR amplification for microsatellite markers and gel electrophoresis. Initially, the Cell Biology component allows the students to evaluate different cassava samples from the Puerto Rican germplasm using a combination of cellular and biochemical techniques. As new varieties are genetically characterized, students will complete their cellular characterization. Our novel approach allows students to directly contribute with our ongoing research efforts in characterizing cassava in Puerto Rico. Pooled data from all sections will allow us to assess the diversity of Puerto Rican samples and their relationships to varieties from Africa, Asia and South and Central America. In depth assessment of content learning and perception is being conducted both pre- and post-course. The development of these lab modules is being supported by the Course Curriculum Laboratory Improvement program of the NSF.

P52. Closing the Loop: A case study in the use of formative program evaluation to direct the successful growth of an intensive summer research program
Karen E. Singer-Freeman, Purchase College, State University of New York
Ronnie Halperin, Purchase College, State University of New York
Joseph Skrivanek, Purchase College, State University of New York

Purchase College, SUNY, began its summer research program through an NIH-funded Bridges to the Baccalaureate grant in 2000. The goal was to increase the number of underrepresented minority students at community colleges who transfer to four-year institutions, obtain bachelor's degrees, and pursue careers in the biomedical sciences. For the past three years, funds from an NSF STEP grant have enabled the inclusion of non-minority students interested in science, technology, engineering and mathematics. To date, the summer program has enrolled more than 100 students. Of these students, 83% have received AA or AS degrees (compared to 30% nationally), 71% have completed BA or BS degrees in the sciences (compared to 15% nationally), and 33% are currently pursuing post-baccalaureate work. The success of the summer research program is largely the result of our use of program evaluations to direct and then assess program innovations. This presentation will demonstrate how closing the loop with formative evaluation can be a central tool in building a successful program.

During the summer program, students spend most of the five 40-hour weeks working in groups in the laboratory and under the direct supervision of a faculty member. There are also two program-wide research meetings during which students and faculty report on their developing research. The summer culminates with a professional style conference in which students make formal PowerPoint presentations on their research findings. The majority of students reside on campus throughout the five weeks and all engage in several scheduled enriching community-building activities.

Each year our program evaluator conducts a formal evaluation of the summer research program based on individual interviews with students, a focus group meeting with the faculty, and a final student survey. She also observes key program events. This level of formative assessment is not unusual for a program of this kind. However, many programs have difficulty utilizing the results of formative assessments to implement effective improvements. In this poster we provide examples of how we have utilized assessment information to effect substantive programmatic improvements from 2004, when we had 22 students, to 2008, when we had 46 students. The evaluator identified three key areas for program modification: Academic readiness, student engagement in science, and academic advising. These led to new program components such as a spring orientation, re-designed research meetings, increased participation of faculty mentors, an added full-time position for an associate director of the program, and a series of advising/information sessions about academic progress and careers. Each of these changes has furthered our efforts in meeting the goals of the program.

The scientific community has, over the past two or three decades, incorporated the practice of rigorously measuring long-term outcomes through summative program evaluations, but these outcome measures often appear after the fact, when meaningful program change is no longer possible. The use of formative evaluations, not simply to document process, but to guide program modification and progress in the short-term, has the as yet unrealized potential to effect meaningful change early on.

P53. The Sustainability Energy and Engineering summer REU: Growth and Progress toward increasing the number of underrepresented people in STEM fields
Avril A. Smart, North Carolina State University
Pamela Martin, North Carolina State University
Steven Peretti, North Carolina State University
Christine Grant, North Carolina State University
Despite the preponderance of summer research programs across various universities in the US designed to encourage students to pursue education in science (Norbet, 2004), underrepresented groups and people of color have a relatively void presence in the science technology engineering and mathematics (STEM) fields. Reporting statistics from the Center for Institutional Data Analysis, Hurtado, Cabrera, Lin, Arellano and Espinosa (2009) report that the “rates of science baccalaureate completion for underrepresented minority undergraduates are dismal with only 24% of African American, Latina/o, and Native American students completing a science bachelor’s degree in six years, compared to 40% of White students” (p.190). In addition, representation of women in STEM fields is disproportionately lower than that of their male counterparts (Zeldin, Britner and Pajares, 2008). The Sustainability, Energy and Engineering (SEE) summer research experience for undergraduates takes an innovative approach to undergraduate research experiences. SEE incorporates multidisciplinary strategies that include mentoring, training in ethical procedure and hands on scientific learning experiences to motivate promising undergraduate scholars to engage in sustainable engineering research and later pursue a graduate education. For three consecutive summers, SEE has successfully incorporated those three key aspects to learning to 1) develop future knowledge leaders in sustainability and green engineering, 2) enhance the likelihood of successful graduate education in engineering among students of color and 3) promote disciplined thinking related to science among students. This presentation will provide a panoramic view of the yearly progress of the SEE program in addition to providing effective strategies to successful summer research programs for undergraduate scholars.

**Ps4. Expanding Participation by Minorities in Biomedical Sciences**

Michael F. Summers, University of Maryland, Baltimore County

Justine Johnson, University of Maryland, Baltimore County

The IMSD Biomedical Graduate Fellows Program at UMBC began in 1996 with an MBRS-IMSD (Minority Biomedical Research Support - Initiative for Minority Student Development) grant from the National Institute of General Medical Science. The program is open to all US citizens and permanent residents. The goal of the program is to increase the number of students who receive their PhD in the biomedical field and who are interested in the advancement of underrepresented minorities in the sciences, particularly at the graduate level.

In 1996 two African American students joined the program - one in chemistry and one in psychology. As of the Fall 2008, there are 50 underrepresented minority students currently in the program pursuing their PhD in the biomedical field at UMBC or the University of Maryland, Baltimore (UMB). A successful module of the IMSD graduate program is the eight-week Summer Bridge that all incoming first year fellows are encouraged to participate in prior to beginning graduate school. The Summer Bridge is designed to (1) facilitate a smooth transition into graduate school; (2) enable incoming fellows to become familiar with UMBC, UMB and the surrounding area; and (3) allow students to get a jumpstart on their research. The Summer Bridge Program also includes a full-time research rotation, and a Technical Writing Workshop.

The IMSD Biomedical Graduate Fellows Program has literally transformed graduate education at UMBC. Since the Program was established in 1996, underrepresented (URM) enrollment in participating PhD programs (Biological Sciences, Chemistry and Biochemistry, Engineering and Human Services Psychology and Physics) has increased from 0%, 1%, 2%, 8% and 0%, respectively, to current levels of 14%, 10%, 25%, 8%, 19% and 13%, respectively. This corresponds to an increase in URM enrollment (US citizens) from 5 students in 1996 to 44 students at present. An additional 23 IMSD Fellows have already received PhD degrees, and more than 30 currently enrolled IMSD students have finished courses, advanced to candidacy, and are expected to earn PhD degrees in the next 2-3 years. By comparison, only 7 URM earned SEM PhDs in participating PhD programs in the 17 years preceding the IMSD program. Interest in the IMSD program continues to climb, with 58 URM applications in AY-07. Retention rates (93% over the past 4 years; 76% since inception) greatly exceed departmental and institutional averages. In an effort to double URM participation in our program we have reduced IMSD tuition and salary support from two years to one year and have expanded the program to include the newly implemented GPILS (Graduate Program in Life Sciences) umbrella at the University of Maryland, Baltimore. The PI and Program Coordinator will continue their efforts to disseminate information about effective diversification and mentoring practices, including organizing and participating in national meetings and publishing peer-reviewed articles.

**OR29. Retaining students in STEM Undergraduate Education: A Research-Based Perspective**

Watson Scott Swail, Educational Policy Institute

Higher education institutions traditionally have challenges retaining and graduating students in
STEM areas who are historically-underrepresented in higher education, such as those from low-income or first-generation families. This session will present an empirically-driven model for retaining STEM students, with examples of practical strategies that can be used in your institution. Dr. Swail created the Geometric Framework for Student Retention based on research related to the Model Institutions for Excellence program in the 1990s. Since then, he has worked to expand the model and now conducts workshops and conferences around the world on this issue.

Yu Tao, Georgia Institute of Technology

Asians of all citizenship statuses are well known to be overrepresented in science and engineering (S&E) fields in the United States. However, not much scholarly attention has been paid to Asian American women, or female Asian U.S. citizens. They are different from Asian American men and also from women of other races/ethnicities due to their cultural backgrounds. This paper uses data from the public-use version of the Survey of Earned Doctorates. It compares the receipt of S&E doctorates by Asian American women to the receipt by Asian American men and women US citizens of other racial/ethnic groups, notably white, black, and Hispanic women.

The results show that Asian American women were better represented in S&E than other women between 1986 and 2006. Their patterns of their S&E doctorate attainment confirm the Asian tradition of preference for S&E occupations as tools for social mobility. However, the Asian tradition does not exclude gender differences in participation, which exist among Asian Americans just as they do among other racial/ethnic groups. This poster also assesses the nature of S&E fields. It concludes by discussing research implications.

OR30. Sealing the Holes in the Middle of the Pipeline
Heather P. Tarleton, University of California, Los Angeles
Carlos Grijalva, University of California, Los Angeles
Beth Schneider, University of California, Santa Barbara
Gloria Chun, University of California, Berkeley
Mary York, University of California, Santa Barbara

Institutional data and anecdotal reports suggest that graduate students enrolled in doctoral degree programs experience a developmental crisis in their 3rd and 4th years of degree pursuit. This developmental crisis can be characterized by feelings of academic limbo in which students are dealing with the transition from student to colleague, lack of mentorship with regard to professional development and future direction, and insecurities about ability to complete the final degree requirement of a dissertation and competitiveness in advancing to faculty positions.

As an institutional alliance, we developed an intervention for those underrepresented minorities in their 3rd and 4th years in doctoral programs in the social sciences at University of California campuses at Los Angeles, Santa Barbara and Berkeley. Our approach is based on two-pronged. We sought to intervene by providing support, in the form of mentorship and guidance, and through empowerment, which is the provision of skills needed to thrive in academia. We also believe that the participation in an event with a critical mass of students of color can, in itself, counter feelings of isolation and helplessness.

Our intervention brought 29 students from 3 different campuses together. This allowed students to network with one another, talk about academic cultures and styles, and see new faces that looked like their own. We also invited faculty from across the social science disciplines to participate as academic and professional mentors. We secured the participation of nine faculty members from across the disciplines of Sociology, Communications, Chicano Studies, Education, Political Science, Anthropology, Geography, and Psychology, which produced a roughly 3:1 ratio of students to faculty. Both faculty and program staff facilitated workshops and panels on the topics of “Academic Writing,” “Understanding the Dissertation Process in the Social Sciences,” “Mentorship,” “The CV as a Portfolio,” “The Path of the Advanced Student,” and “Demystifying the PostDoc and the First Faculty Position.” Additionally, faculty met with small groups of students (2-4 students) in a 3-hour “working group” to discuss goals and direction and to provide feedback on drafts of the students dissertation proposals.

When surveyed after the intervention, only one-third (33%) of the students who participated in this intervention reported that their “department provides graduate students with discipline specific professional development training”. We consider this intervention a success because it served a demonstrated need. This conclusion is supported by the post-intervention survey in which 96% indicated a desire to recommend the UC DIGSSS social science retreat to other students in their 3rd or 4th years of graduate study. The pre and post survey feedback also suggest that the key factors that make this sort of intervention of great value to students is a) the ability to receive specific feedback from faculty in their discipline (92%) and b) that the variety of workshop offerings and discussions ensured that almost everyone “learned something new” about the
skills needed for professional and academic advancement (scored as a 4.6 out of 5 with 4 representing "very informed" and 5 representing "fully informed.").

In the presentation we plan to share not only our rationale for and planning in preparation of this intervention, but also share what we have learned in the process of creating an intervention that targets under-represented students in the "middle of the pipeline". We believe that this format is adaptable across all disciplines and we would like to facilitate this adaptation on a national level.

**P56. A research-based approach to reform introductory physics courses**

Raluca E. Teodorescu, George Washington University
Cornelius Bennhold, George Washington University
Gerald Feldman, George Washington University
Larry Medsker, George Washington University

The need to enhance quantitative literacy in the citizenry of the technological society of the 21st century has been pointed out in many recent national reports. Among the STEM fields, physics may arguably be the one most suited to develop the thinking skills needed for problem solving. The Physics Education Research (PER) community has expanded considerable effort assessing the shortcomings of traditional teaching methods to provide students with a deeper understanding of physics principles in a coherent framework. A vast amount of newly developed curricular materials has demonstrated the need for active engagement, student-centered learning environments that emphasize cognitive processing over information gathering. Yet the positive gains in conceptual physics knowledge attained by many of the innovative instructional methodologies have not necessarily translated into improved problem solving, but rather revealed the complex nature of the problem-solving process. This project describes the approach we used in the years 2006-2009 to reform the first semester of the introductory algebra-based physics course (called Phys 11) at The George Washington University. The reform sought to transform our curriculum in a “thinking skills” curriculum that trades “breadth for depth” by focusing on slightly fewer topics while targeting the students’ cognitive development. We employ existing research on the physics problem-solving expert-novice behaviour, cognitive science findings and educational psychology recommendations.

