



**National Science Foundation
Division of Human Resource Development
2010 Joint Annual Meeting (JAM)**

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POSTER SESSION DESCRIPTIONS

Poster Number: 1

Presenter: Ivon Arroyo

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Digital Affective Learning Companions Help Females and Learning Disability Students

We report the results of a randomized controlled evaluation of the effectiveness of pedagogical agents as providers of affective feedback. These digital learning companions were embedded in an intelligent multimedia tutoring system for mathematics, and were used by approximately one hundred students in two public high schools. Students in the control group did not receive the learning companions.

Positive results indicate that affective pedagogical agents can improve affective outcomes of students in general, but particularly so for female students, who reported being more frustrated and less confident while solving math problems prior to using the tutoring system. Results indicate that lower-than-median achieving students, according to a mathematics pre-test—one third of whom have learning disabilities—also had higher affective needs than their higher-achieving peers; they initially considered math problemsolving more frustrating, less exciting, and felt more anxious when solving math problems. However, after they interacted with affective pedagogical agents, low-achieving students improved their affective outcomes, e.g., reported reduced frustration and anxiety.

Poster Number: 2

Presenter: Diola Bagayoko

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Louisiana Alliances for Minority Participation (LS-LAMP)

The Louis Stokes Louisiana Alliance for Minority Participation (LS-LAMP) is in its 15th year of operation. The major goals of the alliance are to increase the quality and number of minority STEM graduates and their transition into the pursuit of STEM graduate degrees with emphasis on the Ph.D. LS-LAMP is a state-wide program of nine (9) 4-year institutions, two (2) community colleges, and one research facility. All LS-LAMP partner institutions have adopted the 10-Strand Systemic Mentoring Model to achieve the goals of the alliance. In Phase III, LS-LAMP has received four (4) Bridge to the Doctorate Program (BDP) awards. Forty-eight (48) scholars from LS-LAMP institutions are pursuing STEM Ph.D. degrees at Louisiana State University, the bridge institution.

Highlights for 2009/10

1. Eleven (11) LS-LAMP alumni were awarded a STEM Ph.D. degree during 2009- 2010 academic year.
2. Two (2) BDP Fellows were awarded STEM Ph.D. degrees. Dr. Wakeel Idewu is an Assistant Professor at Virginia Military Institute while, Dr. Ursula White is a Post-Doctoral Research Associate at Louisiana State University.
3. LS-LAMP institutions continue to vigorously promote transfers from community colleges to STEM programs in LS-LAMP 4-year partner campuses. In addition to the existing 2-year LS-LAMP partners, funds have been allocated to several 4-year institutions to expand outreach activities to other community colleges. These activities include academic year tutoring, campus visits by prospective community college transfer students, and summer courses and research workshops/projects.

Poster Number: 3**Presenter:** Messaoud Bahoura**Institution:** Norfolk State Univesrity (CREST)**Email:** mbahoura@nsu.edu***Composite Oxide Semiconductor Films for Gas Sensing***

Multicomponent semiconductor oxides mainly composed of elements like indium, zinc, tin or gallium are very promising new class of materials for application in transparent electronics, multifunctional sensors and other electronic applications. The major characteristic of these materials is high mobility, and the electrical behavior is a consequence of a conduction band primarily derived from spherically symmetric heavy-metal cation ns orbital with $(n-1)d^{10}ns^0$ ($n \geq 4$) electronic configuration. The carrier transport becomes insensitive to the degree of disorder of the film, and makes this class of quasi-polycrystalline and amorphous semiconductors attractive for numerous applications. We report here on the environmental sensing, such as ultra-violet-radiation and various gases of pulsed-laser deposited composite semiconductor films. These films demonstrate outstanding sensing capability from measuring the surface resistivity taking into account the absorption of sensing species. Our results show new possibilities for the low-cost high performance environmental sensors for numerous potential applications. The details of the results will be presented.

Poster Number: 4**Presenter:** Lecia Barker**Institution:** National Center for Women & IT Extension Services (GSE)**Email:** lecia@ischool.utexas.edu***Using Systemic Change to Increase Trends***

The National Center for Women & IT (NCWIT) Extension Services for Undergraduate Programs (ES-UP) provides customized consultation services to members of the NCWIT Academic Alliance (AA) for

implementing systemic change in their undergraduate programs to increase enrollment, retention, and graduation of women and underrepresented groups. NCWIT ES-UP's model includes training consultants, who are social scientists and evaluators, about the specific conditions leading to women's underrepresentation in computing disciplines and making these consultants available to academic clients. The consultants conduct a baseline needs assessment, make recommendations for improvement, and provide ongoing consultation. NCWIT ES-UP provides support and resources for achieving change in all of these areas in ways that increase participation of women and underrepresented groups in undergraduate programs.

Increasing participation of women in undergraduate programs requires a multi-pronged, systemic approach including:

- Improved recruitment
- Inclusive pedagogy
- Meaningful curriculum
- Academic and social support for students
- High-level institutional support and appropriate policies
- Ongoing assessment of progress

NCWIT ES-UP has developed a variety of tools that enhance the consultant's ability to succeed with their clients in areas of client support, consulting, assessment, and theoretical and research basis. Our poster will describe these resources, our clients and their successes, and our systemic change model.

Poster Number: 5

Presenter: Joan Barth

Institution: University of Alabama (GSE)

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Factors Affecting STEM Career Interest in 5th-12th Grade Students

Career choices are the result of a complex process, and women are influenced by a myriad of factors: 1) social-contextual influences such as culturally shared gender stereotypes, 2) person-attribute characteristics such as math and science ability, and 3) life goals, especially those related to work, marriage, and family. Furthermore, career decisions are the consequence of many years of socialization and educational experiences. In this poster we examine these factors systematically during critical educational and developmental periods. Male and female students from 5th through 12th grade completed surveys assessing social contextual, person-attribute, and life goal factors. This is one of the first studies to examine the impact of life goals and gender stereotypes on STEM career interest in students in these age groups. We focus on a subset of these factors related to interest in STEM career. Regression and structural equation modeling methods revealed few grade level effects suggesting that the processes involved in developing STEM career interest are similar from late childhood through adolescence. Science, math, and computer attitudes, interests, and efficacy beliefs showed different patterns of relations with STEM career interest, indicating that it is important to consider these subject areas separately. STEM occupation interest was predicted by the student efficacy in science and math

and their stereotypes for these careers. Additional analyses examined if future occupation choices were related to the importance of different life goals. For both boys and girls, the desire to help others was associated with preferring feminine stereotyped occupations.

Poster Number: 6**Presenter:** Sonia Bartolomei-Suarez**Institution:** University of Puerto Rico-Mayaguez Campus (ADVANCE)**Email:** sonia@ece.uprm.edu***UPRM IT-Catalyst Project: Results From The Work Climate Survey and the Reflexive Journal***

The University of Puerto Rico at Mayagüez (UPRM) IT-Catalyst Project has developed procedures to gather information about the present status of female faculty members in sciences, mathematics, and engineering. Results from UPRM's Work Climate Survey and from reflexive journaling by a group of female STEM faculty will be reported.

UPRM's Work Climate Survey explored faculty perceptions on Departmental Resources and Support, Teaching and Mentoring, Leadership, Service and Productivity, Recruitment, Tenure and Promotion, Work and Family, and Professional Climate. Twenty-one percent (21%) of UPRM's faculty completed the survey (N=156). Findings show that professors receive very little mentoring in areas that are fundamental to establishing a supportive environment for professional growth and satisfaction, such as balancing work and family, or networking.

Writing a 'semi-structured reflexive journal' was implemented as an assessment and research technique during a two day workshop titled Women in Academia. Thirty-three (33) female STEM professors from UPRM completed a journal that included several closed questions for the assessment workshop activities and a set of open ended questions and probes. Participants were asked to complete an entry at different times during the workshop. Answers to close questions were analyzed using descriptive statistics and open questions and probes were analyzed using content analysis. Findings show the need to provide alternatives for balancing work and family as well as the importance of role models and mentoring in career plans.

Participants' engagement in this simple activity provided valuable information for future ADVANCE activities, but most important, it helped participants become aware of issues faced by women in academia and the need to transform our university.

Poster Number: 7**Presenter:** Bernard Batson**Institution:** University of South Florida (LSAMP)**Email:** bbatson@eng.usf.edu***NSF Florida-Georgia Louis Stokes Alliance for Minority Participation (FGLSAMP) Bridge to the Doctorate - University of South Florida (Cohorts II-IV, VII)***

This poster highlights the “best practices” and accomplishments of the NSF Florida-Georgia Louis Stokes Alliance for Minority Participation (LSAMP) Bridge to the Doctorate project at the University of South Florida (USF). Since 2004, USF has received a total of four LSAMP BD site awards (Cohorts II-IV, Cohort VII) to support 75 (48 NSF funded, 27 USF funded) minority students in STEM graduate programs. A unique feature of this program is that it leverages USF institutional resources with other NSF programs (IGERT, CREST, GRFP, GRS, etc.) and partnerships with private foundations (Florida Education Fund’s McKnight Fellowship Program, Alfred P. Sloan Foundation), national labs (Brookhaven, Pacific Northwest National Lab, Oak Ridge, NRL, NIST) and international collaborators to ensure success of the FGLSAMP Bridge to the Doctorate fellows. Successful outcomes have included 6 PhD graduates (August 2010), 32 MS degrees awarded, 13 first author journal submissions, over 150 conference presentations, 17 national fellowship awards (NSF, NASA, Ford, GEM, etc.), international research-training (Tanzania, China, Guyana, Bolivia, Taiwan, etc.) and postdoctoral appointments at national labs. The Bridge to the Doctorate project has been transformative in its impact on the University of South Florida’s graduate enrollment profile. USF is now positioned to become a top ten producer of minority PhDs in STEM graduate programs (9 new PhD graduates for this academic year) with 8 to 14 annually over the next six years.

Poster Number: 8

Presenter: Carole Beal

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Online Math Tutoring for Blind Students: Adding Audio Hints to Support Effective Problem Solving

Students who are blind are significantly under-represented in STEM fields, in part due to the challenges that they face in learning mathematics. The overall project goal is to develop and evaluate a web-based tutoring system that will allow blind students to access math instruction delivered in audio format. The system now includes audio hints to guide students through the problem solving process, and an empirical evaluation study was conducted with 16 blind middle school students. Results indicated that use of the audio hints was associated with successful problem solving on the most challenging items.

Poster Number: 9

Presenter: Laura Bechtel

Institution: University of Texas at Austin (GSE)

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Bridging the Gap: Developing a Tag Set for Gender in Science and Engineering Digital

The National Science Foundation Gender in Science and Engineering Extension Services promote the implementation of research-based and evaluated practices for increasing women's and girls' participation in STEM educational programs. Each Extension Service has a web presence and set of resources available by searching or browsing their web sites. While there are clear similarities in the practices recommended and audiences served, there are also differences as Extension Service has a specific focus, so that to date, one set of descriptive terms (tags) for enabling search on these sites has not been available.