Our pedagogy relies on didactic constructs such as learning progressions and concept maps that we have developed and implemented in our introductory physics course. These tools were designed based on a taxonomy of physics problems being developed by Teodorescu et al. (TIPP: Taxonomy of Physics Problems). Their purpose is to: 1) help students build local and global coherent knowledge structures, 2) develop more context-independent problem-solving skills, 3) gain confidence in problem solving and 4) establish connections between everyday phenomena and underlying physics concepts. We organize traditional and research-based physics problems such that students experience a gradual increase in complexity related to problem context, problem features and cognitive processes needed to solve the problem. The instructional environment that we are designing allows for explicit monitoring, control and measurement of the cognitive processes exercised during the instruction period. It is easily adaptable to any kind of curriculum and can be readily adapted throughout the semester. To assess the development of students’ problem solving skills we created rubrics. Colorado Learning Attitudes about Science Survey (CLASS) was administered pre- and post-instruction to determine students’ shift in dispositions towards learning physics. We will present course methodology and the results we obtained. The results feature significant improvements in all targeted areas.

**P57. Alliance for Graduate Education and the Professoriate: The Connectivity and Implementation Project**

Sandra Thomas, Institute for Broadening Participation
Susie Valaitis, Institute for Broadening Participation
Chris Brehme, Institute for Broadening Participation
Liv Detrick, Institute for Broadening Participation

The AGEP Connectivity and Implementation Project was designed to reduce the institutional barriers to academic success in STEM by strengthening the national network of partnerships and resource sharing for the NSF’s Alliance for Graduate Education and the Professoriate (AGEP).

IBP is a small, coordinating organization which has worked with the Division of Graduate Education at NSF for the past seven years. IBP has developed an implementation model for supporting a national network in an effort to increase the number of underrepresented minorities and women in STEM fields. An extensive infrastructure has been built for gathering, storing and exchanging information between programs, potential students, minority serving institutions and organizations and student mentors, with a resulting increase in the number of students who successfully navigate the transition from their undergraduate programs to graduate school. Through virtual and face-to-face meetings and digital tools IBP assists program to build effective partnerships, and helps provide faculty with the knowledge and tools to implement effective recruitment and retention.
questions are formed. From a logic model, appropriate evaluation and short-term outcomes, assures that evaluation is ties program resources, goals, activities, and long-
articulate the program theory. The logic model, which
gram is to delineate the program theory or program
solutions are successful in recruiting and retaining target
students. Potential students, and student mentors through partnerships with related NSF programs (IGERT, GK-12, NSF Grad Research Fellowships, LSAMP, Bridges, ADVANCE, REUs, T-CUP, PIRE and STCs). This enhanced national network increases the visibility and capabilities of this effort, attracts greater numbers of entry level scientists to STEM careers, and produces a diverse new cadre of scientists and leaders for the public and private sectors by increasing the number of underrepresented minorities in the academy.

**OR31. Deciding what works: A 7-step model for evaluating strategic programming to increase numbers of underrepresented groups in STEM fields.**
Linda P. Thurston, Kansas State University
Jan Middendorf, Kansas State University

Organizations and institutions committed to broadening participation in scientific careers are interested in the numbers of future scientists recruited in STEM education and careers and in those who complete their education. However, they are also interested in “what works”; that is, which practices and activities are successful in recruiting and retaining target students? Therefore, evaluating the efficacy of recruitment and retention activities and practices is a crucial component of programs whose purpose is to broadening participation in scientific fields. Evaluation has both summative and formative capacities. Evaluation can define both the intended and untended impact of these activities and programs, and can also help inform practitioners about needed program improvements. This workshop will present a seven-step process for evaluating the success of practices aimed at increasing the number of individuals from underrepresented groups in STEM academic programs and careers.

The first step in evaluating an intervention program is to delineate the program theory or program logic. Most evaluators utilize a logic model flowchart to articulate the program theory. The logic model, which ties program resources, goals, activities, and long- and short-term outcomes, assures that evaluation is based on a clear understanding of the program being evaluated. From a logic model, appropriate evaluation questions are formed.

The Evaluation Plan specifies the approach to answering the evaluation questions. The next steps in the 7-step model relate to the Evaluation Plan, which is designed within the context of the program. The Evaluation Plan includes the evaluation design(s) and the evaluation methodology. Evaluation designs are selected based on the evaluation questions and the needs of the stakeholders. For example, a time-series design is appropriate for formative evaluation in which feedback to the program designers is utilized to inform programmatic changes. Within the methodology section of the Evaluation Plan, components are: instrumentation, data collection, data analysis, and timeline. After an evaluation plan is implemented, the final step of an evaluation is to report the findings in a manner that is useful to the stakeholders involved.

This presentation will also include a discussion about contextual issues in using evaluation to test the replicability an intervention program, and cultural competencies of evaluators.

The 7-step Evaluation Model will be demonstrated with case studies from programs that were designed to broaden participation in STEM fields. Workshop participants will have the opportunity to develop a Logic Model and/or an Evaluation Plan based on their own programs. Evaluation resources and a copy of the 7-Step Evaluation Model will be provided.

**P58. Outdoor Community Building Retreats as Interventions to Improve the Campus Climate for Graduate Students**
Renetta G. Tull, University of Maryland, Baltimore County
Gloria Anglón, University of Maryland, College Park
Jessy Warner-Cohen, University of Maryland, Baltimore County

PROMISE: Maryland’s Alliance for Graduate Education and the Professoriate (AGEP), sponsored by the National Science Foundation, annually takes 80-100 graduate students from its alliance partners, the University of Maryland Baltimore County (UMBC), the University of Maryland College Park, and the University of Maryland Baltimore, on a weekend retreat to build community and encourage persistence in graduate study. The target participants for the retreat are underrepresented graduate students in STEM fields. In an effort to build community both at the retreat and after the weekend, graduate students from all disciplines and ethnicities are invited to participate. These retreats are designed to overcome issues related to graduate student isolation and to promote community within and between disciplines and ethnic groups. Results from both unsolicited comments and formal evaluations, show that the retreats have contributed to students’ motivations to continue in their graduate programs and complete
The first PROMISE Retreat was held in Berkeley Springs, West Virginia in March 2004, and the most recent retreat was held in March 2009 in Rocky Gap/Cumberland, Maryland. The retreats combine elements of indoor encouragement sessions by peers, faculty, and administrators, followed by a full day of outdoor community and skill building activities, and subsequent sessions that involve both oral and written reflection and evaluation. The outdoor portion of the retreat has been annually facilitated by professionally trained members of the Outward Bound organization. These internationally experienced facilitators work with PROMISE to design advanced outdoor activities that motivate students to continue in their degree programs. Intensive program components have included outdoor/winter survival skills that comprised the design of outdoor shelters from available branches and foliage, hunting techniques for food, and primitive cooking using wood and stones for campfires. The workshop for this conference will specifically focus on design components and results of the 2009 retreat which carried the theme “If I can survive this, I can surely survive graduate school!”

Results from the retreat evaluation questions related to building leadership skills, faculty advisor relationships, isolation, and motivation will be presented. Early analyses show overwhelming support for the program by the students and high incidence of responses that show that students agree that participation in the retreat made a difference in their perceptions of motivation and isolation.

Advanced PhD candidates participated in the Dissertation House portion of the retreat and did not participate in the structured outdoor program activities. However, all students participated in encouragement and reflection sessions. Student participation in online activities such as the PROMISE Community Building Blog, http://promisecommunitybuilding.blogspot.com/, and effects of the Facebook social networking site will also be discussed. PROMISE considers the retreats to be one of its most successful interventions for improving the climate for graduate students.

Acknowledgements are extended to Outward Bound Professional trained facilitators and PROMISE outdoor retreat designers: Craig Imler of Terra Trax and Denise Ashman of Heartwood Wilderness School, LLC. The 2009 PROMISE retreat and evaluation was supported by NSF Grant No. 0639698.

Ps9. The Maine Pathways and Connection to STEM Project

Susie Valaitis, Institute for Broadening Participation
Chris Cash, Institute for Broadening Participation
Allyson Fauver, Institute for Broadening Participation
Reba Fowler, Institute for Broadening Participation

The Institute for Broadening Participation (IBP) was founded to design and implement strategies to increase access to science and education for diverse underrepresented groups, including, but not limited to, underrepresented minorities, socio-economically challenged populations, populations in remote locations, women, first-generation college students, and others. In conjunction with its national projects, IBP has expanded its mission in the past year by becoming involved with the STEM education community in Maine through a new project: Maine Pathways and Connections.

The Maine Pathways and Connections to STEM project was designed to strengthen the Maine network of STEM education, research, and industry through the services of a small coordinating team at the Institute for Broadening Participation (IBP). This has been accomplished by creating, maintaining and expanding a web-based interface, with accessibility features, providing up to date resources for students, parents, educators and other professionals. The website and related outreach activities provide information “pathways” for pursuing studies and related careers in science, technology, engineering and mathematics, specifically relevant to Maine residents. It also functions as a forum to bring together diverse user groups: students, educators, parents, researchers, businesspeople, policymakers - with information about STEM programs, events, institutions, and careers in Maine.

IBP piloted the Maine STEM website, http://www.mainestem.org, populated with data on Maine STEM programs, events, institutions, contacts, leadership and student profiles. It also includes content associated with the statewide STEM initiative, which was introduced to the public with a STEM Summit in January 2008. The IBP Maine STEM director serves as a member of the Leadership Team for the Maine Girls Collaborative Project, sits on the Maine STEM Initiative Planning Committee, and the IBP coordinating team partners on projects with other Maine organizations, including University of Maine's Center for Science and Mathematics Education Research, The Challenger Learning Center, the Bigelow Laboratory for Ocean Sciences, Zooey's Room/Platform Shoes, Coastal Studies for Girls, the Wabanaki (Native American) Center, Maine Mathematics and Science Alliance, Mount Desert Island Biological Laboratory, and the Maine Space Grant Consortium.

The Maine Pathways Project takes a strategic approach to improving the STEM education community in Maine. It seeks to contribute to an increase in STEM participation at all levels, to make STEM education and careers more accessible to Maine residents, to increase awareness among policymakers and business leaders about the importance of STEM workforce issues, to support students with information and opportunities as they make their way through their education and
careers in the STEM fields, to increase Maine high
school and undergraduate students’ awareness of
STEM career options, and to increase the participa-
tion of underrepresented groups including women,
minorities, special needs students, and first generation
college students, in science and engineering in Maine.
In implementing this approach, the project is signifi-
cantly contributing to the educational goals of the State
of Maine.

OR32. More Than Getting Us Through:
Cultural Capital Enrichment of
Underrepresented Minority Undergraduates
Brian D. Veazey, University of California, Davis
Sarah M. Ovink, University of California, Davis
Merna Villarejo, University of California, Davis

Though minority groups are making inroads into
the nation’s undergraduate colleges and universities,
minority students continue to be underrepresented
among those who seek advanced degrees, particu-
larly in the physical, biological, and health sciences.
Our research focuses on an area of acute concern:
the lack of minority students pursuing careers in the
biomedical field. What kinds of interventions achieve
significant results? What can be done to effect lasting
mobility among those minority students who serve as
trailblazers, with few relatives or friends to look upon
as mentors and examples? This last query touches on
a subject little discussed in education policy: whether,
how, and to what extent formal educational systems
can augment students’ cultural capital, a specialized
set of class-specific dispositions, knowledge, and
skills that may bring students “profit” as they progress
through their academic and professional careers. To
address these concerns, we examine the effects of one
university-sponsored academic intervention program
aimed at supplying minority students with the disposi-
tions, knowledge, and skills necessary for success in
advanced scientific and biomedical research.

Despite the wide variety of intervention programs
encouraging minority students to pursue careers in the
biomedical field, little research exists investigat-
ing which programs work best, and even fewer studies
examine exactly what good programs do for success-
ful minority students. In this presentation we explore
the experiences of a group of high-achieving minority
students who participated in the Biology Under-
grade Scholars Program (BUSP) at the University
of California, Davis, an undergraduate intervention
program with a highly successful record of increasing
minority retention and achievement in the life sciences.
Primarily academic in scope, BUSP intentionally (and
unusually) addresses students’ deficiencies in cul-
tural, social, and professional capital - such as narrow
professional aspirations, limited knowledge about the
higher education system, or ambiguity over appropri-
ate professional behavior. As previous research has
shown, such deficiencies can have lasting effects on
the academic success, career aspirations, and profes-
sional mobility of many minority students. While BUSP
includes a variety of resources designed to ameliorate
such disadvantages, here we focus on three alumni
identified as especially salient to their individual suc-
cess: the role of advisors, mentors and role models; the
influence of peers; and the experiences gained through
their undergraduate research experience. Although
we see some differences in the ways first- and second-
generation college-going students need and use these
elements, on the whole we find that when alumni speak
of why such assistance was helpful, they almost always
highlight how it bridged some gap between the cultural
capital they are expected to have and that which they
actually possessed.

In previous papers, we have shown that BUSP
clearly succeeds in providing underrepresented
minority students with the academic skills required to
succeed in science majors and careers. Here we show
how BUSP also augments students’ cultural, social and
professional capital in ways that have a lasting effect
on their career aspirations and professional mobility.
In light of this finding, we conclude that traditional
intervention strategies addressing only academic and
financial deficiencies are insufficient for ameliorating
the entirety of the challenge underrepresented minority
students face as they work to complete their degrees
in the biomedical sciences. In contrast, we suggest that
targeted and explicit efforts to augment deficiencies in
their cultural capital, in conjunction with academic and
financial assistance, result in more favorable outcomes
for these vulnerable students.

P60. Successful Bridge-Building Strategies
From The STEM College To The College of
Arts and Letters
Marsha I. Walker, Johnson C. Smith University

C.P. Snow, a British physicist and novelist, de-
scribed the intellectual enterprise as divided into two
cultures, the literary and the scientific, with a great gap
of mutual ignorance and indifference separating them.
Since Snow’s observation, the fissure within the house
of intellect appears to have grown even wider. In this
21st century technological universe, undergraduate stu-
dents housed within STEM colleges often fail to under-
stand the relationships among their scientific engage-
ments and career preparation and college curriculum
prerequisites and electives that involve the study of
the humanities. Disavowing the Western metaphysical
binary system that has produced hierarchical aims both
within and without college-level humanities, I propose
a revisionist English curriculum framework that makes
English studies more relevant to current pedagogical trends in cross-disciplinary praxis.

Empirical data shows that courses such as Literature of Science and Composition for STEM Majors are sustained, successful interventions in bridging the gap between the sciences and the humanities. Undergraduate STEM majors enrolled in English-related courses that are specifically tailored to their scientific projects demonstrate nuanced, qualitative foci in their scientific career objectives. Essentially, these interdisciplinary course interventions ask STEM students to consider what literary writings teach us about scientific thought and vice versa and how two disciplines so frequently opposed to each other may be fruitfully juxtaposed.

**OR33. Preserving the Professoriate by Broadening Participation in STEM Research Careers through Collaborative Preparing Future Faculty Programs**

Etta M. Ward, Indiana University-Purdue University, Indianapolis
Nelson Soto, Indiana University-Purdue University, Indianapolis

Universities and colleges are currently in a significant transformation period that is redefining the way graduate students view faculty life and how they must be prepared to take on the professoriate. In addition, many students are now finding faculty life less attractive as a career choice. This session will explore why and how Preparing Future Faculty programs have to be strengthened by cross-campus collaborations that allow for a more holistic approach to preparing future faculty in order to combat the waning interest of graduate students toward entering the professoriate and to help them become fully prepared for faculty life.

The IUPUI Preparing Future Faculty (PFF) program is designed to introduce advanced graduate students and postdoctoral fellows to the full range of professional responsibilities in research, teaching, and service that will be encountered in the academy. As part of a larger effort to expand professional development in graduate education, the IUPUI PFF program objectives are to supplement the academic credentials of graduate students, enhance marketability of PFF participants, support schools and/or departments in producing more effective and knowledgeable future faculty, and provide the best possible preparation for future faculty in collaboration with each individual’s school and/or department.

The IUPUI PFF program was established based primarily on a national movement spearheaded in 1993 by the Association of American Colleges and Universities and the Council of Graduate Schools to address a need to prepare graduate students for future faculty careers. Most commonly, doctoral programs are research focused and not designed to provide guidance for those interested in faculty careers. The PFF program is intended to help potential faculty by offering opportunities to gain knowledge and experience in teaching and service as well as in research. Universities and colleges are increasingly interested in hiring new faculty who are fully prepared to excel in all areas of endeavor. Since these changing expectations may not be addressed in all doctoral programs, the national PFF movement came to fruition.

According to a 2002 ASHE presidential address presented by Ann E. Austin entitled “Creating a Bridge to the Future: Preparing New Faculty to Face Changing Expectations in a Shifting Context,” universities and colleges are currently in a significant transformation period, which is redefining the way in which graduate students view faculty life and how these students must be prepared to take on roles of the professoriate. She encourages universities and colleges to take a more holistic approach to preparing future faculty by forging partnerships and developing programs that will in the long run combat the waning interest graduate students have toward entering the professoriate and to help them become fully prepared for faculty life.

**P61. Enhancing the Graduate and Postdoctoral Experiences at the University of Michigan to Foster a Diverse Workforce**

Shannon Watt, University of Michigan

The career pipeline for women and underrepresented minorities in science, technology, engineering, and math (STEM) is known to leak at all stages, from pre-school through the professional ranks, due to the self-selection of qualified candidates out of technical careers. The pipeline in chemistry, particularly to academic research careers, hemorrhages before, during, and after PhD study. As graduate students and postdoctoral associates face imminent decisions about pursuing STEM careers, it is imperative to repair this leak, retain students and postdocs already “in the pipeline,” and establish underrepresented groups in scientific careers by developing programs that focus on engaging and equipping female and minority PhDs-in-training and recent PhD graduates to attain their personal and professional goals. While successful programs exist to promote and support women and minorities from preschoo through the workplace, such endeavors are rare at the graduate and postdoctoral levels in chemistry.

In collaboration with the University of Michigan (UM) ADVANCE and Women in Science and Engineering (WISE) programs, a graduate student and postdoctoral associate professional development program has recently been created in the UM Chemistry Department. The project has been designed to have two complementary focus areas: assessment and program
development. A confidential online survey was recently administered to assess the career goals, department experiences, and professional needs of all graduate students and postdocs, particularly women and members of underrepresented populations. The data from this survey is informing the activities of a student- and postdoc-led departmental organization, which builds on the successes of a support program, previously co-founded by the author, for female chemistry graduate students at a research university in the southeastern US. The objective of the UM departmental organization is to develop data-driven programs and policies to engage, enable, and inspire graduate students and postdocs to achieve their full potential. One key goal of this initiative, which is funded by an NSF Discovery Corps grant, is to work with all interested members of the department community towards repairing the leaky pipeline while enhancing the graduate and postdoctoral experiences for chemists of all backgrounds.

P62. Process and Outcome Evaluation of the MARC U*Star Program at UMBC
Tatiana V. Weise, University of Maryland, Baltimore County
Metin Ozdemir, University of Maryland, Baltimore County
Jackie King, University of Maryland, Baltimore County
Kenneth Maton, University of Maryland, Baltimore County

The MARC U*STAR Program at the University of Maryland, Baltimore County (UMBC) is a research training scholarship program for undergraduate students majoring in the sciences, engineering and mathematics. The program aims to increase the number of students from underrepresented groups who pursue a PhD degree and career in biomedical research or mathematics. The program is funded by NIGMS (National Institute of General Medical Sciences)/NIH (National Institutes of Health). Students are eligible for acceptance to the MARC U*STAR Program if they are full-time students at UMBC with a major related to the biomedical sciences, have completed a minimum of 60 college credits, have a minimum cumulative GPA of 3.2, and plan to pursue a PhD and a career in biomedical research or mathematics. Students must also be citizens, noncitizen nationals, or permanent residents and demonstrate an interest in the advancement of underrepresented minorities in the sciences.

Key program components include financial support, paid research experience, research mentoring, multi-faceted support from MARC program staff, and membership in a community of students interested in pursuing graduate study in the sciences. The program also provides academic advising, administrative support, professional development activities, and preparation for graduate school. The purpose of the current study is to examine the effectiveness of the program and key aspects of the student experience.

For the outcome analysis, the 180 students who entered the program since its inception in 1998 were compared to a sample of students who were accepted to UMBC’s Meyerhoff Scholars Program as freshmen but chose to attend another university. Comparison students selected had overall and major GPAs after two years of college comparable to those of MARC students, and were majoring in comparable disciplines. Primary outcome measures were overall GPA, STEM GPA, GPA since joining the program, and entrance into a STEM PhD Program. For the process evaluation, responses to alumni surveys completed in Spring 2009 were analyzed as well as responses to process evaluation surveys, over the years, of students currently enrolled in the program. These analyses indicated consistently high ratings of MARC program components.

Findings indicate that the MARC Program continues to be effective in helping the MARC trainees to maintain high grade point averages while taking increasingly difficult courses in the biomedical sciences and while participating in research. Students who graduated from the program were accepted to PHD and MD/PhD programs at a higher rate than the Declined Comparison group. The MARC alumni rated the majority of the program components as either very helpful or helpful. Academic interaction with MARC/Meyerhoff Program participants, financial support (stipends, traveling expenses), opportunity to attend conferences, opportunities for oral and poster presentations, and research experiences with mentors were reported to be the most helpful aspects of the MARC program. Implications of the findings for efforts to enhance the success of minority students in STEM fields are discussed.

OR34. Broadening Participation in Undergraduate Research: Principles and strategies for designing inclusive programs
Jodi Wesemann, American Chemical Society

A forthcoming publication from the Council on Undergraduate Research (CUR) focuses on ways in which campuses can broaden participation in undergraduate research, scholarship, and creative activity among students of color, students with disabilities, and low-income students. The book draws on a set of program design principles developed by the Building Engineering and Science Talent (BEST) working group (www.bestworkforce.org) and features campuses that are using these principles in building or reforming their undergraduate research programs. In this session, participants will learn about the principles – which focus
on institutional leadership, peers support, and continuous evaluation – as well as campus illustrations of the principles in practice. They will be asked to examine their own campus programs, identify the ways in which each of the principles have (or have not) been implemented, and work in small groups to explore strategies to implement or strengthen the principles.

**P63. Minorities Striving and Pursuing Higher Degrees of Success in Earth System Science Professional Development Program (MS PHD’S): A National Professional Development and Mentoring Network**

Vivian W. Whitney, Institute for Broadening Participation
Ashanti Johnson Pyrtle, Institute for Broadening Participation

The Minorities Striving and Pursuing Higher Degrees of Success in Earth System Science Professional Development Program (MS PHD’S) was established in 2003 by and for underrepresented minorities to facilitate increased and sustained participation within the Earth system science community funded by NASA and NSF.

- Fourteen (14) minority Earth system scientists served as Program mentors and one-hundred fifteen (115) minority and non-minority scientists served as Meeting Mentors to student participants.
- Representatives from fifty-six (56) agencies and institutions provided support and exposure to MS PHD’S student participants.
- One-hundred twenty-six (126) undergraduate and graduate students from underrepresented populations have participated in the MS PHD’S program. Because of funding limitations, slightly less than 50% of the applicants were selected to participate.
- Participants belong to a variety of ethnicities, sixty-eight (68) participants self-identified as African American; thirty-four (34) as Puerto Rican; nine (9) as Hispanic/Mexican American, ten (10) as Native American and one (1) each as African, Asian, Pacific Islander, Hispanic and Multi-Ethnic.
- During the five (5) year span of MS PHD’S programming, sixteen (16) student participants completed BS degrees, twelve (12) completed MS degrees and ten (10) completed the Doctoral degrees.

How did MS PHD’S establish meaningful engagement of the science community to enhance diversity within the Earth system science community? This case study reveals replicable processes and constructs to enhance the quality of meaningful collaboration and engagement. MS PHD’S adopted the management framework described by Abraham H. Maslow (1943), which used the term “self-actualization” to describe a state when human potential may be optimally reached via a hierarchy of needs. MS PHD’S provides its participants with a three phase framework that effectuates the “self-actualization” through group activities, academic exercise, and mentor-mentee partnerships offering the support and professional experiences needed to become successful geoscientists.

Phase I: Students participate in mentor partnerships and community building activities. Initial mentor-mentee partnerships consist of interactions, networking, and professional development, while attending the American Geophysical Union Fall Annual Meeting. Phase II: Each participant will attend the meeting that most closely aligns with his or her specific academic and professional interests at one of the MS PHD’S Organizational Partners’ meetings. Phase III: The final phase consists of “capstone” activities, which includes visits to the National Academies, the headquarters of various government agencies, and the NASA Goddard Space Flight Center. Each student participant receives a scholarship award of $1,000.00 upon completion of the program.

A hierarchy of greater interdisciplinary unity and social concern creates an environment that nurtures geosciences in all socioeconomic realities to further the geosciences pipeline sustainability. Actualization towards broader impact or diversity may require complex support systems that nurture the well being of an individual through earth science experiences and exposure.

**OR35. The Choices Black STEM Students Make: Graduate school versus industry**

Dawn G. Williams, Howard University
Lorraine N. Fleming, Howard University
Venetia Dover, Howard University

The disproportionate representation of Blacks in STEM fields suggests a need to increase the number of STEM degrees, both at the baccalaureate level and beyond, that are earned by Blacks. Subsequently, additional research is needed to examine the career path of minority STEM students after they complete the baccalaureate degree, determine when they make those decisions, and why they make those decisions. Utilizing Social Cognitive Career Theory, this paper will present data from a National Science Foundation funded, mixed method longitudinal study conducted at a Historically Black College (HBCU) during the Fall 2006 to the Spring 2008 academic years. Data was collected via electronically administered surveys, focus group interviews, and semi-structured one-on-one interviews. This study is unique because it includes a minority population of high achieving STEM students and it utilizes multiple data collection methods to examine these students.
over the course of two years, during students’ senior year as well as their first year beyond completion of the baccalaureate degree. There are few studies in the empirical literature that utilize a longitudinal approach to examine minority STEM students during both undergraduate and post-baccalaureate years. Further, this study is significant because it enables educators to better understand how STEM students navigate their post-BS career choices, identify the conceptual foundations students need in order to choose to pursue graduate STEM education, understand this transitional experience across gender lines and discipline, and transform the findings and insights gained from this research to inform practice. Most importantly, however, we aim to contribute to the literature by expanding the knowledge base of this understudied group (i.e., Black students at a historically Black university) which will allow the STEM community to identify where additional research work is needed and what “the vision of the possible” for intervention programs may look like. Study findings revealed that academic discipline play a significant role in the post-baccalaureate decisions. Further, there are several social factors that influenced students’ self-efficacy beliefs and subsequently impacted the outcome expectations and goal mechanisms for the study participants. Findings revealed a diverse array of decisions and the impact of access to mentorship, family support, research opportunities, and employment internships. Overall, study findings shall serve to inform STEM educators how the various activities and factors (i.e., academic climate, mentorship, summer research and internship experiences) can influence the pipeline of STEM students that pursue advanced degrees.