The objective of the project was to propose a set of tags to be used across websites, facilitating the organization of and access to Extension Services resources. The current organization scheme of the online resources was heuristically evaluated to identify common themes and vocabulary. Building upon this evaluation, a preliminary tag set was developed and submitted to the National Science Foundation Gender in Science and Engineering Extension Services members with a short survey requesting feedback. Using the survey responses, the appropriate adjustments were made to the tag set. The final draft of tagging terms has been offered to the group to improve resource discovery and use by their clients, trainers, staff, and the public. This set of terms will be presented on the poster.

Poster Number: 10**Presenter:** Sarah Berenson**Institution:** University of North Carolina at Greensboro (GSE)**Email:** sarah_berenson@uncg.edu***Building A Quantitative Model Of STEM Career Choice From Qualitative Data***

We present a model of seven variables associated with STEM career choices among high achieving girls who began GIRLS ON TRACK in middle school and who are now in college. Using interview data from 53 college women, 26 attributes were sorted into four categories that included Education, Internships, Career Values, and Family. Using the notion of odds of selecting a STEM career, seven attributes were found to be associated with a STEM career decision (SAS). The logistic regression analysis of the STEM data produces a L-R Chi-square value of 14.1 that has a probability of occurring due to chance alone of 0.0002. Therefore, the STEM data provides evidence of a statistically significant relationship between a young woman's career choice and her SAS. These findings were used to create a model or a Mind Map to predict STEM career choice.

Poster Number: 11**Presenter:** Canan Bilen-Green**Institution:** North Dakota State University (ADVANCE)**Email:** Canan.Bilen.green@ndsu.edu***Programs to Support Advancement of Women Faculty at North Dakota State University***

The goal of the NDSU Advance FORWARD project, funded by the National Science Foundation ADVANCE Institutional Transformation program, is to develop and implement a comprehensive research-driven strategy to increase representation and advancement of women in academic science and engineering careers. Specifically, Advance FORWARD strives to improve the climate across campus, enhance faculty recruitment efforts, increase faculty retention and advancement, and open leadership opportunities. Retention and advancement programs include a cohort mentoring program for new faculty, a mid-career mentoring program to support the transition of associate professors to the rank of full professor, and research, course release, and external mentor grant programs. In this poster we describe our faculty advancement initiatives and share our progress to date in moving up faculty through the ranks.

Poster Number: 12**Presenter:** Joan Blanton**Institution:** Jackson State University (LSAMP)**Email:** joan.blanton@jsums.edu***International Research Opportunities through LSMAMP***

LSMAMP is committed to affording its students opportunities to travel internationally to present research and to conduct research. Over the first six years of the program, over 25 students have had this opportunity. The poster will show the places and faces of this program.

Poster Number: 13**Presenter:** Barbara Bogue**Institution:** Pennsylvania State University and The AWE Project (GSE)**Email:** barbarabogue@gmail.com***Ten Years Later: An Overview of AWE Project Research, Products and Activities***

The SWE AWE Project has developed a wide range of materials and research since it was first funded in 2001. This poster will provide a broad overview of the multi-faceted AWE Project, including:

- Surveys to measure the success of initiatives for STEM education and outreach education and to measure self-efficacy in engineering and classroom climate
- Applying Research to Practice (ARP) Resources that provide STEM educators and practitioners with access to social science and educational research (developed in collaboration with the CASEE in the National Academy of Engineering);
- AWISE, an off-shoot of The AWE Project
- Research derived from data collection using AWE and AWISE surveys;
- AWE Assessment Workshops; and,
- AWE's institutionalization in the Society of Women Engineers.

Poster Number: 14**Presenter:** Nicole Boulais**Institution:** Rochester Institute of Technology (RDE)**Email:** nabest@rit.edu***College Success for Students with Autism Spectrum Disorders***

Information provided for this poster session reflects achievements during the first year of implementation of a support program for college STEM students with Autism Spectrum Disorders at Rochester Institute of Technology. Achievements include development of a peer mentoring program, delivery of services to enrolled undergraduate students, development of program initiatives to assist with transition both into

college and into the work force, and outreach and training efforts for campus faculty and staff. Additionally, an overview of the planned evaluation model will be shared.

Poster Number: 15

Presenter: Claude Brathwaite

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Global Citizen-The International Experience: A Collaborative Partnership of the NYC LSAMP, Universidad De San Buenaventura (Cartagena), and the Pro Boquilla Foundation

Despite increases in the number of American students going abroad to study, the participation by underrepresented minorities and persons in the STEM disciplines is still low. This fact has been documented by the *Open Doors* report, published by the Institute of International Education, the leading not-for-profit educational and cultural exchange organization in the United States. By targeting participants of the LSAMP program (in the City University of New York (CUNY) and nationally), the reported model will allow the United States to benefit from the local CUNY and national networks of over 300 colleges and universities that comprise the LSAMP program. At CUNY (and nationally), LSAMP programs are well poised to participate in international programs, and for Scholars to acquire training in an international collaborative environment, thereby contributing towards the development of a globally competent scientific and engineering workforce.

Poster Number: 16

Presenter: Brenda Britsch

Institution: National Girls Collaborative Project (GSE)

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National Girls Collaborative Project: Advancing the Agenda in Gender Equity for STEM

The National Girls Collaborative Project (NGCP) brings together organizations throughout the United States that are committed to informing and encouraging girls to pursue careers in science, technology, engineering, and mathematics (STEM). Fourteen Regional Collaboratives have been established as part of NGCP, facilitating collaboration between more than 1,000 girl-serving STEM organizations, K-12 educators, higher education, professional organizations, business, and industry. Participant organizations include national entities like the Girl Scouts and Society of Women Engineers as well as local entities like robotics clubs, summer camps, and museums.

The NGCP has developed an innovative model to facilitate and support collaboration among practitioners serving girls in STEM. The NGCP collaborative model includes in-person and online collaboration opportunities, mini-grants for collaborative projects, and the dissemination of promising practices via a Web site, webcasts, and in-person events. To date, NGCP has received over 6 million successful Web site requests, has hosted over 40 in-person events, and has awarded 59 mini-grants that support projects reaching over 5,000 girls.

A key component of NGCP is the Program Directory, an online database of girl-serving STEM programs across the United States. Organizations enter program descriptions as well as needs and resources they have in order to facilitate collaboration with other organizations that may be able to address their needs or take advantage of their resources. There are currently over 1600 programs entered in the directory, representing over 3 million girls.

By providing the infrastructure and incentive for organizations to interact and collaborate, NGCP has built the capacity of girl-serving organizations to more effectively serve girls in STEM. This poster session will highlight the numerous resources provided by NGCP, including a rich Web site, online Program Directory, and mini-grant projects. Participants will have the opportunity to learn more about NGCP activities in their region and how to utilize available resources in their efforts to engage girls in STEM activities.

Poster Number: 17

Presenter: Judy Brown (and Cheryl Juarez)

Institution: Miami Science Museum, Center for Interactive Learning (GSE)

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Girls RISEnet: Building Capacity to Engage Minority Girls in STEM

Girls RISEnet is strengthening the professional capacity of informal science educators to engage and motivate minority girls in grades 6-12 to explore and pursue science and engineering careers. The project addresses the national need to cultivate diversity in preparing the next generation of female scientists and engineers. Objectives include:

- Utilize the national network of science centers and museums to raise awareness and broaden access for girls underrepresented in STEM.
- Develop linkages between organizations with the common purpose of increasing the pipeline of minority female engineers.
- Facilitate translation of gender and diversity research into practice through a unified training program.
- Provide ongoing services, access to program materials, and tools to broaden the ability of science centers to provide relevant and engaging programming for girls.

Project team includes Miami Science Museum, Association of Science-Technology Centers (ASTC), and SECME Inc.; advisory/research panel includes leading researchers in gender in STEM.

Ten science centers and museums serve as regional hubs and receive host awards to support their work: California Academy of Sciences, Connecticut Science Center, COSI, Explora, Louisville Science Center, Maryland Science Center, New York Hall of Science, OMSI, Saint Louis Science Center, and Sci-Port: Louisiana's Science Center.

An online Activity Tracking Survey was developed to assess the number/kind of research-based programs related to gender equity and diversity present in museums in each region. Baseline data has been

collected, in two tiers, from the regional museum hubs, and from a large sample of regional science centers and museums beyond these hubs.

Poster Number: 18

Presenter: Monica Bruning

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Female Recruits Explore Engineering

The Female Recruits Explore Engineering (FREE) study is an engineering career exploration project for high achieving, mostly low-income, mostly minority high school girls. The focus is to facilitate explorations in engineering, track the course of their explorations and considerations during high school, identify and map the influences that shape their sense of the profession, and analyze their views and feelings about their career options in engineering. Findings suggest that even interested young women are unlikely to pursue engineering in the U.S. because their college and career choices are deeply affected by overlapping educational, social and ideological systems that ignore or discourage engineering, thereby making real choice moot.

Poster Number: 19

Presenter: Sheryl Burgstahler

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Increasing the Participation and Success of Students with Disabilities

The RDE-funded alliance AccessSTEM helps K-12 teachers, postsecondary educators, and employers make classroom and employment opportunities in STEM accessible to individuals with disabilities, and supports students with disabilities as they move through critical junctures to STEM careers. This poster shares results from tracking the progress of more than 200 students with disabilities who have participated in NSF-funded projects, some as early as 1992, as they complete high school, attend college, earn degrees, and secure employment. The reported study also provides evidence of effective interventions for students with disabilities.

Poster Number: 20

Presenter: Glenn Busby

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Access to Advancement: An Audio Exploration of the National Effort to Increase the Role of Women with Disabilities in Science, Technology, Engineering, and Mathematics (STEM)

Access to Advancement, funded by the Research in Disabilities Education (RDE) program, is a ten-part radio series that sheds light on the opportunities for, and achievements of, women with disabilities in STEM fields. The series includes five stories about evidence-based tools, educational practices, and

programs designed to broaden the participation of women with disabilities in STEM, as well as five profiles of women with disabilities who are successfully working or learning in STEM fields. Access to Advancement will be distributed broadly on CD and through radio stations nationally, and it is now available via Flash audio and transcripts at www.womeninscience.org.

Poster Number: 21

Presenter: Angela Calabrese Barton

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From Club 2 School: Rethinking the SMT pipeline

In this poster we report on the first 9 months of a 3 year longitudinal study focused on: How do middle school girls become engaged in science, especially when their developing “sense of self” can seem to be at odds with traditional images of what it means to be a good science student or a scientist? The purpose of our study is to better understand the mechanisms by which urban middle school girls author possible selves in science, and what impact this has on their interest and participation in the SMT pipeline. Project objectives include:

1. To follow a cohort of girls in four cities over their middle school years to document the mechanisms by which they author possible selves in science, how their identity formation (and their attendant resources and positions) in different figured worlds support them in doing so, and what impact this has on their interest and participation in science class and the SMT pipeline.
 - a. What figured worlds do girls belong to during middle school (and high school transition)?
 - b. What resources and positions are accessible to girls in these figured worlds and how do they recruit them in support of authoring identities that further their interest and participation in school science and the SMT pipeline?
 - c. What roles do girls’ identity formation in their different figured worlds play in how girls shape their participation and interest in school science and the SMT pipeline?
 - d. In what ways and to what extent do the science-related figured worlds (in and out of school) play a role in how and why youth recruit identities for participation and interest in school science and the SMT pipeline?
2. To develop a model for how and why girls recruit identities across different figured worlds and how girls seek to leverage them in support of participation and interest in science and the SMT pipeline.
3. To create a set of cases along with guiding design principles focused on girls’ identity development and SMT pipeline participation that can be used as tools for teacher learning and program design.

To meet our objectives we are following 750 girls in five US cities over three years (Lansing & Jackson, MI, NYC, Greensboro, NC & Honolulu, HI). Utilizing a nationally validated survey focused on identity development and pipeline participation, data is being gathered over the three years to ascertain patterns in

identity development and pipeline participation. We are also conducting ethnographic longitudinal case studies of 40 girls in three of the sites over three years. Case study data allows us to delve deeply into girls' participation and experiences in out-of-school figured worlds and the figured world of school science, to uncover the salient identities pertinent to them, and how they select and coalesce identities across figured worlds to further their interest and performance in science. Using the tools of large-scale survey and grounded theory analysis, along with detailed case studies and cross-case comparisons, this research is designed to contribute to the field's understanding of girls' SMT interest and participation.

We are employing a mixed methods and longitudinal approach to generating a set of conjectures regarding the possible selves that girls construct in science, how their access and activation of resources across different figured worlds supports them in doing so, and the impact this has on their participation in the SMT pipeline. We focus on the "pipeline" because it casts a conceptual net that encompasses learning, participation, and career aspirations. Supported by research in girls' success in SMT we know that all three domains are consequential in how and why girls persist in SMT. Our goal is for this project to yield a theoretically-based yet empirically-driven model for the relationship between identity development and participation in the SMT pipeline for low-income urban girls from racially diverse backgrounds. By creating a set of cases along with guiding design principles focused on girls' identity development and SMT pipeline participation, we will be better able to work with teachers and program organizers to tailor program design and instructional practice to best support girls.

Our poster will report on a subset of case studies from two cities and results from year 1 surveys.

Poster Number: 22

Presenter: Susan Calonkey

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Bridge to Doctorate: Encouraging and Increasing Diversity and STEM Expansion Through Research, Academic Experiences, and Service

The Oklahoma LSAMP Alliance has two Bridge to the Doctorate cohorts: Oklahoma State University (Stillwater) and the University of Oklahoma (Norman). Fellows accepted into both cohorts are working diligently to complete course/degree requirements toward a PhD in the STEM fields. In addition, fellows have participated in grant writing workshops, engaged in research and experienced the rich culture of academia. They have served as mentors and bridges for undergraduates; linking them to research and graduate degrees. Through service experiences, they have exposed K-12 students to higher-ed experiences enticing and exciting them about futures in the STEM fields. This poster highlights Oklahoma Alliance activities which demonstrate best practices in Bridge to Doctorate programs.

Poster Number: 23**Presenter:** Larry Campbell**Institution:** North Carolina Alliance to Create Opportunity Through Education (NC OPT-ED) (AGEP)**Email:** lecamp@email.unc.edu***North Carolina Alliance to Create Opportunity through Education (NC OPT-ED)***

NC OPT-ED combines the resources of three AGEP institutions: the University of North Carolina at Chapel Hill (UNC-CH), North Carolina State University (NCSU) and North Carolina Agricultural and Technical State University (NC A&T) as well as a formal network including all other NSF-HRD supported URM projects in North Carolina.

These programs operate both individually and cooperatively to diversify the STEM workforce and academe by encouraging underrepresented minority students, from middle school through graduate school to obtain the Ph.D. in one of the STEM disciplines.

The NSF-initiated programs at each North Carolina University are listed below:

- Historically Black Colleges and Universities Undergraduate Initiative Program (HBCU-UP): Bennett College For Women, Johnston C. Smith University, NC A&T, Shaw University, Saint Augustine's College and Winston-Salem State University
- The NC-Louis Stokes Alliances for Minority Participation (NC LSAMP) Program: Fayetteville State University, NCCU, NC A&T, NCSU, UNC-CH, UNC-Charlotte, UNC-Pembroke and Winston Salem State University
- North Carolina Math Science Education Network (NC-MSEN) (Grades 6-12): Elizabeth City State University, Fayetteville State University, NC A&T, NCSU, UNC-CH, UNC-Charlotte and Winston-Salem State University
- Centers of Research Excellence in Science and Technology (CREST): North Carolina Central University
- Engineering Research Center (ERC): North Carolina A&T State University
- Alliances for Graduate Education and the Professoriate (AGEP) Program: UNC-CH, NCSU and NC A&T

Poster Number: 24**Presenter:** Elizabeth Cardoso**Institution:** Hunter College-CUNY-MIND Alliance (RDE)**Email:** ecardoso@hunter.cuny.edu

Social-cognitive predictors of intention to pursue STEM education and careers in high school and college students with disabilities

Statement of the Problem: Individuals with disabilities from racial and ethnic minority backgrounds are significantly underrepresented in the science, technology, engineering, and mathematics (STEM) fields. Social cognitive career theory (SCCT; Lent, Brown, & Hackett, 1994; Lent et al., 2008) can be used as a conceptual framework to study factors promoting academic and career interests in STEM. The SCCT is an extension of Albert Bandura's (1986) general social cognitive theory to explain academic and career behavior. According to Lent et al. (2000), SCCT can form the foundation for conceptualizing and designing career development interventions, including efforts to expand the STEM pipeline. The key elements of SCCT include self-efficacy beliefs, outcome expectations, contextual supports and barriers, goals and intention, and career outcome. The purpose of this study was to examine the relations of STEM self-efficacy to outcome expectations, interests, contextual supports and barriers, and STEM educational goals in high school and college students with disabilities.

Participants: Participants were students with disabilities who participated in the MIND Alliance project at Hunter College and Southern University in academic year 2008-2009. The sample included 65 high school students (52%) and 60 college students (48%), with 63 male students (50%) and 62 female students (50%). The mean age of the participants was 22.20 years ($SD=9.64$). Race and ethnicity of the students are diverse, with 62 African Americans (50%), 16 Native Americans (13%), 16 European Americans (13%), 12 Hispanics (10%), five Asian Americans (4%), and 14 other (11%). The majority of the students report sensory disabilities, learning disabilities, and mental disabilities.

Procedure: SCCT assessment data were extracted from the files of high school and college students who participated in the MIND Alliance project at Hunter College and Southern University in academic year 2008-2009. Students completed the SCCT instruments as part of their career assessment and planning services.

Results: The full model accounted for 46% of the variance, $R^2 = .46$, $F(8,116) = 12.43$, $p < .001$. The first step of the regression analysis, in which the demographic covariates (gender, race [white vs. nonwhite], and student status [college vs. high school]) were entered, contributed significantly to the variance in STEM intention scores. $\Delta R^2 = 0.17$, $F(3, 121) = 8.21$, $p < .001$. Examining the standardized partial regression coefficients indicated that there is no race and gender effect on STEM intention. However, as expected, college student status is significantly associated with STEM intention with $\beta = .39$, $t(124) = 4.59$, $p < 0.001$. The SCCT predictors (STEM self-efficacy, outcome expectations, barriers, support, and interest) entered in Step 2 also contributed significantly to increasing the variance explained in commitment scores, $\Delta R^2 = 0.29$, $F(5,116) = 12.60$, $p < .001$, suggesting that SCCT variables are significantly related to STEM intention after controlling for the effect of the demographic covariates. Examining the standardized partial regression coefficients within this step, STEM self-efficacy with $\beta = .22$, $t(124) = 2.50$, $p < 0.05$ and STEM interests with $\beta = .37$, $t(124) = 4.86$, $p < 0.01$, both contributed significantly to the change in variance in STEM intention scores, indicating that higher levels of STEM self-efficacy beliefs and STEM interests predicted higher levels of intention to pursue STEM education and careers. It should be noted that the effect of college status remains significant after the SCCT variables were entered in step 2. It indicated that the effect of college status could not be mediated by the SCCT variables.

Conclusions: Social-cognitive career theory can be used to predict STEM education and career intention of students with disabilities from both majority and racial and ethnic minority backgrounds. Helping

students develop strong STEM self-efficacy beliefs and STEM career interests through career counseling, summer institute experience, and mentoring could improve recruitment and retention of students with disabilities majoring in STEM fields.

Poster Number: 25

Presenter: Jenna Carpenter

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ADVANCEing STEM Faculty at Louisiana Tech by Increasing Retention, Improving Climate and Enhancing Promotion and Leadership

The ADVANCEing Faculty Program in the College of Engineering and Science at Louisiana Tech University is a four-year NSF ADVANCE adaptation and implementation project that utilizes a college-wide, systematic, sustainable approach for advancing women in STEM fields. The Program aims to educate all faculty and specifically enable women faculty in STEM disciplines to participate in a supportive and nurturing work environment, thus enhancing job satisfaction, research productivity, and retention. Based on an analysis of institutional data and a detailed climate survey, the goals of the ADVANCEing Faculty program are to:

1. strengthen the gender-neutrality of the climate by reducing isolation of women faculty and instituting faculty training through monthly Faculty Lunches, and the creation of a Mentoring Program and new productivity-enhancing Worklife Policies;
2. increase the retention of women faculty through implementation of a Grant Writing Program, Career Networking Awards and exposure to role-models through a Distinguished Lectureship Program;
3. enhance management training and promotion and leadership opportunities for female faculty in through an Executive Coaching Program, Career Development Workshops and a Women in STEM Awards Banquet.

Poster Number: 26

Presenter: Bettina J. Casad

Institution: California State Polytechnic University, Pomona (GSE)

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Math and Gender Identity Moderate Stereotype Threat Effects in Adolescents

This study examined the effects of stereotype threat on adolescent girls' and boys' math performance, attitudes, and behavioral intentions. Research on stereotype threat regarding women and math has largely been conducted with college women and effects on adolescents are less clear. Seventh and eighth-grade students (N = 1124) from five middle schools in southern California participated in the study. Participants completed a pre-questionnaire, a grade appropriate math test under stereotype threat or no threat conditions, and a post-questionnaire. It was predicted that girls under stereotype threat would have lower

math performance, more negative attitudes toward math, and fewer behavioral intentions to pursue further math education compared to girls in the identity safety condition. Further, this effect will be moderated by math or gender identity such that girls who have stronger identities will be more negatively affected by stereotype threat than girls who have weaker identities. Results generally supported the hypotheses. Seventh grade females in non-honors math classes performed worse on the math test under threat if they were highly identified with math compared to females who were less identified with math, $F(1, 91) = 4.58, p = .035, R^2 = .297$. Seventh grade females in honors math performed worse on the math test if they were highly identified with gender compared to females less identified with gender, $F(1, 256) = 2.135, p = .145, R^2 = .376$. Further, females in honors math scored worse on the spatial ability item under threat than females in the control if they were highly identified with gender, $F(1, N= 400) = 3.632, p = .057, R^2 = .164$. Among honors students, females highly identified with gender (or math) had more negative attitudes in the threat than the control condition, whereas males experienced stereotype lift and had more positive attitudes in the threat condition, gender: $F(1, 393) = 2.502, p = .115, R^2 = .099$; math: $F(1, 420) = 2.253, p = .134, R^2 = .154$. The role of gender and math identity in moderating girls' reactions to stereotype threat will be discussed in the context of the larger body of stereotype threat literature.