P65. African-American female doctoral students and cross-cultural mentoring relationships: A case for intercultural competence and cognitive frame-shifting
Lisa E. Wills, University of South Carolina

Barriers to matriculation experienced by African American female doctoral students include isolation as the only one or one of a few in a program, lack of valuing research agendas that benefit communities of color by non-minority faculty, and the challenge of overcoming negative stereotypes of students of color (e.g., Baez, 1999; Girves, Zepeda, & Gwathmey, 2005; Pinel, Warner, Chua, 2005; Steele, Spencer, & Aronson, 2002). These barriers attest to a present-day environment within academia that is still very much hostile towards the presence of African American women and devalues their voices (e.g., Fries-Britt & Kelly, 2005; Packer, Jay, & Jackson, 2007; Schwartz, et al., 2003.) Packer et al. (2007) emphasize that these challenges negatively impact psychological well-being in regards to self-acceptance, sense of autonomy in thought and action, the establishment of positive, quality relations with others, and continued growth and development. Such compromised psychological well-being can lead to depression, anxiety, and high blood pressure, health factors that present yet another set of barriers to matriculation (Packer et al., 2007). In response, this mixed-methods study considers how mentoring supports or constrains...
a doctoral students’ well-being and success, and how intercultural competence affects the outcomes of these relationships. The results of the study suggest cognitive frame-shifting as a mechanism for improving the students’ doctoral experiences and sense of well-being (Wills, 2008).

The participants of the study are two African American women, ages 28 and 50, enrolled in doctoral programs in a southern predominantly white institution. Participants were asked to give general impressions of their doctoral experiences, to discuss the faculty members inside and outside of their department that influence their doctoral experience, and to talk about the various challenges they face in their programs. The participants then completed the Intercultural Development Inventory (IDI) (Hammer & Bennett, 2001a) and a demographic questionnaire. Interviews were transcribed and coded according to both the interview questions and themes that arose from the data that pertained to emotional challenges during the doctoral experience, conscious strategies for dealing with those challenges, and the ways in which faculty supported or constrained the participants’ coping with those psychological challenges.

Two very distinct themes arose from the qualitative data. Their interviews spoke strongly of emotional challenges as well as of two very different strategies for handling the psychological distress that accompanies their doctoral experiences. That is, one participant is very much a loner through her program; whereas, the other student has actively constructed and regularly engages in dialogue with what the researcher refers to as a cadre of mentors.

The quantitative data in the form of the IDI results validated the participants’ qualitative responses. Overall, the participants’ developmental intercultural sensitivity scores are quite similar as are their scores on the Adaptation Scale of the IDI. Of notable interest, however, are their startlingly different scores on the components of the Adaptation Cluster. Specifically, the participants’ Adaptation Cluster component scores for “cognitive frame-shifting” and “behavioral code-switching” reflect the different strategies employed and attitudes of the individual participants as revealed in the interviews. Thus, the results of this pilot study suggest that strategic engagement between African American female doctoral students and their mentors over issues of cultural difference with the shared goal of cognitive frame-shifting is a plausible tactic for improving the experiences of this population of students. Moreover, the interface between the qualitative and quantitative results suggests that an investigation of the neural correlates of intercultural sensitivity are worthy of a more neuropsychophysiological-oriented investigative approach.

P66. Exploratory Comparison of the Student Engagement Experiences of Underrepresented Minority Students in STEM at PWIs versus HBCUs
Mycah J. Wilson, University of Maryland, College Park

In an effort to respond to the underrepresentation of some minority groups in STEM majors and employment, governmental agencies and affiliates have developed initiatives to financially support institutional efforts to underrepresented minority participation. While progress has been made, a disproportionately larger number of doctoral recipients earned their baccalaureate degrees from HBCUs (NSF, 2008a). Specifically, HBCUs represent 3% of all colleges and universities nationwide, graduate 22.3% of all minority bachelor’s degrees in science and engineering and are the baccalaureate institution of 24% - 33% of science and engineering doctorate recipients (DOI, 2008; NSF, 2008a, NSF, 2008b). For example, HBCUs account for seven of the top ten institutions producing baccalaureate degrees in engineering and biological and biomedical science for African Americans (Borden, 2008). The purpose of this research is to explore and compare the engagement experiences, through the means of a literature review, of underrepresented minority students at HBCUs and PWIs. Student behaviors related to engagement include study habits, peer involvement, interaction with faculty, time on task, and motivation while institutional conditions related to engagement include, the first year experience, academic support, campus environment, peer support, teaching, and learning approaches (Kuh, Kinzie, Buckley, Bridges and Hayek, 2007). Literature concerning this comparison could shed light on the factors that may contribute to this striking over-representation.

National Science Foundation (NSF). (2008b). Women, minorities, and persons with disabilities. C-9 Bachelor’s degrees awarded by historically black col-
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P67. Broadening the Base of Competitive Applicants for Graduate Training

Valerie P. Wilson, Brown University, Leadership Alliance

Anika Bissahoyo, Bradley University
Barbara Kahn, Brown University, Leadership Alliance
Joel Oppenheim, New York University Medical School

Many research institutions host "capstone" research experiences for undergraduates. Often critics contend that these programs merely glean students prepared by other programs and are not expanding the talent pool. Therefore, the challenge to the academic community is to broaden the base of underrepresented minority students being prepared for graduate training programs. The Leadership Alliance is an academic partnership that has dual goals for its Summer Research- Early Identification Program (SR-EIP): 1) increasing the competitiveness of undergraduate honors students for graduate training programs; and 2) providing talented, but inexperienced students with a critical first undergraduate research exposure. Accomplishing the latter goal has the potential to broaden the base of applicants for graduate programs and work to close the parity gap in training at the PhD training level.

Within the SR-EIP participant data base we asked: What are the sources of the first time participants in the SR-EIP and what are their prior research experience profiles? Data for this study were derived from SR-EIP application information provided by students who applied directly to the Leadership Alliance and who were selected for undergraduate research placement. From 2001-2005, 517 participants met this criteria. Of this number, 20 students participated in the Leadership Alliance in multiple years; therefore the analysis only includes their information at the time of their first participation in the program, resulting in 497 participant profiles upon which the subsequent analyses are based. Data reviewed include student classification (by expected graduation date), race/ethnicity, gender, academic major, undergraduate institution, and enrollment in undergraduate scholarship programs and prior summer research experiences.

From 2001-2005, nearly 60% of the students participating in the SR-EIP were rising seniors (two or less semesters remaining before award of a baccalaureate degree); 40% were students who were rising sophomore or rising juniors. We were not surprised to find that among students who were not seniors,
the SR-EIP was the first external summer program for nearly 60% of them. However, among rising seniors, we were surprised to find that the SR-EIP was the first external summer experience for nearly half of them (133 “inexperienced” vs. 139 “experienced”). Further analyses were conducted on the gender, ethnicity, and undergraduate origins of this inexperienced rising senior population. The four principal findings about the “inexperienced” seniors are: 1) there are variations in inexperience by gender across disciplines; 2) the inexperienced population is not derived from a single source of institutions; 3) students in the social sciences and humanities are more likely not to have had an external research experience by senior year; 4) there are significant proportions of inexperienced seniors in the biological, physical sciences and engineering disciplines. The Leadership Alliance is not only recruiting the seasoned undergraduate researcher, but also is reaching a significant proportion of “inexperienced” students of color potentially interested in research careers who are entering their senior undergraduate year. Providing summer research experiences for this population is essential to broadening the base of participation of those seeking graduate training.

**OR36. Enhancing the Talent Pool: a Multi-Institutional Approach**
Valerie Wilson, The Leadership Alliance

The Leadership Alliance, currently a thirty-three member multi-institutional academic partnership, originated in 1992 as an initiative among research institutions and minority-serving institutions to encourage enrollment of talented underrepresented minority students into competitive graduate programs. While many of the research institutions had begun already some form of summer undergraduate research programs on their campuses, the group concurred that a collaborative venture would offer greater success through the sharing of resources, ideas and talents. Since that time, the strategies employed by the Alliance have been focused on the identification, mentoring and progression of young researchers to prepare them for positions of leadership in the academy and other sectors. The presentation will focus on some aspects of our collaborative venture. Specifically the presentation will highlight three aspects of the Leadership Alliance programming: 1) The core elements of the summer research identification program - research, communication skills and professional development opportunities; 2) the long term assessment of student satisfaction with regard to improvement in knowledge, usefulness of program and commitment to research careers over the past seven years; and 3) the establishment of developmentally appropriate support for Leadership Alliance alumni at critical transitions along the training pathway(s). The role of mentors and administrative leadership will be described. The presentation will also offer ‘lessons learned’ to sustain programmatic efforts over time that may be adaptable for programs with similar missions, whether based in single institutions or alliances of varying size.

**OR37. Decoding Classroom Dynamics using H.F.R.T. to Develop a Triad of Interventions That Engage and Retain Minority 5th-12th grade Students in STEM Fields**
Garen S. Wolff, Wayne State University School of Medicine

A plethora of programs and initiatives have been implemented to increase the number of underrepresented minorities in STEM (science, technology, engineering, and mathematics) fields. Organizations such as the National Institutes of Health (NIH) and National Science Foundation have targeted underrepresentation by fostering opportunities in biomedical and summer research internships respectively. Citywide programs, such as Detroit Area Pre-College Engineering Program (DAPCEP), provide STEM activities in coordination with universities and engineering companies for K-12. The fruit of these labors is evident in the 6.4 to 14.1 percent increase in bachelor’s degrees in the biological and agricultural sciences, and 5.6 to 14.0 percent in physical sciences from 1977 to 2005. However, these numbers are disproportionately lower than the general population; consequently contributing to the disparity at the doctorate level and science and health workforce.

This unique qualitative study was conducted over 4 months and included 75 students between the ages of 12-18 in the city of Detroit. It is based on classroom observations, activities; and student, teacher, parent interviews and surveys. Two middle and two high schools were selected from charter schools. Students that participated in supplemental academic programs were also included. Classroom dynamics were thoroughly examined through the categorization of students as Hardworker, Follower, Rebel and Turtle (H.F.R.T.). Analogous to a feedback mechanism, each group significantly inhibits and activates the other, thus impacting the overall system, or in this context, the educational experience of a class. To test this theory of categorization, a crossword puzzle was distributed to students with a noted completion time of 45 minutes. The “Hardworker” worked fast, diligently and often assembled in teams with 4-5 other hardworkers to produce a score of 85-90 percent. The “Rebel”, consistently 1-2 students, achieved scores of 10-30 percent due to the refusal or perhaps inability to complete the assignment. The “Follower”, 2-3 students, is the recipient of peer pressure exerted by the rebel. Often this results in an incomplete assignment with scores of 40-60 percent.
The “Turtle”, as the name implies, worked slow, steady and quite frequently alone. This slow pace could be due to a learning disability or mere need for additional time to conceptualize ideas. These 1-2 students on occasion seek assistance from a “Hardworker”, resulting in scores of 60-85 percent. It is evident in our interviews, surveys and classroom observations that math and science polarize students and further validate H.F.R.T. The identification of these groups provides insight on the differentiation of academic achievement among students in the same class. Dissolution of these groups must occur in order to foster academic parity and engage all students.

A triad of interventions “academic workshops; parental involvement strategies; and innovative teaching techniques and activities” have been developed from this study with the goal of (1) fully engaging students, 5th-12th in math and science (2) retaining this interest and (3) ensuring preparedness for the pursuit of STEM fields in college and beyond. The predominant sentiment expressed in student interviews is that science and math are “boring” and not “fun”. The problem does not lie with the concepts, but method of presentation. This study found that when relatable examples and projects were incorporated into lessons, students became more eager to learn and challenge themselves. Interests were enhanced by speaker series that highlight minorities in STEM fields. However, the most influential force found in this study was the parent/guardian-child paradigm. Only through continual dialogue with parents can the appreciation for education, especially subjects perceived to be difficult, be encouraged and instilled.

**OR38. Fostering Minority Scientists: The Role of Belonging and Goal Orientation**

Anna Woodcock, Purdue University  
Paul Hernandez, University of Connecticut  
Mica Estrada-Hollenbeck, California State University, San Marcos  
P. Wesley Schultz, California State University, San Marcos

For almost half a century, hundreds of Minority Training Programs (MTPs) have been implemented in colleges and universities around the country. The goal is to increase the racial/ethnic diversity of students majoring in the sciences, and ultimately to increase the diversity of the research community. Despite these efforts, ethnic minorities are significantly under-represented in doctoral-level research careers across the sciences. In this paper, we report data on talented minority science students enrolled in two large intervention programs; the National Institutes of Health's (NIH) RISE and MARC programs. We compare the outcomes of program-supported students with a matched control group of equally talented and motivated minority students not enrolled in any formal training or intervention program. We track students over time (through college and beyond), to explore whether these programs are effective at retaining minorities in the sciences, thereby increasing their chances of pursuing a biomedical research career. We also investigate the mechanisms via which these effects occur.