Poster Number: 27

Presenter: Pam Cook (and Heather Doty)

Institution: University of Delaware (ADVANCE)

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ADVANCE P.A.I.D. at the University of Delaware-RRR (Resources for Recruitment and Retention) of Women Faculty

The University of Delaware P.A.I.D. grant is to adapt workshops created by the University of Wisconsin (WISELI) and the University of Michigan (STRIDE) for the purposes of a midsized university, such as Delaware. Our working group of faculty developed two workshops, one on “Best Practices in Faculty Recruitment” and one on “Mentoring the Mentors” to present to their colleagues—faculty and administrators in STEM fields. This poster presents lessons learned in preparing and presenting these workshops as well as supporting materials developed for the workshops.

Poster Number: 28

Presenter: Margaret Curtis

Institution: Bennett College (HBCU-UP)

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Opening Doors Through Computational Science

The Computational Science Project at Bennett College for Women is opening doors for students to new ways of viewing science. Our project focus on computational science gives us a unique opportunity to introduce science students to one of the most important technical fields of the 21st century. The project objectives are to 1) enhance STEM faculty technical expertise and scholarly productivity; 2) enrich the curriculum to better prepare students to enter graduate and professional schools, and assume productive careers in new interdisciplinary fields; and 3) improve retention through support and enrichment experiences for students, and 4) increase recruitment through outreach activities.

The project is designed to infuse computational science in selected courses in biology, chemistry, mathematics, and computer science. Through workshops and presentations by visiting scientists, faculty improve their technological expertise and develop modules for their courses. Additionally, faculty use available software to provide simulations that enliven concepts and enhance instructions. HBCU-UP Scholars and other STEM majors are introduced to computational science through training sessions, visits to computing centers, and course work. They quickly learn the value of using the tools of computational science and of working in teams to solve complex science problems.

To encourage and stimulate the next generation of scientists, outreach activities are offered through a Girls Making it In Science Day program for middle school girls, a STEM Fair that targets juniors and seniors in high school, and a NSF Summer Academy that includes rising high school seniors and confirmed Bennett first year students.

The project has served as a vehicle for change that encourages new ways of thinking, working in teams, and interdisciplinary collaborations.

Poster Number: 29

Presenter: Ethan Danahy

Institution: Tufts University (RDE)

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Improving STEM Learning Through Interactive RoboBooks

Our goal is to incorporate universal learning design (UDL) in our interactive digital portfolio software (RoboBooks). UDL will enhance the learning for people of all learning styles and RoboBooks allow students to proceed at their own pace. The RoboBook is a digital worksheet in which students can explain their story through words, movies, robotic programming code, and graphs. The worksheet interacts directly with LEGO hardware, where sensors can affect the book content (and the other way around). This work concentrates on how we can use RoboBooks, LEGO robotic sensors and actuators, and UDL to improve student learning in high school chemistry and physics.

Poster Number: 30

Presenter: Jeffrey Davis

Institution: University of Knoxville (RDE)

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Fieldwork and Digital Archive of North American Indian Sign Language: Why, Who, Where, What, and How?

This poster highlights the outcomes of a NSF-DEL project to document, describe the linguistic features, and create a digital archive of Plains Indian Sign Language (PISL), which has been the best documented variety. PISL was once widely used as a signed lingua franca among cultural groups of the Great Plains. Although classified as an endangered language today, the project has documented that it is still being used within some native groups in traditional storytelling, rituals, and conversational narratives by both deaf and hearing Indians (e.g., Assiniboine, Blackfeet, Crow, and Northern Cheyenne). The fact that PISL has

survived and continues to be used is remarkable—especially considering the pressures for linguistic and cultural assimilation to acquire and use the dominant spoken or signed languages of the larger society or community.

Our research group of linguists, interpreters, and community stakeholders has been conducting fieldwork in various parts of the USA and Canada; and involves students from tribal colleges studying PISL and graduate students in linguistics. This is the first project in over 50 years to focus on PISL and the first that includes women and deaf signers; prior to this project, PISL had been long overlooked and understudied. We are filming the stories of native signers of Plains Indian Sign Language for the purpose of linguistic analysis and language preservation before it disappears. We maintain that PISL is a rich part of American Indian linguistic and cultural heritage, and have been encouraged by Native American community stakeholders to do this research, documentation, and description. Linguistic analysis of PISL is providing new insights about signed and spoken language contact, multilingualism and code-switching, creolization, the conveyance of human language in signed and spoken modalities, the interrelatedness and distinctiveness of speech, sign, and gesture. .

This poster presentation will showcase our project's application of Eudico Linguistic Annotator (ELAN). ELAN is a tool for the creation of complex annotations on video/audio resources using captions, voice-over, slow motion, and annotations. We are training Deaf and American Indian students and linguistics students to use ELAN for the transcription, translation, and annotation of signed and spoken languages. Its current application to the project's PISL corpus is enabling linguists to conduct syntactic analyses and identify lexical-grammatical categories; and will contribute to the compilation of a PISL dictionary and grammar. Thus, the use of ELAN and collaboration with PISL community members are central to revitalization and the development of curricular materials. These findings are being integrated into the project's website/digital archive, and featured in the poster session.

Poster Number: 31

Presenter: Jill Denner

Institution: ETR Associates (GSE)

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Students' Pathways into Computer and Information Sciences Majors: A Study of Community College Students

Women's enrollment in computer and information sciences (CIS) majors and completion of CIS undergraduate and graduate degrees has declined in the US over the last 20 years (National Science Board, 2006). Efforts to reverse this trend have been limited by a lack of research on pathways into and out of community college CIS classes. Community colleges are of interest because they attract a higher proportion of females and a broader demographic in terms of age and socioeconomic status than 4-year universities (National Center for Education Statistics, 2007). But previous studies of community colleges are limited; few are longitudinal; most lack theory; are primarily descriptive; ignore variation within gender; focus on individual not relational factors, and are not recent enough to account for the current era of pervasive technology use (Singh, Allen, Scheckler, & Darlington, 2007).

This study is designed to overcome these limitations and to collect data that can be used to inform efforts to reverse the decline in CIS majors. It is a longitudinal study of male and female community college students in introductory programming courses. We draw on theoretical frameworks that suggest the importance of motivation (Eccles, 1994), parent and peer support (Bleeker & Jacobs, 2004; Tiedemann, 2000), and previous computer use (Burger, Creamer, & Meszaros, 2007) and specifically computer game play (Cassell & Jenkins, 1998; Tillberg & Cohoon, 2005).

Starting in Fall 2010, we will recruit 700 female and male students in introductory programming courses at community colleges that are key feeder schools to the University of California (4-year public universities) CIS departments. They will complete three surveys over two years, and a subsample will be interviewed. There are three major research questions:

1. What is the relationship between individual characteristics and attributes of community college students and their probable choice of CIS major?
2. What are the unique contributions of motivational factors, familial factors and previous computer use in predicting whether community college students who are interested in computer science will pursue a CIS major at a 4-year university?
3. Is there a significant difference between female and male students in the factors that explain pursuit of CIS major?

Poster Number: 32

Presenter: Kamla Deonauth

Institution: Howard University (AGEP)

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Howard University and the University of Texas-El Paso (HUTEP) Alliance for Graduate Education and the Professoriate (AGEP) HUTEP-AGEP

Howard University and the University of Texas –El Paso (UTEP) have formed a unique partnership, “The HUTEP Alliance.” The goals of this alliance are to: 1) increase the number of underrepresented minority Ph.D. enrollment in the science, technology, engineering and mathematics (STEM) disciplines, 2) increase the retention and graduation rate to exceed the national average and 3) increase the number of Ph.D. recipients entering postdoctoral positions and the professoriate. This partnership represents the first major endeavor in graduate education to join a Historically Black College or University (HBCU) with a major Hispanic Serving Institution (HIS) to address the obvious disparity of African Americans and Hispanics in SSTEM doctoral education. In addition to expanding the range of doctoral disciplines offered by either University, the HUTEP Alliance provides students with additional academic and research opportunities. The HUTEP Partnership has aggressively pursued initiatives that benefit and engaged the other AGEP Alliances. Two Programs that have been promoted by the Alliance and has gained national recognition are the “Preparing Future Faculty Summer Institute” and the “National Postdoctoral Symposium” co-sponsored with the National Postdoctoral Association. Both Programs are designed around major thematic units of preparing for the professoriate and the necessity and importance of the postdoctoral experience as part of this preparation

Poster Number: 33**Presenter:** Catherine Didion**Institution:** National Academy of Engineering/ Center for the Advancement of Scholarship on Engineering Education (GSE)**Email:** cdidion@nae.edu***Lessons Learned in Developing Effective Materials and Resources: The Engineering Equity Extension Service Project***

The Engineering Equity Extension Service (EEES) Project is a GSE supported extension service project (HRD-0533520). The project began in 2005 and has worked with engineering professional societies, K-12 engineering programs, and departments of engineering to build career awareness of engineering, enhance student engagement, and promote academic success of female students from middle school (grade 6) through second year at university (collegiate sophomore). The ultimate aim of the project is to increase the number of women receiving baccalaureate degrees in engineering. This poster summarizes the materials and resources created for the various communities we work with (including educators and engineers) and the lessons learned about the creation and the dissemination of effective resources during the five-year performance period of the grant.

Poster Number: 34**Presenter:** Lisa Elliot**Institution:** Rochester Institute of Technology (RDE)**Email:** lbenrd@rit.edu***RDE-FRI: Supporting Deaf and Hard of Hearing Undergraduate Students in STEM Field Settings with Remote Speech-to-Text Services***

This project addresses an unmet need for deaf and hard-of-hearing (d/hh) students and those students who are d/hh with low vision to have wireless access to real-time speech-to-text services (RT-STTS) in varied outdoor and indoor settings. Two goals of the project are:

1. To develop assistive technology that allows d/hh and d/hh-low vision students to view RT-STTS in remote field science settings using a handheld device, such as a cellular phone or personal digital assistant; and,
2. To evaluate the extent that RT-STTS aids students' communication and learning in remote science field settings.

Poster session objectives:

1. Illustrate the technology that has been developed, including recently added low vision options
2. Describe trials that have been conducted to date in field settings associated with STEM college courses
3. Share qualitative and quantitative findings from data collected as a result of the field trials

Poster Number: 35**Presenter:** Cheri Fancsali**Institution:** Academy for Education Development (GSE)**Email:** Cfancsal@aed.org***Great Science For Girls - Extension Services Project***

Great Science for Girls: Extension Services for Gender Equity in Science through After-School Programs (GSG) is building the capacity of after-school centers to deliver programming that will broaden and sustain girls' interest and persistence in science, technology, engineering and mathematics (STEM). This poster will describe the strategies and different components of the GSG project, including partnerships, evidence-based curriculum, research and evaluation, and the unified program of change.

Poster Number: 36**Presenter:** Ana M. Feliciano**Institution:** University of Puerto Rico (LSAMP)**Email:** a_feliciano@prlsamp.org***PR-LSAMP PHASE IV: Sustaining Numerical Goals and Building Permanent Pathways to Grad Studies***

For the past nineteen year, PR-LSAMP has successfully implemented its activities in Puerto Rico; helping thousands of undergraduate and graduate STEM students. We will present a summary of our program activities including the Bridge to the Doctorate Program which has sponsored 82 graduate students to this date.

Poster Number: 37**Presenter:** Igor Filikhin**Institution:** North Carolina Central University (CREST)**Email:** ifilikhin@ncu.edu***Low-Lying Resonances Of ^9Be***

Studied is structure of the ^9Be low-lying spectrum within the $\alpha+\alpha+n$ cluster model. In this model the total orbital momentum is fixed for each energy level. The ^9Be energy levels are determined as a members of spin-flip doublet corresponding to the system total orbital momentum ($L=0+, 2+, 4+, 1-, 2-, 3-, 4-$). The Ali-Bodmer potential (model E) is applied for the α - α interaction and a local α - n potential is constructed to reproduce the α - n scattering data. The Pauli blocking is simulated by repulsive core of the s -wave components of these potentials. Configuration space Faddeev equations are used to calculate energy of the bound state ($E(\text{calculated})=-1.493$ MeV v.s. $E(\text{experimental})=-1.5735$ MeV) and resonances. A variant of the method of analytical continuation in coupling constant is applied to calculate the energies of low-lying levels. The proposed model satisfactorily reproduces available ^9Be spectral data. We confirmed previous predictions for the $J^\pi=9/2^-$ and $J^\pi=7/2^+$ resonances and compared the spectra of ^9Be and ^9Be nuclei.

Poster Number: 38**Presenter:** Benjamin Flores**Institution:** University of Texas System LSAMP (LSAMP)**Email:** bflores@utep.edu***UTEP: Promoting STEM Doctoral Student Success Through Mentoring and Professional Development Activities***

The University of Texas at El Paso (UTEP) is a national leader in Hispanic graduate degree production. Recent efforts by the Alliance for Graduate Education and the Professoriate and the Louis Stokes Alliance for Minority Participation's Bridge to the Doctorate are directly impacting STEM degree production. For instance, through the BD program, UTEP has offered competitive research fellowships to 46 under-represented STEM MS students. Of these fellows, 25 are now pursuing a Ph.D. degree and 5 have already earned their Ph.D. degree. Although BD fellowships are for two years only, we anticipate that the Ph.D. graduation rate will closely match that of the inspiring NSF Graduate Research Fellowship program. Similarly, AGEP has offered competitive stipends to 29 under-represented STEM Ph.D. students. These students report that, aside from the crucial financial support provided by AGEP, the program has created a support system and a sense of community that encourages them to persist in their studies. Students also report that AGEP sponsored conferences allow to learn about and explore career options.

Poster Number: 39**Presenter:** Norman Fortenberry**Institution:** NAE/Center for the Advancement of Scholarship on Engineering Education (GSE)**Email:** nfortenb@nae.edu***Engineering Equity Extension Service: Materials Developed and Lessons Learned***

The Engineering Equity Extension Service (EEES) project is an GSE supported (grant HRD-0533520) extension service project. Begun in 1995, the project has engaged engineering professional societies, K-12 engineering programs, and engineering departments to build career awareness, enhance engagement, and promote academic success among girls and women from middle school through collegiate sophomore. The ultimate aim of the project is to increase the number of women receiving baccalaureate degrees in engineering. This poster summarizes the materials created and the lessons learned over the five-year performance period of this grant.

Poster Number: 40**Presenter:** Merle Froschl**Institution:** Educational Equity Center at AED (GSE)**Email:** mfroschl@aed.org***Science: It's a Girl Thing***

It's a Girl Thing! poster will demonstrate how the project is harnessing the power of social media (Facebook, Twitter) to connect with parents and educators about how to foster girls' interest in science

and technology, and why that is important. The program offers web-based and easy-to-use resources for parents to conduct science activities at home with their young daughters. It posts regular updates, comments, videos, and links to materials on its Facebook page and other websites, which add interactive and dynamic features to the lessons. The target audience is parents who blog and use other social media—such as Twitter and Facebook—to find and share information.

Poster Number: 41**Presenter:** Amy Fruchtman**Institution:** Midwest Alliance in Science, Technology, Engineering and Math, University of Wisconsin-Madison (RDE)**Email:** afruchtm@wisc.edu***Exploration by Design***

For students with disabilities to consider STEM as a career possibility, it is essential that they have opportunities to participate in STEM activities outside of a classroom and visualize themselves engaged successfully in a STEM profession. Exploration by Design: How Stuff Works is an immersion experience hosted by the Midwest Alliance for high school students with disabilities who are interested in STEM, and for their parents to learn with them about transition issues. This poster will discuss the features of this immersion experience that make it an effective way to recruit students with disabilities into exploring STEM and postsecondary participation.

Poster Number: 42**Presenter:** Irene F. Goodman**Institution:** Goodman Research Group, Inc. (GSE)**Email:** goodman@grginc.com***Gender Differences in Early Science Experiences Leading to 8th Grade Science Achievement-related Choices (aka: Massachusetts Linking Experiences and Pathways Study)***

The NSF GSE-funded project, the Massachusetts Linking Experiences and Pathways Study (M-LEAP), is a prospective longitudinal study exploring how early formal and informal science experiences of elementary school-aged children are related to 8th grade gender differences in science achievement-related choices. The research is guided by the Eccles Expectancy-Value (EV) Model of Achievement-Related Choices (Eccles et al., 1983) and will follow overlapping cohorts of girls and boys from 3rd to 8th grade. The study, begun in March 2010, will start with approximately 1,200 students from classrooms across 8-10 purposively selected Massachusetts school districts, with the goal of retaining 800 students across the three years. The key data collection tool will be an annual student science experiences and interests questionnaire, supplemented by in-depth interviews with a subset of students; questionnaires for parents, teachers, and district subject matter specialists; and community informal science scans. This research will advance knowledge about attracting girls and other underrepresented groups into science. Considering the science career model as a chain across the lifecourse, ultimate science career selection can be linked back to earlier points, including graduate and undergraduate science degree attainment and high school and middle school science course choice and career aspirations. Gender disparities have been documented at all these points. However, to date, no research has examined how experiences earlier than

middle school affect successive links and how these relationships differ by gender. We envision this study as the first phase of ongoing longitudinal research with students through high school.

Poster Number: 43

Presenter: Laura Graves

Institution: Tennessee Technology University (RDE)

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Effects of Teaching with Table PCs with Asynchronous Student Access in Post-Secondary STEM Courses on Students with Learning Disabilities

TTASA-SWLD's three year RDE study of web-based instructional access as an accommodation for students with learning disabilities (including ADD/ADHD), analyzed student's attitudes, success, and persistence toward STEM courses at the post-secondary level. All partnering institutions were located in Tennessee and included Tennessee Technological University, Tennessee State University, Nashville State Community College, and Roane State Community College.

Poster Number: 44

Presenter: Rebecca Haacker-Santos

Institution: University Corporation for Atmospheric Research (GEO)

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New Strategies for Undergraduate-to-Graduate Bridge Programs from SOARS, Significant Opportunities in Atmospheric Research and Science

Research shows that even talented and academically well-prepared students encounter significant challenges when applying to and entering graduate school, and that these challenges may be especially discouraging for students from historically under-represented groups. SOARS, a multi-year undergraduate-to-graduate bridge program designed to broaden participation in the atmospheric and related sciences, prepares its students for these challenges with year-round training, mentoring and support.

Our presentation will describe particular SOARS elements' that help students prepare for graduate school, including authentic summer research experience at NCAR and partnering labs, strong mentoring that extends over several years, and a supportive community of peers. We will also describe our leadership training, comprehensive psychological support, graduate school seminars, GRE courses, school funding and the advice we provide on applying to and choosing a graduate program. Drawing from our ongoing program evaluation, we will highlight those strategies that students' describe as most useful. We will also describe how SOARS protégés, at their request, have led science outreach in low-income communities, introducing local elementary-aged children to hands-on science.

All these approaches have contributed to SOARS' success. Since SOARS' founding, 129 students have participated in the program. Of those participants, 107 have gone on to pursue graduate school. Eleven SOARS participants have already earned their PhD, 29 are currently in PhD programs, and 52 protégés have earned their master's, Over 86 percent of protégés in SOARS have been members of groups that are

historically under-represented in science, and 55% have been women. In recent years, SOARS has also welcomed students with disabilities and GLBT students.

In addition to discussing the SOARS' approach, we will also describe its influence on the creation of a summer high school internship program modeled after SOARS and our collaboration with RESESS, a partner program for students in the solid earth sciences, now in its fifth year.

Poster Number: 45

Presenter: Amy Hamlin

Institution: Michigan Technological University (GSE)

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Improving the Success and Retention of Engineering and Technology Students by Building Spatial Visualization Skills

Spatial visualization skills are vital to many careers and in particular to STEM fields. Materials have been developed at Michigan Technological University and Penn State Erie, The Behrend College to assess and develop spatial skills. The EnViSIONS (Enhancing Visualization Skills-Improving Options aNd Success) project is combining these materials and testing them with pre-college and college students at seven institutions: Michigan Tech, Penn State Behrend, Purdue University, University of Iowa, Virginia State University, Virginia Tech, and a "Project Lead the Way" course in south-central Arizona. By removing a barrier to success for students with low visualization skills, particularly women, the project leaders hope to improve the retention of these students in STEM disciplines and to enhance their success. This poster will give a brief overview of the implementations at the university level and the findings

Poster Number: 46

Presenter: Sandra Hanson

Institution: Catholic University (GSE)

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Views of Asian American Students on their Family's Support for Science: Positives and Negatives

This research uses a status attainment approach guided by a multicultural framework to examine recent data from a web survey collected on a representative sample of Asian American youth. Qualitative data from open-ended questions reflect perceptions regarding the influences of family, race, and gender on a variety of science related outcomes in the context of Asian culture. These outcomes include science attitudes and abilities as well as career aspirations for scientific occupations. An analysis of the content of the survey responses provides insights into the way that young Asian American women and men view positive (e.g. parents with science occupations and parental involvement and support), negative (e.g., pressures and high, often unrealistic expectations for success), and gendered (with more pressures on boys but expectations becoming increasingly similar) cultural and family influences in the science domain. Stereotypes about the "model" minority and the Asian advantage in science were often noted by respondents. Generally, the youth agreed that family expectations were higher for Asians than for non-Asians and that "parents expect their children to do well because they are oriental." Although most respondents noted the Asian pressure to succeed in science (in support of the stereotype) not all of the

respondents were interested in following this path. The youth in our sample reveal considerable complexity in their reports of Asian American family influences on science experiences and success. Findings question simplistic assumptions about "model minority" experiences in science including "model" family experiences that promote science.