Drawn from a larger panel, two years of data from a sample of 163 pairs of matched undergraduates (N=326) who were either continuously a member or non-member of a targeted MTP indicates that continued membership in such programs is predictive of sustained and increased intention to pursue a research career in the sciences. As reported previously, there is a significant program effect, t(103) = 4.74, p < .001, with MTP students reporting greater intention to pursue a science-related research career (M=8.5, SD=2.29) than matched non-MTP students (M=6.92, SD=2.77). There is also a significantly greater feeling of belonging in the scientific community for RISE and MARC students than those not enrolled in such a program (t(103) = 3.4, p < .001. It is clear that membership in an MTP such as RISE or MARC fosters a sense of belonging and sustained intention to pursue a scientific career; we now start to explore the process by which this may be occurring and ask how a sense of belonging to the scientific community translates into motivation to pursue scientific career goals.

An individual's concerns about belonging in evaluative environments can have negative impacts on performance via a feedback loop that involves appraisals of the environment and the motivation to respond (Cohen & Garcia, 2008). Academic environments are strongly associated with the ways goals are pursued. Achievement goal theory describes two broad categories of goals: task or mastery goals that are defined by developing ability, and goals that are defined by the demonstration of ability (Midgely et. al. 1998). “Achievement goals (task/mastery goals)” are predictive of academic persistence and achievement (Grant & Dweck, 2003), and the mediate the relationship between school environment and academic achievement (Roeser, Midgley, and Urdan, 1996). “Task goal orientation is also associated with feelings of belonging in academic environments.” What is yet to be fully understood is the impact of Academic climate on the pattern of associations between belonging, the formation of a task goal orientation, and outcomes such as persistence and performance. “We explore the relations between task goal orientation (the desire to learn and master material), belonging, and intention to pursue a scientific research career, for both RISE and MARC students and students not enrolled in a MTP.” Interestingly the relations were not consistent for program and non-program students. A moderated mediation effect was found in the relation between belonging and intention.
to pursue the sciences as a career, whereby perception of belonging in the scientific community was associated with task goal orientation and increased intention to pursue a scientific career differently for MTP members and non-members. Since belonging concerns are particularly relevant for members of under-represented groups, the impact of these findings on interventions aimed at increasing diversity are discussed.

**P68. Perceptions of Departmental Climate: Differences by Sex**

Monica J. Young, Syracuse University
John W. Tillotson, Syracuse University

Recently, national attention has focused on the role of engineering and technology in refueling the economy in the United States. In the widely publicized report, Rising above the gathering storm: Energizing and employing America for a brighter economic future, the authors suggest that “without high-quality, knowledge-intensive jobs and the innovative enterprises that lead to discovery and new technology, our economy will suffer and our people will face a lower standard of living” (NAS, 2007, p. 1). For decades, excellence in building and sustaining institutions of higher education that attract science and engineering talent from all over the world has defined this nation, but other countries have been working diligently to catch up. As the number of respected institutions of higher education increases across the globe, the field of candidates for faculty positions will become more limited. This is particularly important in engineering fields where the number of doctoral degrees awarded from universities in the United States has increased from just over 5,000 in 2002 to 6,500 in 2005, but not because of increased numbers of US citizens completing the degree, rather a 50% increase in the international student population (NSB, 2008). With the limited supply of US doctoral candidates available for faculty positions at US institutions, a concerted effort is needed to both increase the number of individuals who pursue a career in academia in STEM fields as well as retain new faculty members, particularly in engineering. Supporting the potential of women, underrepresented minorities, and persons with disabilities in STEM research and education must be a priority for the United States to continue to be competitive globally and prosper (NSF, 2004).

Engineering as a field has suffered most seriously from the shortage of women entering and advancing through the STEM education pipeline. The National Science Board (2008) in its recent Science and Engineering Indicators 2008 found that, although the percentage of women earning doctoral degrees in engineering fields has increased from a low of 6% in 1985, women still lag far behind men in doctoral degrees in engineering, comprising just 18% of total degrees awarded (NSB, 2008). At earlier levels of education, these numbers are comparable, where the percentage of women completing masters and bachelors degrees in engineering in 2005 was 22 and 20 percent, respectively (NSB, 2008). The attrition of women as compared to men on the path to the PhD results in the ever-widening gap in the numbers of women achieving advanced academic positions in STEM disciplines causing an overall ripple effect on future generations (McIlwee & Robinson, 1992).

The goal of this qualitative research study was to compare the perceptions of male and female engineering professors concerning the departmental and institutional climate within their respective university engineering programs and its combined influence on female engineering professors. The intent was to determine the commonalities and differences that exist within and between these two groups to gain additional insight into the problem of underrepresentation of women in STEM fields. The researchers explored the following broad question: how do male and female engineering professors compare regarding their perceptions of the influence of the departmental and institutional culture on the career development of women engineering faculty members? The themes that emerged from the interview data fall into two major categories: challenges associated with tenure and promotion and climate related to faculty collaborations within mechanical engineering departments. Within these categories, there were a number of ideas that were repeated in multiple interviews. As far as tenure and promotion are concerned, the areas most frequently discussed include: the process of tenure and promotion and the similarity in process for all faculty members; a potential double stigma for female faculty member hires whereby they might have the impression they were hired simply because they are female; and, the issues associated with extension of the tenure clock for family purposes. Common themes related to collaborative climate in the department of mechanical engineering were: issues related to grant and publication collaboration; “rewards” associated with being a strong female faculty member; and, the need for a critical mass of female faculty members to facilitate a positive departmental climate.


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Anthony L. DePass, Co-Chair

Anthony DePass is the Assistant Vice President for Faculty Research Development at the Brooklyn campus of Long Island University. He has extensive experience in the administration and evaluation of programs aimed at faculty and student development. Additionally, he is the Principal Investigator and Director of the Long Island University MBRS SCORE program and a MARC (T36) award to the American Society for Cell Biology, where he currently serves as the Chairman for the Minorities Affairs Committee. Under his leadership, the ASCB MAC runs development programs targeting individuals from the undergraduate to the faculty levels, where several hundred participants representing over 140 institutions have been directly impacted. One activity under the ASCB MARC program is the annual conference on Interventions that Encourage Minorities to Pursue Research Careers. Dr. DePass has served as Chair and Co-Chair for the 2007-09 conferences that have served as venues for the dissemination of scholarship that impact training programs.

He has extensive evaluation and review experience. He is an external evaluator on several funded training programs, and through service on review panels for the National Institutes of Health, National Science Foundation, US Department of Agriculture and other non-federal organizations has reviewed numerous grants and served on several site visit teams in the assessment of many programs.

Daryl E. Chubin, Co-Chair

Daryl E. Chubin became founding Director in 2004 of the Center for Advancing Science & Engineering Capacity at the American Association for the Advancement of Science (www.aaascapacity.org). Prior to joining AAAS, he was Senior Vice President for Research, Policy & Programs at the National Action Council for Minorities in Engineering, after nearly 15 years in federal service. Posts included Senior Policy Officer for the National Science Board; Division Director for Research, Evaluation and Communication at the National Science Foundation; and Assistant Director for Social and Behavioral Sciences (and Education) at the White House Office of Science and Technology Policy. He began his federal career in 1986 at the congressional Office of Technology Assessment (Science, Education, and Transportation Program, until 1993). He has also served on the faculty of four universities, 1972-86, achieving the rank of Professor at the Georgia Institute of Technology.

Dr. Chubin is the author of eight books and numerous policy reports and articles on science policy, education policy and evaluation, and careers and workforce development in science and engineering. He is a AAAS Fellow, a Fellow of the Association for Women in Science, a 2006 QEM Giant of Science, a Sigma Xi Distinguished Lecturer 2007-09, a recipient of the Washington Academy of Sciences’ 2008 Social and Behavioral Sciences Award, an alumnus member of three nonprofit boards, an editorial advisor for three journals, a long-time consultant to corporate and philanthropic foundations, a member of various committees of The National Academies, and has been an adjunct professor in the Cornell in Washington Program since 1991.
Linda Blockus, Vice-Chair

Linda Blockus is serving as a Fellow of the AAAS Center for Advancing Science & Engineering Capacity (Capacity Center) during 2008-2009, while taking a one-year leave of absence from the University of Missouri (MU). Dr. Blockus serves as the Director of the Office of Undergraduate Research at MU, the land grant and flagship research university for the state of Missouri. In this capacity, she directs a number of academic year programs for students, as well as summer research programs for over 70 MU and non-MU students which have been supported by grants from NSF, HHMI, USDA ARS and the US Army. She is currently serving as co-PI on an Initiative for Maximizing Student Diversity (IMSD) grant from NIGMS.

Before her work at Missouri, Dr. Blockus served as the academic administrator for the Department of Biology at Boston University which included responsibilities for both the undergraduate and graduate programs. Dr. Blockus earned her baccalaureate degree in Biology from Dartmouth College and her master's in Educational Leadership from Boston University. Her PhD in Educational Leadership and Policy Analysis (Higher Education) was granted from the University of Missouri. During her doctoral study, she spent a year at Stanford University as a visiting graduate student and research assistant at the Stanford Institute for Higher Education Research. An active member in the Council on Undergraduate Research (CUR), Dr. Blockus was a founding member of the Undergraduate Research Program Directors division and remains active in the division's leadership.

Renato Aguilera

Renato Aguilera obtained his BS and MS degrees in Microbiology from the University of Texas at El Paso (UTEP) and his PhD in Immunology from UC Berkeley in 1987. He subsequently became a tenured professor in the Department of Molecular, Cell and Developmental Biology at UCLA. In 2002, he joined the Biological Sciences Department at UTEP where he serves as the Director of the Biology Graduate Program. Dr. Aguilera's research is in the area of Molecular Biology/Immunology, and his research has been funded by grants from the National Science Foundation, the National Institutes of Health and research foundations. Dr. Aguilera has an active research laboratory at UTEP and is the director of the RISE Scholars and SCORE programs. At the national level, Dr. Aguilera served on Board of SACNAS, the Board of Scientific Advisors of the NIEHS, and is currently serving as a member of the Minority Affairs Committee of the American Society for Cell Biology.

Martin M. Chemers

Martin M. Chemers is Campus Vice-Provost and Professor of Psychology at the University of California, Santa Cruz. Dr. Chemers came to UC Santa Cruz in 1995 from Claremont McKenna College to accept an appointment as the Dean of Social Sciences and Professor of Psychology. At UC Santa Cruz, he also served as Interim Executive Vice-Chancellor and Provost (December 2003-April 2004), Acting Chancellor (April 2004-February 2005), and Chair of Psychology (2006-2009). Prior to his tenure at UC Santa Cruz, he was the Henry R. Kravis Professor of Leadership and Organizational Psychology and Director of the Kravis Leadership Institute at Claremont McKenna College. He was previously on the faculties of the Universities of Illinois, Delaware, Washington and Utah where he was chair of the Department of Psychology.

Since receiving his PhD in Social Psychology from the University of Illinois in 1968, he has been an active researcher in the areas of leadership, culture and organizational diversity. His current research is focused on psychological factors that affect the commitment and success of underrepresented minority students in science.

Adam Fagen

Adam P. Fagen is a Senior Program Officer with the Board on Life Sciences of the National Research Council (NRC). He came to the National Academies from Harvard University, where he most recently served as
Preceptor on Molecular and Cellular Biology. Dr. Fagen has served as study director for a number of projects related to science education and training, including the first Understanding Interventions conference: *Understanding Interventions that Encourage Minorities to Pursue Research Careers: Summary of a Workshop* (2007); the National Academies Summer Institute on Undergraduate Education in Biology; and an ongoing study on undergraduate education in agriculture.

Beyond education, Dr. Fagen has also directed NRC studies on developing new antimicrobial therapeutics, biomolecular materials and processes, and the National Academies’ *Guidelines for Human Embryonic Stem Cell Research*. He is Study Co-Director for the National Academies Human Embryonic Stem Cell Research Advisory Committee and Research at the Intersection of the Physical and Life Sciences.

Before coming to the National Academies, Dr. Fagen served as co-director of the 2000 National Doctoral Program Survey, an online assessment of doctoral programs organized by the National Association of Graduate-Professional Students, supported by the Alfred P. Sloan Foundation, and completed by over 32,000 students. He earned his PhD in molecular biology and education from Harvard, working on issues related to undergraduate science courses; his research focused on mechanisms for assessing and enhancing introductory science courses in biology and physics to encourage student learning and conceptual understanding, including studies of active learning, classroom demonstrations, and student understanding of genetics vocabulary. He also received an AM in molecular and cellular biology from Harvard, based on laboratory research in molecular evolutionary genetics, and a BA from Swarthmore College with a double-major in Biology and Mathematics.