Poster Number: 47**Presenter:** Kimberly Haynes**Institution:** Georgia Tech (AGEP)**Email:** kimberly.haynes@ece.gatech.edu***FACES: Facilitating Academic Careers in Engineering and Science***

FACES endeavors to increase the number of under-represented minorities (URMs) that attain science and engineering doctoral degrees, as well as those that enter academia. Primary focus is placed upon impacting the recruitment, retention and professoriate preparation of students spanning from undergraduate research experiences through doctoral programs of study. The target group is comprised of select scholars (undergraduates) and fellows (graduates) associated with metro-Atlanta universities/colleges Georgia Tech, Emory, Morehouse and Spelman. Based upon these constituents, the demographical impact is naturally weighted toward African-Americans, but other URMs (e.g., Latino) are also beneficiaries.

Poster Number: 48**Presenter:** Stella Helvie**Institution:** New Mexico Highlands University (RDE)**Email:** slhelvie@nmhu.edu***Universal Design: Access for All***

STEM-Stars is an innovative approach to introductory programs in science, technology, engineering, and math (STEM) fields. The objective of the STEM-Stars project is to enhance enrollment and retention for students with disabilities who pursue degrees in the STEM fields. STEM-Stars has adopted an integrative approach where diversity is viewed as the norm. The project will benefit a wide range of students who are currently underrepresented in the STEM fields especially students with disabilities. The project utilizes evidence based methods and advocates the use of Universal Design for Learning (UDL), Universal Design for Instruction (UDI), peer assisted learning, career and internship mentoring, and the use of technology to support the redesign and implementation of the targeted courses. Through the use of these strategies, the project creates an environment that not only creates accessibility for students with disabilities, but also benefits all students in general. STEM-Stars is working to bring systematic changes in teaching and learning at New Mexico Highlands University.

Poster Number: 49**Presenter:** Joan Herbers**Institution:** The Ohio State University (ADVANCE)**Email:** herbers.4@osu.edu

Comprehensive Equity at Ohio State

Comprehensive Equity at Ohio State (CEOS) is an institutional transformation program that focuses on the intersections between academic quality, leadership, and gender equity. CEOS has four programs: workshops for deans and chairs, peer mentoring for tenured women, entrepreneurship training for tenured women, and action project learning teams.

Our interventions are based upon a model of transformational leadership with five components. Research protocols are designed to examine the relative strengths of those five components for advancing gender equity, with a view to assess the validity of the model itself.

CEOS is in its second year, and our success to date is being evaluated. We are especially pleased to have recruited a strong contingent of partners in offices across campus, and very positive press has given us a reputation across campus for service.

Poster Number: 50

Presenter: Jill Hochstein

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ADVANCE-Nebraska: A Bird's Eye View

The goal of ADVANCE-NE is to create an environment at UNL where all Science, Technology, Engineering and Mathematics (STEM) faculty thrive. The grant supports best practices to increase recruitment and retention of women STEM faculty and efforts to study what practices best support their academic success. The leaders of our effort include the Original PI, Barbara Couture and the Current PI, Prem Paul, Senior Vice Chancellor for Research and Economic Development, and the co-Pis: Associate Dean of Engineering Chandra, Professor Holmes, Dean of Arts and Sciences Manderscheid, Associate Professor McQuillan. The proportion of women faculty in STEM departments at UNL is lower than national averages for all 26 departments we are studying. Preliminary conversations with department chairs, women in STEM, and baseline data indicated several areas that required attention to reach our goal. We needed to focus dual career issues, increasing women in applicant pools, and retaining Associate and Full professor women. Because of tremendous variation across departments, we planned to learn from departments with more women, replicate their practices in departments with fewer women, and identify modifiable barriers that influence all STEM departments. Our poster will provide a “birds eye view” our major initiatives and components, with preliminary evaluation information regarding which efforts have been most successful. Barriers identified in 2008 included challenges hiring spouse/partners, limited childcare availability, limited lactation support, limited information about work/life policies and options. We will describe the Advance Nebraska role in rectifying these barriers. We will focus on the new dual career procedures. Additionally, we will emphasize the “Best Practices” hand out created by our Recruit committee, the interactive program in development from our Promote committee, speaker series, workshops, writing retreats, data based presentations, and insights from the unique UNL department based network study. Preliminary results from this study indicate that departments with more research and social interactions have higher satisfaction and lower risk of faculty planning to leave in the near future. Serving on committees - without research or social interactions – does not improve faculty experiences.

Poster Number: 51

Presenter: Anne Hornickel

Institution: University of Minnesota (LSAMP)

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North Star STEM Alliance--Minnesota's LSAMP Program

The North Star STEM Alliance is a partnership of 16 Minnesota colleges and universities and two community organizations, a program supported by the National Science Foundation Louis Stokes Alliances for Minority Participation.

Alliance Partners:

Lead campus: University of Minnesota Twin Cities

Two affiliate campuses: University of Minnesota Morris and University of Minnesota Duluth

Five private colleges: Gustavus Adolphus College, Augsburg College, Carleton College, Macalester College and St. Olaf College

Three Minnesota State Colleges and Universities 4-year colleges: St. Cloud State University, Metropolitan State University, and Minnesota State University Mankato

Five Minnesota State Colleges and Universities 2-year colleges: Century College, Fond du Lac Tribal and Community College, Anoka Ramsey Community College, North Hennepin Community College, Minneapolis Community and Technical College

Two community organizations: Minnesota High Tech Association, Science Museum of Minnesota

III. Goals and Objectives

To double the number of underrepresented students receiving bachelor's degrees in science, technology, engineering and math among partner institutions in the state of Minnesota.

Objectives:

1. Support student achievement via tutoring and supplemental instruction.
2. Engage students more deeply in their fields through faculty mentorship and research opportunities.
3. Explore career pathways at 4-year colleges, in industry, and in graduate school.
4. Build community through social networking, peer mentorship, and student organizations.
5. Enhancing the academic and collegiate climate for success of underrepresented students in STEM through faculty engagement, curriculum development and institutional change.

IV. Methods/Program

Research preparation and engagement in undergraduate research opportunities:

Workshops were designed to prepare students to develop proposals for undergraduate research opportunities at their institution, a partner institution or an NSF- funded REU programs. Student who participated in the workshops were guided in identifying a faculty mentor and developing a research proposal. The outcome of the workshop was that it increased student awareness of graduate school opportunities.

Cohort based programs:

In order to foster community among students, they were placed in cohorts based on a number of factors, including: college of enrollment, class level, and/or coursework. Peer mentors, many from within the Alliance, led the cohorts.

Professional development:

Funding and programs have been created to provide networking opportunities, career exposure and guidance to students on professionalism as they seek to enter the workplace, apply for internships, co-ops and graduate school. Students have gained this experience through participation in workshops, travel to national or regional meetings in their field, or interdisciplinary meetings focusing on multicultural involvement such as the National Society of Black Engineers and the Minorities in Agriculture, Natural Resources and Related Sciences.

V. Current findings

We will report results from the North Star STEM Alliance's baseline survey given in the fall of 2009. The purpose of the survey was to understand how multicultural and majority students perceive and feel about the support they receive from their colleges toward achieving a bachelor's degree in science, technology, engineering, and mathematics. Over 1,100 first-year students on three University of Minnesota campuses responded to the online survey. The survey collected demographic information, high school preparation in subjects related to the STEM fields, self-efficacy in chemistry, math and physics, as well as information on the collegiate experience. Students were asked if they have, or plan to participate in various extracurricular, academic, and work-related activities. These data were collected to match questions asked by the National Survey on Student Engagement (NSSE).

In addition, students were surveyed about finances, career planning, and concerns which may inhibit their degree completion in the STEM fields.

Poster Number: 52

Presenter: Mahesh Hosur

Institution: Tuskegee University (CREST)

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Structural, Thermal, And Fire Properties Of A Series Of Brominated Resole Phenolic Copolymer Resins

A series of brominated resole phenolic (BrPF) copolymer resins were examined to determine how the position of the bromine substituent affected thermal, viscoelastic, and fire properties. The resins were prepared such that the bromine substituent was located on either the meta, ortho, or para position relative to the hydroxyl group of the phenolic ring. A non-brominated resole phenolic (PF) resin was also prepared to observe the overall effect of bromine on resin properties. Isothermal cure kinetics was determined at 110° C, 120° C, 130° C, and 140° C showed shorter cure times for the ortho- and para-brominated resins. Differential scanning calorimeter revealed a decrease in the glass transition temperature (T_g) for the BrPF resins and an abundance of residual monomer for the meta-brominated phenolic resin. Dynamic mechanical analysis also revealed a decrease in the T_g with the incorporation of bromine. The presence and position of bromine did not cause a significant difference in the storage modulus. Thermomechanical analysis (TMA) also showed a decrease in the T_g with the presence and position of bromine as well as a decrease in the dimensional stability for the ortho- and para-brominated resins. Thermogravimetric analysis (TGA) curves revealed increased thermal stability for the BrPF resins below 330° C and above 870° C relative to the non-brominated PF resin. Pyrolysis-combustion flow calorimetry (PCFC) and cone calorimeter analysis revealed increased fire properties for the ortho- and para-brominated resins relative to the non-brominated PF resin. Decreased fire properties were observed for the meta-brominated resin.

Poster Number: 53**Presenter:** Eric Howard**Institution:** Fulbright Academy of Science & Technology (LSAMP)**Email:** ehoward@FulbrightAcademy.org***The Fulbright Exchange Program - Alumni as a Resource for HRD***

Each year, over 2,000 college seniors, graduate students, post-docs and professors in science, engineering and technology fields are awarded Fulbright Scholarships to conduct research and/or lecture and teach abroad. Some are internationals who come to the USA from their home country, others are US citizens going abroad. The alumni are a rich and diverse network of academics, professionals and researchers working in government, the private sector and the educational community. The Fulbright Academy of Science & Technology is using these alumni as a means for linking the US and international science community, thereby promoting professional development, research collaboration and science diplomacy. The poster describes work done with undergraduate students in the LSAMP program.

Poster Number: 54**Presenter:** Gail Hyde**Institution:** Rochester Institute of Technology (RDE)**Email:** gail.hyde@rit.edu***RDE-Enrichment: Testing the Concept of a Virtual Alliance for Postsecondary Level STEM Students who are Deaf and Hard-of-Hearing***

This project is focused on investigating the creation of a virtual support network for deaf and hard-of-hearing (D/HOH) students mainstreamed in colleges and universities across the US who are enrolled in STEM programs. The idea for the alliance grew out of a 2008 NSF-sponsored Summit to Create a Cyber-Community to Advance Deaf and Hard-of-Hearing Individuals in STEM (NSF OCI-0749253) that brought together national and regional leaders in the field of support service provision for postsecondary D/HOH students.

Goals of the project are to:

1. Establish a comprehensive baseline profile of current D/HOH postsecondary students in STEM programs
2. Determine which institutions these students attend
3. Conduct focus groups with service providers to identify key attributes related to academic success of D/HOH STEM students
4. Identify potential partner institutions for an alliance
5. Identify elements of successful support services for STEM students
6. Identify features of successful NSF RDE Alliances that could be implemented virtually for D/HOH students
7. Explore technologies that could provide support services for STEM students using cyberinfrastructure
8. Formulate plans to enrich the academic performance of these students through a virtual cyber-community that could include:
 - a. Remote interpreting and remote captioning provided by interpreters/captionists with expertise in the vocabulary and concepts of STEM subjects
 - b. Remote mentoring and tutoring
 - c. Social networking system that functions as a “support network” allowing D/HOH students to connect with peers in STEM fields
 - d. Support for service providers

Poster Number: 55

Presenter: Overtoun Jenda

Institution: Auburn University (RDE)

Email: jendaov@auburn.edu

The Alabama Alliance for Students with Disabilities in Science, Technology, Engineering, and Mathematics (AASD-STEM)

The Alabama Alliance for Students with Disabilities in STEM (South Alliance) is a collaborative research effort between Alabama State University, Auburn University, and Tuskegee University. The Alliance also includes Auburn University at Montgomery, Central Alabama Community College, Southern Union State Community College, Alabama Institute for the Deaf and Blind, and six school districts in East-Central Alabama. The objective of this alliance is to increase the quantity and quality of students with disabilities receiving associate, baccalaureate, and graduate degrees in science, technology, engineering, and mathematics (STEM) disciplines through distinctive bridge interventions. This unique Alliance, which includes two Historically Black Universities, Tuskegee University and Alabama State University, builds upon established STEM bridge programs for underrepresented groups

Poster Number: 56

Presenter: Rand John

Institution: Kapiolani Community College (TCUP)

Email: jrand@hawaii.edu

FIRE UP - Faculty Integration, Research, and Engagement in Urban Polynesia to institutionalize, improve and sustain a formal STEM enterprise.

This poster will highlight the grant activities to date of the I-Cubed FIRE-UP grant at Kapiolani Community College, University of Hawaii. Highlights will include best practices embedded in STEM faculty development opportunities, as well as the other features of the grant that allow faculty to improve their teaching and subsequent success rates in their classes. This poster will highlight efforts in institutional integration of federal grants and the cross-cutting nature of FIRE-UP by introducing tools that measure STEM institutionalization progress, summer faculty development workshops aimed at increasing student retention, and success rates in the STEM classroom, as well as other program changes that increase the level of collaboration among STEM faculty.

Multiple measures including formative and summative assessment, focused group discussions, and STEM student tracking indicate a significant growth in (1) Math and science faculty who are actively engaged in regards to mentoring students, (2) Faculty participation in undergraduate research experiences for STEM students, and (3) The application of intrusive advising and recruitment by faculty to encourage STEM as a major. The challenge lies in broadening the awareness of the program's opportunities to faculty and students in other disciplines and in fully integrating these efforts broadly throughout the institution.

Poster Number: 57

Presenter: Alvin Kennedy

Institution: Morgan State University (CREST)

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Morgan's CURE: Continuous Undergraduate Research Experience

Morgan State University has developed a Continuous Undergraduate Research Experience (CURE) which actively engages students from freshman through graduate level in scientific research. The specific goal of CURE was to develop Morgan's research infrastructure by providing students, beginning in their

freshmen and sophomore years, with a comprehensive and continuous undergraduate research experience throughout at least two academic years and subsequent summers. CURE is comprised of two interrelated components; Undergraduate Research Development Program and Interdisciplinary Research Experience. The Undergraduate Research Development Program is designed to facilitate the development of critical thinking and essential survival and time management skills as they relate to research and academic activities. The framework for the research development program is divided into three categories: critical thinking and literature, critical thinking and research and critical thinking and peer review. Students are required to make presentations, attend developmental workshops during the summer and the academic year, critique technical seminars and participate in networking activities. The Interdisciplinary Research Experience allows students of varying levels to conduct meaningful interdisciplinary biosensor research among different research subprojects. The strategies and challenges involved in implementing Morgan's CURE will be presented.

Poster Number: 58**Presenter:** Crist Khachikian**Institution:** California State University Los Angeles (CREST)**Email:** ckhachi@calstatela.edu***CREST Center for Energy and Sustainability at the California State University Los Angeles***

The California State University, Los Angeles has established a new CREST Center for Energy and Sustainability (CEaS), with the three fold mission of: 1) increasing the number of underrepresented students in STEM fields and, especially, putting them on a path towards the professoriate; 2) conducting innovative, multidisciplinary, research in energy and sustainability; and 3) increasing public awareness and engaging policymakers in this nascent movement. Under the unifying theme of Energy and Sustainability, the four center subprojects engage in research to address three cornerstones of energy sustainability: diversity of sources, efficiency in use, and long-term sustainability. The “biofuels combustion” subproject tackles research to make current combustion more efficient and less polluting. The “photovoltaics” subproject personnel are developing highly efficient and inexpensive photovoltaic cells. The “fuel cells” subproject is creating micro-fuel cells for applications in portable electronics. Finally, the “carbon sequestration” component is interested in understanding the impacts of carbon capture and storage on the environment. Our consortium of partners includes representatives from middle and high schools, community colleges, public and private Ph.D.-granting institutions, the largest energy providers and utilities in the U.S., private industry, national laboratories, and policy-makers. Our dedication to recruiting underserved students into STEM and our commitment to providing them with excellent research opportunities and high quality mentoring will ensure that our activities will address the gross underrepresentation of our students in STEM fields.

Poster Number: 59**Presenter:** Judith Kirkpatrick**Institution:** Kapiolani Community College (TCUP)**Email:** kirkpatr@hawaii.edu***STEM Institutionalization Mapping through Campus Surveys***

This poster will display information and initial implementation results from its 2009 FIRE-UP “I-Cubed” grant survey that measures campus-wide institutionalization with an instrument called the “Assessing Institutionalization Map” (AIM). The grant investigators have a baseline and improvement strategies that measure the degree to which STEM Education, as an innovation in undergraduate education, is integrated six aspects of institutionalization. In January 2009, AIM was adapted from a large focus group methodology to a broad, institutional, online survey by Professor Judith Kirkpatrick and Dr. John Rand, who refined the factors to reflect the STEM program and its status on campus, facilitated electronic distribution, and collaborated on subsequent analysis with the College’s Institutional Research staff. The first campus-wide electronic survey was administered in February 2009. After assessing the success of the AIM in survey form and improving it, the survey will be administered again in 2011 and 2013.

The online AIM-STEM 26 item survey assesses the knowledge of the respondents faculty and staff on various aspects of the STEM program and how the respondents identify the degree of institutionalization of the STEM program.

Six aspects of STEM institutionalization are covered in the survey:

1. philosophy and mission, items 1-4;
2. faculty and staff support, items 5-8;
3. student support, items 9-12;
4. partnership, items, 13-17;
5. institutional support, items 18-23;
6. curriculum and activities, items 24-26.

Also, five demographic questions ask respondents to identify their primary role at campus, full-time or part-time status, length of employment, primary program for teaching faculty and staff and primary duty for support faculty and staff.

Poster Number: 60

Presenter: Peter Lalley

Institution: Rochester Institute of Technology (RDE)

Email: palbgs@rit.edu

Enhancement Of Educational Access Through Emerging Technologies: Real Time Text Generation And Unified Information Display Methods

Students who are deaf or hard of hearing as well as students with other special needs (e.g. Low Vision, LD, and ADHD) are often denied full participation in formal and informal educational activities due to the lack of appropriate and effective access services. Continuing advances in technology have the potential to expand availability of real-time display of text and non-text information that could reduce communication and educational barriers that can impede effective learning. Our study with 108 student participants who are deaf or hard of hearing was initiated to provide effective options and data-based guidance for students, teachers, employers, and service providers to reach the goal of full participation in educational environments and the world of work. Data from the study demonstrate that automatic speech

recognition (ASR) combined with a unified field of vision is an effective access service, both educationally and cost wise. In addition, ASR provides direct exposure to the vocabulary of science and technology, which is critical for interactive participation in STEM disciplines and conceptual understanding. We will share the lessons learned about what works or doesn't work when displaying multiple inputs of text and non-text information to enhance student participation and learning in STEM disciplines.

Poster Number: 61**Presenter:** Susan Lord**Institution:** University of San Diego (GSE)**Email:** slord@sandiego.edu***Framing Persistence: Gender and Race in Undergraduate Engineering***

Concern for workforce needs, social justice, and the diversification of the profession has driven considerable research on women and minorities in engineering. In this NSF GSE research grant, we have shown that women in all racial groups graduate in 6 years at rates comparable to men. We have also studied how the way we measure persistence of engineering students affects our conclusions. Findings from studying a longitudinal, comprehensive dataset of more than 75,000 students matriculating in engineering at nine universities reveal that trajectories of persistence from eighth-semester enrollment to six-year graduation are non-linear and racialized. Gender differences in persistence of Asian, Black, Hispanic, Native American, and White students are still far outweighed by institutional differences. Racial differences are more pronounced, however, revealing some patterns that transcend institutional difference

Poster Number: 62**Presenter:** Lynn Lovewell**Institution:** EAST-2 Alliance (RDE)**Email:** llovewell@usm.maine.edu***RDE EAST Alliance for Students with Disabilities in STEM Phase 2***

The RDE EAST Alliance for Students with Disabilities in STEM Phase 2 is a comprehensive Pipeline of supports, which serve as a model for institutes of higher education nationally that are advancing high school, undergraduate, and graduate students with disabilities in STEM. The primary institution is the University of Southern Maine, partnering with Central Maine Community College, Kennebec Valley Community College, and four regional high schools.

The two primary goals of the project are : Increasing the number of students with disabilities that enroll in STEM majors, specifically natural, biological, chemical, and physical sciences, technology, engineering and mathematics, at the primary and partner institutions of post-secondary education, and increasing the number of undergraduate and graduate students who successfully complete associate degrees, baccalaureate degrees and graduate degrees in STEM disciplines and subsequently enter the STEM workforce.

The refined steps for success include three primary foci: targeted STEM learning experiences for high school students with disabilities, providing STEM academic support and research experiences for undergraduate students with disabilities, and professional educational development for STEM teachers and faculty. The external evaluation of EAST2 is being conducted by the Education Development Center. The purpose of the evaluation is to collect formative evaluation to help guide the implementation of project activities, and to obtain summative data about the impact of the activities on program participants

Poster Number: 63**Presenter:** Randal L.N. Mandock**Institution:** Clark Atlanta University (LSAMP)**Email:** rmandock@cau.edu***Highlights of the Georgia LSAMP 2010 Research Symposium***

The 2010 Georgia LSAMP Research Symposium took place on the campus of Clark Atlanta University on 17 April 2010. More than thirty LSAMP undergraduate scholars were present. Six oral presentations of student research and about two dozen poster presentations were judged by a panel of LSAMP Campus Coordinators, Interdisciplinary Faculty Team Members, and the LSAMP Program Coordinator. At the end of the day, five awards were presented to three winners and to two teams of two winners. Posters and oral presentations covered the fields of biology, chemistry, computer science, mathematics, and physics.