**Rachel Ivie**

Rachel Ivie is Assistant Director of the Statistical Research Center (SRC) at the American Institute of Physics. She received her PhD in Sociology from the University of North Carolina at Chapel Hill, where she specialized in research methods, statistics, gender, and the life course. Before coming to the SRC, Dr. Ivie was a Professor of Sociology and taught various courses to undergraduates, including the sociology of gender and research methods. Over the past ten years at SRC, she has specialized in studies of the workforce and diversity in physics. Dr. Ivie has been involved in several US and international efforts to increase women’s presence in physics. Dr. Ivie provides social science expertise in the collection, analysis, and reporting of data—both quantitative and qualitative—about women and minorities in the fields of physics and astronomy.

**Anne MacLachlan**

Anne J. MacLachlan, PhD, is a Senior Researcher at the Center for Studies in Higher Education at the University of California at Berkeley and affiliated with the Department of Molecular and Cell Biology as an evaluator of its NSF REU program. Her research areas for the last 20 years include the issues of women and minorities in science, minority success in postsecondary education, discrimination and bias. She also organizes and gives professional development programs for REU students, which draws on twenty years experience creating and giving employment and professional development programs for graduate students, post-docs and undergraduates.

institutional evaluation of STEM education in the California Community Colleges. Her work has been supported by the NSF, the Spencer Foundation, the Max-Planck-Institute, among others. She is active in campus and community service as a member of the Coalition for Excellency and Diversity at UCB, a reviewer for NIH, Sloan, NSF, and others.

Richard McGee

Richard McGee is the Associate Dean for Faculty Recruitment and Professional Development at the Northwestern University Feinberg School of Medicine. He is developing new approaches to increasing faculty diversity and enhancing professional development of all faculty.

Dr. McGee received his BS in 1971 from the University of Minnesota and PhD in 1975 from the University of Iowa, both in Biochemistry. After 2 years of postdoctoral research at NIH, he joined the faculty of the Department of Pharmacology at Georgetown University. His research interests were in molecular pharmacology and membrane structure/function relationships in neurons. During the next 10 years, in addition to doing basic research, he played an increasing role in graduate student affairs, and developed a strong interest in diversity and development of new approaches to assist students from educationally disadvantaged backgrounds. From 1987-1991 Dr. McGee was the Associate Dean for Student Affairs and Associate Professor of Pharmacology at the Medical College of Ohio. From 1991 to 2003, Dr. McGee joined Mayo Clinic as Associate Dean for Student Affairs, Mayo Graduate School, and Director of the Office of Minority Student Affairs for Mayo Clinic College of Medicine. In addition to leadership roles in the PhD, MD/PhD and Summer Undergraduate Research programs, he created several minority student development programs including a new post-baccalaureate research model funded by the NIGMS Initiative for Maximizing Student Diversity (IMSD). At Mayo, Dr. McGee also helped create, lead, teach in and evaluate the Clinical Research Training Program. From 2003 to 2007, Dr. McGee was the Director of Student Affairs for the NIH Graduate Partnerships Program (GPP) through which PhD students do dissertation research on the NIH campus or collaborative research projects between university and NIH research mentors.

For the past 15 years, Dr. McGee has been interested in the developmental processes that shape young scientists, which led him to develop interview-based qualitative research methods. He is currently leading a multi-year, national study of the career decision-making processes of young scientists in training, funded through the NIGMS “Research on Interventions that Promote Research Careers”. Dr. McGee also is the Program Director for the NIGMS-funded IMSD at Northwestern: “Mentoring for Success: Developing Fundamental Skills for Biomedical Research”.

Laura Robles

Laura Robles serves as Dean for Graduate Studies and Research at California State University, Dominguez Hills. She received her BS and MS degrees from San Diego State University and her PhD from the University of California, Santa Barbara. In 1975, she was hired as a full-time lecturer and in 1976 became an Assistant Professor in the Department of Biology. She later received tenure and promotion to full Professor. In 1980, she became part of the MBRS program and was appointed Program Director in 1986.

Dr. Robles has served as Chair of the Department of Biology, Acting Associate Dean for Student Academic Advancement and past president of the CSUDH chapter of Sigma Xi. She is currently President for the CSUDH chapter of Phi Kappa Phi. She has been Co-Chair of the Institutional Review Board, Graduate Coordinator for the Department of Biology, Co-PI for the Harbor-UCLA Research and Education Institute (REI) MBRS IMSD grant and a member of the CSUDH Foundation Board of Directors. She served two terms on the SACNAS Board of Directors, is a member of the American Society for Cell Biology Minority Affairs and Public Information Committees, and is Chair of the Diversity Issues Committee for the Association for Research in Vision and Ophthalmology. She received the CSUDH Lyle E. Gibson Distinguished Teaching Award and was twice
selected as the CSUDH Outstanding Professor. The Latino Faculty and Staff Association at CSUDH honored Dr. Robles with the Cesar Chavez Aguila Negra Educacion, Justica e Igualdad Award and she received Undergraduate Institution Mentor Award from the Society for Advancement of Chicano and Native Americans in Science. Dr. Robles served on the NIH/NIGMS Minority Access to Research Careers Subcommittee as well as two NIH study sections, including Cell Structure and Function and Retinopathies. She is committed to providing research opportunities to under-served students and promoting their careers in biomedical science.

**Rhonda Vonshay Sharpe**

Rhonda Vonshay Sharpe currently serves as the 2008-09 Fellow at the Institute of Higher Education Law & Governance at the University of Houston Law Center, and is on leave from her position as Assistant Professor of Economics at the University of Vermont. She also serves as the Program Coordinator for the Diversity Initiative for Tenure in Economics at the Research Network on Racial and Ethnic Inequality at Duke University.

Dr. Sharpe has three primary areas of research interest: affirmative action policies and their impact on faculty diversity; the impact of disparate treatment in education policy; and discrimination in labor and sports markets. Her recent articles include *“State of Blacks in Higher Education”* for the National Association for Equal Opportunity in Higher Education, and she has presented papers at more than 40 conferences and seminars throughout the country. In 1996, she co-authored the first examination of the impact of the California Civil Rights Initiative on the University of California System. She is the co-recipient of the 2004 Rhonda Williams Prize from the International Association for Feminist Economics.

Dr. Sharpe earned her PhD in Economics/Mathematics from Claremont Graduate University in Claremont, California. She also holds a master’s degree in Economics from Claremont Graduate University; a master’s degree in Operations Research from Stanford University; a master’s degree in Applied Mathematics from Clark Atlanta University; and a bachelor’s degree in Mathematics from North Carolina Wesleyan College.

**Merna Villarejo**

Merna Villarejo received her PhD degree in Biochemistry from the University of Chicago. At the University of California, Davis, Professor Villarejo conducted research on the molecular mechanisms of adaptation to osmotic stress in bacteria and has consistently worked to improve undergraduate education. As Associate Dean for Undergraduate Academic Programs in Biology (1987-1993), she designed and implemented supplementary education programs for underrepresented minority students, transfer students and honors students from all backgrounds, raising over $10 million in external grants to support that work. In recognition, she received a University of California Presidential Award for Excellence in Mentoring Undergraduate Research.

Professor Villarejo was active in K-12 education as Principal Investigator and Chair of the Advisory Committee for the state-funded California Science Project and recently coordinated campus efforts to launch a new School of Education. Since her retirement in 1999, she has been conducting research on the efficacy of educational intervention programs for minority students in biology on a grant from the NIH. She currently serves on Educational Advisory Committees to the National Human Genome Research Institute and the NSF-sponsored Center for Biophotonics and Technology.
Jamie Lewis Keith, *Keynote Speaker*

Jamie Lewis Keith is Vice President and General Counsel of the University of Florida, a position she assumed in October 2006. In this position, Ms. Keith is a member of the President’s cabinet and is responsible for all of the legal affairs of the third largest public research university in the U.S., with 50,000 students, 20,000 employees, two academic health science/medical research centers, $580 million of research annually, and NCAA Division I athletics. Ms. Keith leads the University's General Counsel's Office and is also responsible for the legal affairs of the University's over 25 tax-exempt private affiliates, including the University Athletic Association, Inc., the University of Florida Research Foundation, Inc., and the University of Florida Investment Management Company, Inc. She has a legal oversight role with the University of Florida Foundation.

Ms. Keith is a member of the Board of the Council on Governmental Relations; the ten general counsel legal advisory group for the Association of American Universities; the advisory board for the American Association for the Advancement of Science's Center for Advancing Science and Engineering Capacity; and the College Board's so-called “brain trust” advisory group for its diversity collaborative. From July 1999 until her appointment at the University of Florida, Ms. Keith was the Senior Counsel of the Massachusetts Institute of Technology, establishing and leading the Institute's first primary counsel's office. At MIT, Ms. Keith and then-President Charles M. Vest successfully defended two, long-time mentoring and bridging programs aimed at increasing participation of under-represented minorities in STEM higher education and careers.

Ms. Keith's primary areas of expertise include diversity in higher education; complex and international research and education collaborations; research compliance; corporate governance; students at risk and other student affairs; First Amendment; and security-driven regulatory issues in the post 9/11/01 world.

**David J. Asai**

David Asai is Director of Precollege and Undergraduate Science Education Programs at the Howard Hughes Medical Institute. In this position, he is responsible for several programs that advance science education, including (i) precollege grants awarded to biomedical research institutions, (ii) undergraduate science grants to colleges and universities, (iii) HHMI Professors who are distinguished scientists engaged in science education, and (iv) the EXceptional Research Opportunities Program (EXROP) that enables talented undergraduates from disadvantaged backgrounds to spend a summer in the research laboratories of HHMI Investigators and Professors. All together, these grants total to over $50M annually.

Prior to his arrival at HHMI in the autumn of 2008, Dr. Asai was for five years Stuart Mudd Professor and Chair of Biology at Harvey Mudd College, where he continues to have a faculty appointment. Before his time at Harvey Mudd, Dr. Asai was Head of Biological Sciences at Purdue University, where he was a faculty member for nineteen years. Dr. Asai was Program Director of three HHMI grants for undergraduate science education at Purdue and Harvey Mudd. Dr. Asai is a cell and molecular biologist. His laboratory studies the structural and functional diversity of the molecular motor, dynein. His laboratory is currently supported by grants from the National Science Foundation.
Kellina M. Craig-Henderson

Kellina M. Craig-Henderson is a Program Director at the National Science Foundation in the Social Psychology program within the Behavioral & Cognitive Sciences division of the Social, Behavioral and Economic Sciences directorate. She retains an affiliation with the Department of Psychology at Howard University where she was promoted to the rank of full professor shortly before officially joining the federal service to work with the Social Psychology program at NSF.

Dr. Craig-Henderson, who also serves as the Foundation’s Human Subjects Research Protections Officer, has published numerous reports of empirical research as well as a book on interracial relationships. Her research includes studies of groups, cross-cultural gender and race stereotyping, and aggression. The NSF, the Ford Foundation and the American Psychological Association have provided support for her work. She has presented findings from her research activities at a variety of regional, national and international research and pedagogical meetings. Dr. Craig-Henderson graduated from Wesleyan University in Connecticut before attending the Master’s Program in the Social Sciences at the University of Chicago where she earned a M.A. Immediately following that she attended Tulane University in New Orleans, Louisiana and earned an M.S. and a Ph.D. in Psychology. She served on the faculty in the Department of Psychology as well as the Afro-American Studies and Research program at the University of Illinois in Champaign-Urbana. This was followed by an appointment in the Psychology Department of California State University in Long Beach. She subsequently moved to Howard University in Washington, DC. Dr. Craig-Henderson remains passionate about broadening the participation of underrepresented groups, and has been involved in a number of activities at NSF which share this focus.

Janice Cuny

Since 2004, Jan Cuny has been the Program Officer for the CISE Broadening Participation in Computing (BPC) program at the National Science. Before coming to NSF, Dr. Cuny was a faculty member in the Computer Science departments at Purdue University, the University of Massachusetts, and the University of Oregon. Her research centered on programming environments for computational science. At NSF, Dr. Cuny founded the BPC program. It aims to significantly increase the number of students getting postsecondary degrees in computing, with an initial emphasis on those groups – women, minorities, and persons with disabilities – who have traditionally been underrepresented in computing. BPC supports efforts from middle school through graduate school and the early faculty ranks. It currently has a portfolio of over $50 million in active awards. More importantly, it has built a national community of several hundred researchers and practitioners who actively collaborate on interventions that address underrepresentation.

Dr. Cuny has been involved in efforts to increase the participation of women in computing research for many years. She was a long time member of the Computing Research Association’s Committee on the Status of Women (CRA-W), serving among other activities as a CRA-W co-chair, a mentor in their Distributed Mentoring Program, and a lead on their Academic Career Mentoring Workshop, Grad Cohort, and Cohort for Associated Professors projects. Jan was also a member of the Advisory Board for Anita Borg Institute for Woman and Technology, the Leadership team of the National Center for Women in Technology, the Executive Committee of the Coalition to Diversify Computing, and the Board of Directors of the Computing Research Association. She was Program Chair of the 2004 Grace Hopper Conference and the General Chair of the 2006 conference. For her efforts with underserved populations, she is a recipient of one of the 2006 ACM President’s Awards and the 2007 CRA A. Nico Habermann Award.
**Cinda-Sue Davis**

Since 1984, Cinda-Sue Davis has directed the University of Michigan Women in Science and Engineering (WISE) Program which encourages girls and women, from elementary school through graduate school, in science, engineering and mathematics through intervention programming, advocacy, and research. She has authored numerous papers on WISE issues and is the co-editor of *The Equity Equation: Fostering the Advancement of Women in the Sciences, Mathematics, and Engineering*, published by Jossey-Bass in 1996. Dr. Davis has a Ph.D. in biochemistry and is the recipient of numerous awards, including the “Can-Doer” award for science education from the Michigan Technology Council, the Maria Mitchell Women in Science Award, and the UM Sarah Goddard Power Award. The UM WISE Program was recognized in 2000 with the Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring and in 2003 was named an “exemplary program” by the Congressionally Mandated Committee “Building Engineering and Science Talent” (BEST). Currently she is co-directing the Michigan STEM Academy for the UM College of Engineering.

**Lisa Frehill**

Lisa Frehill is the Executive Director of the Commission on Professionals in Science and Technology (CPST) located in Washington, D.C. collects, synthesizes, analyzes and disseminates reliable information about the science and engineering workforce in the United States. Dr. Frehill holds a Ph.D. in sociology with a minor in systems engineering and an M.A. in sociology both from the University of Arizona. Her bachelor's degree is in industrial engineering from General Motors Institute (now Kettering University). Prior to coming to CPST in July 2006, she was an Associate Professor of Sociology at New Mexico State University, where she is now an adjunct faculty member. She was the original PI for the NMSU ADVANCE: Institutional Transformation award. Current projects at CPST focus on the science and engineering workforce, how gender and ethnicity impact access to careers in these fields, and on women's international participation and collaboration in science and engineering. Dr. Frehill is the lead on several program evaluation projects related to human resources in science and engineering.

**Deborah Harmon Hines**

Deborah Harmon Hines is the vice provost of school services and professor of cell biology at the University of Massachusetts Medical School in Worcester, Massachusetts. She earned her Ph.D. at the University of Tennessee. An exceptional leader and role model for more than 25 years, Dr. Hines has been a driving force in developing a diverse biomedical research and healthcare workforce reflecting her state's population. Believing that children from Worcester's underrepresented communities should gain the science and math literacy necessary to thrive as members of the workforce, particularly in the dynamic health, science, and biotechnology industries, Dr. Hines led the charge to develop and manage several programs that have reached over 15,000 students every year since 1989. These programs include the High School Health Careers program, the Summer Enrichment Program, the NIH Summer Research Program, and the Worcester Pipeline Collaborative (WPC) which involves more than 6,000 K-12 students in Worcester public schools in a year-round curricular program. The program's purpose is to provide a seamless pipeline for kids to consider careers in all the health professions.

Dr. Hines’ initiatives have born fruit by significantly making the healthcare workforce in Massachusetts more diverse. For instance, the NIH Summer Research Program, which has focused for 15 years on minority students, has produced 230 graduates. Out of those graduates, 30 have gone on to get Ph.D.’s, 30 have obtained M.D.’s, five have fulfilled their M.D.-Ph.D.’s, and 85 have been published in peer-reviewed publications. Additionally, of the approximately 100 students who graduate from the WPC annually, nearly half have entered or are pursuing further education in the fields of health sciences or biomedical research. Dr. Hines was recognized with the President's Public Service Award in 2008 given by the President of the University of Massachusetts system.
Nancy Hensel

Nancy Hensel is the third executive officer of the Council on Undergraduate Research (CUR). She assumed her current position on July 1, 2004. The Council on Undergraduate Research, founded in 1978, is a national organization of individual and institutional members representing over 900 colleges and universities. CUR's mission is to support and promote high-quality undergraduate student-faculty collaborative research and scholarship. Prior to becoming CUR’s National Executive Officer, Dr. Hensel was the sixth president of the University of Maine at Presque Isle. She served in that role from 1999 until 2004. She strongly advocated for the inclusion of undergraduate research in the curriculum and under her leadership the University Day undergraduate research symposium was begun.

Previously she served as Provost and Vice President for Academic Affairs at the University of Maine at Farmington where she also served as Dean of the College of Education. Before moving to Maine in 1992, she was Department Chair and Professor of Education at the University of Redlands in Redlands, California. She holds a doctorate degree in early childhood education from the University of Georgia, masters' degrees in theater and early childhood education from San Francisco State University and a Bachelor of Arts degree in theater also from San Francisco State. In 2003 she was inducted into the Maine Women's Hall of Fame for her work in promoting higher education in Maine and supporting the role of women in higher education. Dr. Hensel is the author of several articles on issues of family and work, creativity in young children, and diversity in education.

Scott Jaschik

Scott Jaschik is one of the three founders of Inside Higher Ed, an online source for news, opinion and jobs for all of higher education launched in 2004. With Doug Lederman, he leads the editorial operations of Inside Higher Ed, overseeing news content, opinion pieces, resources, and interactive features. Scott is a leading voice on higher education issues, quoted regularly in publications nationwide, and publishing articles on colleges in publications such as The New York Times, The Boston Globe, The Washington Post, Salon, and elsewhere. He has been a judge or screener for the National Magazine Awards, the Online Journalism Awards, the Folio Editorial Excellence Awards, and the Education Writers Association Awards. Scott is a mentor in the community college fellowship program of the Hechinger Institute on Education and the Media. From 1999-2003, Scott was editor of The Chronicle of Higher Education. Previously at The Chronicle, he held numerous other positions and his reporting work was honored by Investigative Reporters and Editors and The Washington Monthly. Scott grew up in Rochester, N.Y., and graduated from Cornell University in 1985.

Roosevelt Y. Johnson

Roosevelt Johnson is serving as a Fellow of the AAAS Center for Advancing Science and Engineering Capacity (Capacity Center) and as an Executive on Loan from the National Science Foundation (NSF). Prior to his AAAS appointment, Dr. Johnson served as Program Director for the Alliances for Graduate Education and the Professoriate (AGEP) program. The AGEP program is part of the portfolio of programs in the Division of Human Resource Development (HRD) within the Directorate for Education and Human Resources (EHR) at the National Science Foundation (NSF). The Division's programs aim to increase the participation and advancement of underrepresented minorities and minority-serving institutions, women and girls, and persons with disabilities at every level of the science and engineering enterprise. The AGEP program supports alliances of doctoral institutions (20 alliances; 100+ doctoral institutions), which work collaboratively to increase the number of minorities receiving doctoral degrees and progressing into leadership roles in science, technology, engineering, and mathematics (STEM). In addition to managing numerous cross-directorate programs during his 20-year career at NSF, Dr. Johnson has represented NSF with distinction on Government-wide committees and working groups, including representing the NSF (and the Government) as one of its representatives at NATO Postdoctoral Fellowship meetings in Brussels, Belgium.
Dr. Johnson received his baccalaureate degree in Zoology from Howard University and earned his doctorate in Microbiology from Indiana University. As a NIH Fellow, Dr. Johnson engaged in postdoctoral research at the University of Washington. Dr. Johnson has served on the faculties of Pacific Lutheran University, the University of Washington, Howard Community College, Howard University. He has also served as the Deputy Director and Interim Executive Director for the GEM Consortium. Dr. Johnson has been presented with the Frank Abbott Award for Distinguished Service from the Southern Regional Education Board (SREB; 2008), a Legacy Award from the Benjamin Banneker Institute for Science and Technology (2006) and Science Spectrum Magazine's prestigious Emerald Honors Award (2005) in recognition of a 30-year career of effectively championing efforts to broaden participation in STEM disciplines.

Tuajuanda Jordan

Tuajuanda Jordan received a B.S. degree in Chemistry from Fisk University in Nashville, Tennessee. During this time she engaged in research focused in organic synthesis as a MARC Scholar under the direction of the late Dr. I. Wesley Elliott. She earned a Ph.D. in Biochemistry from Purdue University in West Lafayette, Indiana, with Dr. Victor Rodwell as a MARC Predoctoral Fellow. She then did postdoctoral work with Dr. Judith Harmony at the University of Cincinnati, Medical Center, in Pharmacognosy and Cell Biophysics.

In 1994, she became a faculty member in the Department of Chemistry at Xavier University of Louisiana in New Orleans where she advanced to Associate Professor before assuming the position of Associate Dean in the College of Arts and Sciences in 2003. In 2005, Dr. Jordan was named Associate Vice President for Academic Affairs at Xavier. During her time at Xavier, Dr. Jordan served as Program Director of the National Science Foundation's Model Institution of Excellence Program. She was also a Visiting Scholar in the Department of Biophysics at The University of Michigan.

Dr. Jordan has devoted much of her professional career mentoring students and working with programs designed to retain underrepresented minorities in the STEM disciplines. Additionally, she is currently a member of the Keystone Symposia Diversity Advisory Board, the National Conference for Undergraduate Research Board of Governors, the NIH MORE division's Minority Access to Research Careers subcommittee and has served as the chair of NIH’s Minority Biomedical Research Support program and on numerous NIH and NSF scientific review panels. She is presently a Director at the Howard Hughes Medical Institute where she has developed a new division specifically focused on science education. Recent honors include the Purdue University College of Agriculture Distinguished Alumni Award in 2008 and being named on Innovative Mind by The SEED science education magazine in 2009.

Robert E. Layne

In 1996, Robert E. Layne joined the administrative team at University of Massachusetts Medical School (UMMS). He is currently the Director of Outreach Programs and the Worcester Pipeline Collaborative (WPC) at the university. This collaborative includes professionals, K-20 educators from local schools, colleges, universities, biotechnology, biomedical and healthcare professions (BBHP) industries. The WPC is only one of the outreach programs sponsored by the UMMS. Mr. Layne's other responsibilities includes the management of the High School Health Career Program and the Summer Enrichment Program (for college sophomore and juniors). Under his leadership, the WPC has become a national model for educational partnerships providing opportunities for students who are under-represented in BBHP and/or from economically and educationally disadvantaged backgrounds. He initiated new programs for students, their families, teachers and administrators at the North Quadrant section of the Worcester Public Schools. In addition, he has helped to strengthen existing curricula, programs in science, health care, math and biotechnology by supporting professional development training sessions for faculty.
Before joining UMMS, Mr. Layne was a Program Director at a community college in the Boston area providing programming to meet the needs of minority students that were labeled “at risk”. Mr. Layne earned his B.S. in Education from Boston University and his M.Ed. in Educational Administration from Boston State College. He has received both the Thomas Jefferson Award and the Community Service Award presented by the Worcester Public Schools, and the George L. Alden Higher Education Access Award presented by the Colleges of the Worcester Consortium.

Michael J. Leibowitz

Michael J. Leibowitz is Professor of Molecular Genetics, Microbiology & Immunology at University of Medicine & Dentistry of New Jersey (UMDNJ)-Robert Wood Johnson Medical School (RWJMS). UMDNJ is the largest public health science university in the U.S. Dr. Leibowitz is also Director of Graduate Academic Diversity at UMDNJ-Graduate School of Biomedical Sciences (GSBS) at RWJMS, and a member of the Master Educators Guild of UMDNJ. He is Director of an NIH-funded Initiative for Maximizing Student Diversity Award, which supports the training of Ph.D. candidates in the Molecular Biosciences Programs, which are jointly offered by UMDNJ-GSBS at RWJMS and Rutgers, The State University of New Jersey. He also leads two Bridge to the Doctorate Programs, which are articulated M.S./Ph.D. programs jointly offered with University of Puerto Rico-Mayagüez Campus and Montclair State University in New Jersey. Dr. Leibowitz is a member of the Minority Affairs Committee of the American Society for Cell Biology, and serves as an external advisor for a Research Initiative for Scientific Enhancement Program at Universidad del Este in Puerto Rico and for Support for Competitive Research (SCORE) Programs at University of Puerto Rico and Long Island University. These programs are funded by the NIH through the Minority Biomedical Research Support Programs. He also participates in the Research in Science and Engineering (RISE) Program, a residential summer undergraduate research program focusing on under-represented and first generation college students, on this campus. He has a long-standing interest in increasing diversity of the scientific workforce.

Dr. Leibowitz is also the founding course director of a course in Responsible Conduct of Research, which is required of all Ph.D. candidates in the Biomedical Sciences on this campus. He has lectured on this and related topics at other universities, and is now starting a course on Ethics and Regulations in Clinical Research which is part of a new M.S. program in Clinical and Translational Research offered by UMDNJ-GSBS at RWJMS. Research interests of Dr. Leibowitz include mechanisms of amyloid formation and anti-amyloid therapy development, polymeric carriers for drug delivery, and molecular genetics of double-stranded RNA viruses of yeast. He is also currently pursuing educational evaluation research on factors which promote development of identity as a scientist and academic success in graduate level trainees in the biomedical sciences, comparing these between under-represented minority and non-minority trainees.

Kenneth I. Maton

Kenneth I. Maton is a professor of psychology and director of the Community and Applied Social Psychology PhD program in Human Services Psychology at the University of Maryland, Baltimore County. His research interests include minority student achievement including longitudinal evaluation of the Meyerhoff Scholars Program, empowering community settings, strengths-based research and policy, and community psychology of religion. Recent books include Investing in children, youth, families and communities: Strengths-based research policy (edited volume), Beating the odds: Raising academically successful African American males (co-author), and Overcoming the odds: Raising academically successful African American females (co-author). Dr. Maton is past-president of the Society for Community Research and Action (SCRA; APA Division 27) and recipient of the 2006 SCRA Award for Distinguished Contributions to Theory and Research given by the American Psychological Association. Dr. Maton serves on the editorial boards of the American Journal of Community Psychology, and the Journal of Community Psychology. He received his Ph.D. in Community-Clinical Psychology at the University of Illinois at Urbana-Champaign.
**John Matsui**

John Matsui is a product of the California public school system. His teaching, research, and administrative activities have focused on broadening access to education for all students, with a special emphasis on those from historically under-represented socio-economic, gender, and ethnic/racial groups. Dr. Matsui is Assistant Dean of Biology at the University of California, Berkeley and co-founder and director of the Biology Scholars Program (BSP), an undergraduate diversity program in the Department of Integrative Biology, funded by the Howard Hughes Medical Institute and Gordon and Betty Moore Foundation.

Since 1992, 2000 Berkeley undergraduates have participated in BSP and 1200 have graduated. 80% of its program members are first-generation/low-income, 70% women, and 60% underrepresented minorities (URM). In spite of entering Berkeley with lower SATs and high school GPAs, BSP students have graduated in equivalent percentages with biology degrees and comparable exit GPAs as biology majors at large (Matsui et al, 2003). To date more than a dozen universities including UC San Diego, UC Riverside, Cornell, and Yale have started their own programs inspired by the BSP model.

**Michael T. Nettles**

Michael T. Nettles is Senior Vice President and the Edmund W. Gordon Chair for Policy Evaluation and Research at the Educational Testing Service in Princeton, NJ. He has a national reputation as a policy researcher on educational assessment, student performance and achievement, educational equity, and higher education finance policy. Dr. Nettles’ publications reflect his broad interest in public policy, student and faculty access, opportunity, achievement and assessment at both the K-12 and postsecondary levels. Recently he co-authored *Three Magic Letters: Getting to Ph.D.*

His current professional activities include serving on two National Research Council boards: the Board on Testing and Assessment (BOTA) and the Board on Higher Education and the Workforce (BHEW). Dr. Nettles is a member of the Bank Street College of Education Board of Trustees. He also serves on the Board of the NSF sponsored Center on Research on Teaching and Learning (CRTL); the Joint Advisory Board for Education Research Centers in the state of Texas; the Board of the Center for Enrollment Research, Policy, and Practice (CERPP) at the University of Southern California; the National Center for the Improvement of Educational Assessment, Inc. (NCIEA); Harvard University Medical School Advisory Committee on Diversity, the International Advisory Panel on Assessment (IAP) for the Human Science Research Council of the Republic of South Africa and the Advisory Board of the Community Links Foundation. A native of Nashville, Tennessee, Michael earned his bachelor's degree in political science at the University of Tennessee, master's degrees in political science and in higher education, and a Ph.D. in education, at Iowa State University.

**Alan Peterfreund**

Alan Peterfreund is Executive Director of SageFox Consulting Group, a research, evaluation and custom software solution firm located in Amherst Massachusetts. Dr. Peterfreund has a Ph.D. in Geology from Arizona State University, and has been a research faculty member at Brown University. He participated on numerous NASA planetary exploration missions studying Mars, Venus and the moons of Jupiter. A career-shift in 1984 led to 16 years of consulting in the private and public sector with primarily emphasis on organizational change, quality management, and employee participation. Starting in 2000, Dr. Peterfreund began to focus on supporting higher education partners in projects that address broadening participation in the sciences, graduate student development, curriculum innovation, instructional technology, teacher professional development and other education reforms. This past fall Dr. Peterfreund formed a new company, SageFox Consulting Group. SageFox is currently engaged in evaluation of federally and state-funded projects involving over 35 higher education institutions. In addition, Dr. Peterfreund and his colleagues have been partners on an NIH RO1 grant with San Francisco State, New Mexico State and Cal State Los Angeles investigating the efficacy of interventions associated with minority support programs at those institutions.
Clifton A. Poodry

Clifton A. Poodry is Director of the Minority Opportunities in Research (MORE) Division at the National Institute of General Medical Sciences (NIGMS), National Institutes of Health (NIH). He is responsible for developing and implementing NIGMS policies and plans for minority research training programs. He also serves as a liaison between NIGMS and NIH, other federal agencies, and the scientific community. Prior to assuming this position in April 1994, Dr. Poodry was a professor of biology at the University of California, Santa Cruz, and the principal investigator on a grant of $1,000,000 for undergraduate biological sciences from the Howard Hughes Medical Institute. Dr. Poodry is a native of the Tonawanda Seneca Indian Reservation in Western New York. He earned both a BA and an MA in biology at the State University of New York at Buffalo and holds a PhD in biology from Case Western Reserve University.

Daphne Rainey

Daphne Rainey is a Program Director in the National Science Foundation Directorate of Education and Human Resources. Dr. Rainey earned her doctorate at the University of Colorado, Boulder and conducted postdoctoral research at the University of Michigan, Ann Arbor. She has worked in industry and academe as a Bioinformatics Researcher in the area of genome science. She works on cyberlearning initiatives through the National Science Digital Library and Course, Curriculum and Laboratory Improvement and Math Science Partnership programs. She serves as lead Program Director for the Presidential Awards for Excellence in Science, Mathematics and Engineering Mentoring Program and has served as both Vice Chair and Chair of Virginia Tech University's Commission on Equal Opportunity and Diversity.

Marie-Elena Reyes

Marie-Elena Reyes is the President and Founder of the Frida Kahlo Institute for Women at the Borderlands (FKI) a non-profit dedicated to research, programs, and advocacy for the education of Latinas and American Indian girls and women of the Borderlands. Ms. Reyes currently also serves as an expert for the Engineering Equity Extension Service (EEES) an NSF grant to the National Academy of Engineering, providing consulting on gender research, faculty and staff development with respect to best practices in gender equitable engineering education.

Her past work focused on developing outreach programs and research on the Women in Science and Engineering Program (WISE) at the University of Arizona to increase the participation of women from underrepresented groups in science, technology, engineering, and math careers while researching methods for infusing science education with gender and multicultural perspectives. She served as an Assistant Research Scientist with the Southwest Institute for Research on Women (SIROW) for six years. Ms. Reyes was the Principal Investigator of the NSF Futurebound Program from 2001-2005, a recruitment and retention program for women of color in science and engineering fields, transferring from Pima Community College to the University of Arizona. She has served on the Executive Board for the Women in Engineering Programs Advocates Network (WEPAN), the Committee for Diversity with Sigma Xi Scientific Honorary Society, the Diversity Task Force of Millennium Report Oversight Committee at the University Of Arizona, and was a 2003 fellow with the National Hispana Leadership Institute.

Alberto I. Roca

Alberto I. Roca was a Project Scientist in the Department of Molecular Biology and Biochemistry at the University of California, Irvine. His research involves using biophysical and bioinformatic approaches to understand the molecular mechanism of recombinational DNA repair. Born in Houston, Texas, Dr. Roca is a first-generation Peruvian-American. He received his Ph.D. in Molecular Biology from the University of Wisconsin-Madison. He is a former University of California President's Postdoctoral Fellow. With respect to his diversity activities, Dr. Roca is an active member of the Society for the Advancement of Chicanos and Native
Americans in Science (SACNAS). Namely, he founded the SACNAS Postdoc Committee and received a Sloan Foundation grant to create the web portal, www.minoritypostdoc.org. In addition, he organized the Minority Postdoc Summit at the 2004 SACNAS annual conference. He is a member of AAAS, AWIS, and the National Postdoctoral Association (NPA). He co-founded the NPA Diversity Committee. He has been an invited speaker on minority postdoctoral issues at the following conferences: the Compact for Faculty Diversity's annual Institute on Teaching and Mentoring; the Howard University/UTEP Institute on Preparing for Postdoctoral Experiences in STEM; the COSEPUP Second Convocation on Enhancing the Postdoctoral Experience; and the 2009 NPA annual conference. In recognition of his achievements, Dr. Roca has received the UC-Irvine Chancellor's Living Our Values Award as well as the SACNAS Presidential Service Award.

James H. Stith

James H. Stith is recently retired from serving as the Vice President, Physics Resources Center for the American Institute of Physics. He directed a broad portfolio of programs and services that includes AIP's Magazine Division, the Media and Government Relations Division, the Education Division, the Center for the History of Physics, the Statistical Research Division and the Careers Division. His doctorate in physics was earned from The Pennsylvania State University, and his masters and bachelors in physics were received from Virginia State University. A physics education researcher, his primary interests are in Program Evaluation, and Teacher Preparation and Enhancement. Throughout his career, he has been an advocate for programs that ensure ethnic and gender diversity in the sciences.

Dr. Stith was formerly a professor of physics at The Ohio State University and also spent 21 years on the faculty of the United States Military Academy at West Point. He has also been a Visiting Associate Professor at the United Air Force Academy, a Visiting Scientist at the Lawrence Livermore National Laboratory, a Visiting Scientist at the University of Washington, and an Associate Engineer at the Radio Cooperation of America. He is a past president of the American Association of Physics Teachers, past president of the National Society of Black Physicists, a Fellow of the American Association for the Advancement of Science, a Fellow of the American Physical Society, a Chartered Fellow of the National Society of Black Physicists, and a member of the Ohio Academy of Science. Additionally, Dr. Stith serves on a number of national and international Advisory Boards and has been awarded a Doctor of Humane Letters by his alma mater, Virginia State University.

Watson Scott Swail

Watson Scott Swail is the President and Chief Executive Officer of The Educational Policy Institute, a non-profit, non-governmental organization dedicated to policy-based research on educational opportunity for all students at the postsecondary level. With offices in Virginia Beach, VA, Toronto, Ontario, and Melbourne, Australia, the mission of EPI is to impact the development and implementation of public policy and educational practice through research and analysis. Dr. Swail's recent publications include Latino Students and the Educational Pipeline, The Affordability of Higher Education, and Higher Education and the New Demographics. He has been published in Phi Delta Kappan, Change, and the Chronicle of Higher Education. Dr. Swail's research focuses primarily on issues regarding preparation for, access to, and success through postsecondary education. He is currently serving as Principal investigator on several research projects, including a federal GEAR UP evaluation, investigation into college attainment at for-profit institutions, and student-level data systems for higher education.
Prior to establishing EPI, Dr. Swail served as the Founding Director of The Pell Institute and Vice President of the Council for Opportunity in Education in Washington, DC. He previously served as senior policy analyst with SRI International and associate director for policy analysis with the College Board. While with the Board, Dr. Swail co-directed the *Trends in College Pricing* and *Trends in Student Aid* reports released in the U.S. each fall. He is a former technology teacher and taught at Victor Wyatt School in Winnipeg, Manitoba, and also at Benjamin Symms Middle School in Hampton, Virginia. In addition to his research and writing, Dr. Swail earned his doctorate in educational policy from the George Washington University in Washington, D.C., a Master’s of Science from Old Dominion University and Bachelor's of Education from the University of Manitoba. Dr. Swail serves on the research advisory board of the National Action Council on Minorities in Engineering (NACME) and also on the Board of Directors of the Student Resource Services in St. Louis.

**Wanda E. Ward**

Wanda E. Ward is the Acting Assistant Director for Education and Human Resources, National Science Foundation (NSF). Throughout her tenure at NSF, Ward has served in a number of science and engineering policy, planning, and program capacities in the Directorate for Education and Human Resources (1992-1997; 2006-present), Office of the NSF Director (1997-1999); and Directorate for Social, Behavioral and Economic Sciences (1999-2006). From 2001-2002 she was on assignment at the Council on Competitiveness as Chief Advisor to the initiative, BEST (Building Engineering and Science Talent), where she provided leadership in the launch and development of this public-private partnership, established to carry out the implementation of a national diversity initiative called for by the Congressional Commission on the Advancement of Women and Minorities in Science, Engineering and Technology Development.

Since joining the Foundation, Dr. Ward has also led or served on several NSF and interagency task forces, working groups, commissions and committees. These include: Co-Chair, Subcommittee on Social, Behavioral and Economic Sciences (SBES), the President's National Science and Technology Council (NSTC) Committee on Science (COS, 2004-2005); NSF representative to the Interagency Working Group on the U.S. Science and Technology Workforce of the Future, NSTC COS (1997-1999); Executive Liaison to the Co Vice-Chair of the NSTC former Committee on Education and Training (CET) and Executive Secretary of the NSTC CET Subcommittee on Excellence in Science, Mathematics, and Engineering Education (1994-1996). She has forged international research and workforce development collaborations in both developed and developing nations, including in China, Europe and Africa. Since 2007, she has served as a member of the International Social Science Council (ISSC) Committee for Developing and Transition Economies (CoDATE).

Prior to joining NSF, Dr. Ward served as tenured Associate Professor of Psychology and Founding Director of the Center for Research on Multi-Ethnic Education at the University of Oklahoma, Norman. She took the B.A. in Psychology and the Afro-American Studies Certificate from Princeton University and the Ph.D. in Psychology from Stanford University. She was awarded the Ford Foundation Fellowship, the 2005 American Psychological Association Presidential Citation, the 2006 Presidential Rank Award for Distinguished Executive and the 2006 Richard T. Louttit Award.