Besides the student presentations, afternoon student breakout sessions involved lively discussions about ways the LSAMP program could improve scholars' research and academic experiences, career preparation, and professional and cultural growth. Each breakout session sponsored representatives who summarized the work of their group and made recommendations about activities and attitudes that would enhance student progress through their STEM academic programs. Summer research activities, visits to workplace industries and agencies, better communication about internship and job opportunities, the undergraduate research environment, student research and cultural collaborations between partner institutions, travel and academic scholarship support, peer tutoring, additional symposiums and science competitions, and initiation of student and alliance LSAMP chapters (including a possible STEM Student Council of members from all alliance schools) were among the topics discussed.

Our poster will show highlights of the Symposium activities, results of the student competitions and breakout session discussions, and students engaged in dissemination of their research results.

Poster Number: 64**Presenter:** Aristides Marcano**Institution:** Delaware State University (CREST)**Email:** amarcano@desu.edu***Photo-thermal Lens Based Immunoassay for Detection of Gold Labeled Protein Bio-markers***

We report on a new type of immunoassay based on the photothermal lens effect and aimed at high sensitivity detection of protein biomarkers. The proteins are labeled with gold nanoparticles that exhibit high absorbance of visible light. We show that gold nanoparticles can be detected in water solution at the

ppb level using the photothermal lens generated by green or blue light of moderate power. We use gold labeled biotin and mix it with avidin water solution of different concentration. We demonstrate detection limits of the order of 10 ng/ml for the avidin protein.

Poster Number: 65**Presenter:** Jay Martin**Institution:** Midwest Alliance in STEM University of Wisconsin-Madison (RDE)**Email:** martin@engr.wisc.edu***Exploration by Design: Immersion to Promote Transition into Postsecondary STEM Education***

For students with disabilities to consider STEM as a career possibility, it is essential that they have opportunities to participate in STEM activities outside of a classroom and visualize themselves engaged successfully in a STEM profession. Exploration by Design: How Stuff Works and Exploration by Design: How CAD Works are immersion experiences hosted by the Midwest Alliance for high school students with disabilities who are interested in STEM, and for their parents to learn with them about transition issues. This poster will discuss the features of these immersion experience that make it an effective way to recruit students with disabilities into exploring STEM and postsecondary participation.

Poster Number: 66**Presenter:** Sergei Matinyan**Institution:** North Carolina Central University (CREST)**Email:** smatinian@nc.rr.com***Single Electron Level Statistics In Double Quantum DOT***

Nanosize quantum objects manifest atom-like electron structure due to size confinement. The electronic structure of single quantum dots (SQD) can include from a few to several hundred electron and hole levels. We model InGaAs/GaAs and Si/SiO₂ quantum objects, such as double quantum dots (DQD) based on single band effective mass approximation. Statistical properties of the electron confinement are considered. In particular to determine the type of the nearest neighbor spacing (NNS) statistics, the distribution function is calculated. The influence of the DQD shape symmetry on the NNS distribution is investigated. The Brody formula is applied and variations of the Brody parameter for different QD shapes are evaluated. Repulsion of the levels indicated by energy distribution function is considered as an evidence of chaotic properties of the electron confinement.

Poster Number: 67**Presenter:** C. Diane Matt**Institution:** WEPAN - Women in Engineering ProActive Network (GSE)**Email:** dmatt@wepan.org***WEPAN Knowledge Center-Celebrates 1st Birthday!***

WEPAN is leading an effort to develop a resource to meet the need for readily accessible information and communication about women in engineering. Funded in 2007 by a National Science Foundation

Engineering Education and Centers (EEC) grant (#0648210) WEPAN has built a digital Women in Engineering Knowledge Center focused on informing research, practice and institutional change related to women in engineering. The WEPAN Knowledge Center, launched in April 2009, serves as a national repository of links to resources, reports, books, organization profiles, data, and best practices on issues related to women in engineering. In addition, the Knowledge Center serves as a capacity-building tool, where communities of people and groups working to address these issues can connect, share best and promising practices and support one other's programs. This poster presents an overview of these opportunities as well as usage statistics for the WKC that demonstrate significant audience response to dissemination and project activity.

Poster Number: 68**Presenter:** Holly Matusovich**Institution:** Virginia Tech (GSE)**Email:** matushm@vt.edu***Mixed-Methods Study of the Effects of First-Year Project Pedagogies on the Retention and Career Plans of Women in Engineering***

Despite the growth of design projects in first-year courses, little research to date examines the pedagogies appropriate for such courses or seeks to understand in detail how such pedagogies affect women's experiences in engineering. Broad studies of retention data do show promising results for women in project-based courses. However, given the wide variations in the way such projects are implemented, engineering educators need a richer understanding of how specific project-oriented pedagogies affect students', and particularly women's, beliefs about engineering and their intended career plans. We focus on women because of the strong need to insure effective retention efforts in the midst of a movement to enact large-scale curricular transformation in engineering.

To address this gap, over three years are investigating the problem-based learning (PBL) model to identify elements of the model most likely to better support the persistence of women in engineering. The study compares first-year project pedagogies at two universities. At State U1, students select a specific engineering department before entering the university, and a well-defined, explicitly structured PBL model has been employed successfully in the first-year program in biomedical engineering for several years. At State U2, students enter a large general engineering program that has uses a more general project-based approach to integrate design projects into the first-year curriculum. The proposed study examines each model individually, and then creates interventions in the general program at State U2, to test the effects of both the project definition and team facilitation practices from the PBL model. Using a longitudinal, mixed-methods approach, we will answer the research question: How does applying the PBL principles of problem definition and team facilitation to first-year design courses affect women's beliefs about engineering and their persistence in engineering when compared to traditional engineering design project pedagogy? Results from quantitative surveys will be integrated with qualitative results from observations of team interactions and interviews using a purposive sample of women and men in each program.

Poster Number: 69**Presenter:** Nina Maung-Gaona**Institution:** Stony Brook University (AGEP)**Email:** Nina.Maung@stonybrook.edu***Ten Years of SUNY AGEP: Four Major Alliance Outcomes***

Since the inception of the State University of New York (SUNY) AGEP Program in 1999, comprehensive activities and services have been created to broaden access and success of historically underrepresented students in science, technology, engineering, and mathematics (STEM) doctoral programs. These systems were strategically designed to expose students to opportunities in research, help students overcome challenges in graduate school, excel in their fields and plan productive futures. In celebration of our tenth anniversary, we will share four major outcomes of our program in the form of one case study per alliance institution. These case studies include measured outcomes of: (1) The Preparing for the Professoriate Conference, (2) The Summer Research Institute, (3) The Research Lunch Series and (4) The Graduate Community of Scholars. Significant impact has also been achieved in the advancement of underrepresented minorities in Professoriate careers and we will share those statistics as well.

Poster Number: 70**Presenter:** Melissa McDaniels**Institution:** Michigan State University (ADVANCE)**Email:** mcdani73@msu.edu***Advancing Diversity through the Alignment of Policies and Practices (ADAPP) - Establishing a Foundation for the Institutionalization of Michigan State University's NSF ADVANCE Program***

MSU's ADVANCE program has been established to promote MSU's values of quality and inclusion by enhancing the alignment, consistency, transparency and objectivity of academic human resource practices across the STEM fields. This poster will showcase three core elements of our conceptual approach to transformation, as well as highlight project activities forming the foundation of institutionalized change at Michigan State. Signature programs such as the Faculty Information Tool (e-portfolio for faculty / AHR data system for chairs and deans) as well as our new Mentoring Initiative will be described. We will highlight normative tensions that characterize our approach to institutional transformation at Michigan State University.

Poster Number: 71**Presenter:** Richard McGinnis**Institution:** Tougaloo College (HBCU-UP)**Email:** rmcginnis@tougaloo.edu***Buiding Research Capacity at a Small College***

Small HBCUs are primarily teaching institutions, but current expectations for undergraduate science programs strongly encourage the integration of research into teaching. This is clearly best done if campus faculty members are carrying out research with students during the academic year. In this poster we

describe how Tougaloo College has gone from no faculty researchers to five, with 50% released time for four of them at no expense to the institution, lasting well beyond the support from HBCU-UP. Our project has been significantly enhanced by support from other institutions and government funding sources.

Poster Number: 72**Presenter:** Lois McLean**Institution:** McLean Media (GSE)**Email:** stem@storyline.com***Combining Online Resources to Tell STEM Stories***

The STEM Stories project is building a free online collection of digital resources to introduce students in intermediate and middle-school grades to STEM careers through compelling personal stories. It highlights individuals (especially women) in diverse STEM fields using a variety of media, including images, audio interviews, personal photo albums, video clips, interactive experiments, and text biographies. The site includes a searchable database of media clips and biographical profiles of STEM pioneers, past and present, and a "Featured" section that offers an in-depth look at the lives and work of inspiring individuals. The site builds on the Content Clips system framework for assembling and customizing online resources and presentations (www.contentclips.com), which grew out of a research and development project funded by the NSF's National Science Digital Library program. This poster will show the range of resources available at the STEM Stories web site and outline future plans. Other projects with related goals and materials are invited to collaborate with STEM Stories to distribute and publicize their own digital content through this web portal. GRE Outreach and Communication Grant, NSF HRD-0734004, Principal Investigators: Lois McLean, Ed.D. and Rick Tessman, McLean Media, stem@storyline.com

Poster Number: 73**Presenter:** Lisa McMullin**Institution:** Tuskegee University (CREST)**Email:** bufford@tuskegee.edu***PhD Program in Materials Science and Engineering at Tuskegee University***

Housed in the College of Engineering, Architecture and Physical Sciences at Tuskegee University, the Ph.D. Program in Materials science and Engineering was started in 1988 with support from the National Science Foundation under the Center for Research Excellence in Science and Technology (CREST) program. It is the University's first doctoral program, which is designed to substantially increase the number of African American Ph.D.'s in Materials Science and Engineering. The program is spearheaded by the Center for Advanced Materials (T-CAM), which represents the largest multidisciplinary research and education and outreach activity on Tuskegee's campus. The program is designed to allow students with an undergraduate or a Master's degree in Engineering, Mathematics, Chemistry or Physics to enroll. A broad spectrum of areas connected with Materials Science and Engineering is available for research at the Ph.D. level. The success of the program within a short period of time has been phenomenal. We have already produced nineteen (19) graduates and several others are on their way to complete their degree requirements.

The program is also supported through various other grants including those from the National Science Foundation, the U.S. Department of Defense, (Air Force Research Laboratory, Army Research Off, Office of Naval Research, and U.S. Army Engineer Research Development Center-Construction Engineering Research Laboratory) and industry.

Poster Number: 74**Presenter:** Hayk Melikyan**Institution:** North Carolina Central University (CREST)**Email:** melikyan@nccu.edu***Electron Properties of Si/SiO₂ Quantum Dots: From Single To Array***

Spherically shaped Si quantum dots embedded into SiO₂ substrate are considered under the single sub-band effective mass approach. The energy dependence of electron effective mass is taken into account for the case of small size QDs. We considered the single, double QD, and array of QDs in three dimensions (3D). Calculations of low-lying electron energy levels are performed using finite elements method. We used first order perturbation theory, including the Coulomb force between an electron and a heavy hole, to calculate neutral exciton recombination energy and compared obtained results with the PL experimental data, which are reproduced well by our calculations. For double QD we found the distance between QDs when tunneling becomes impossible to be about 3 nm. Only the high levels electrons are tunneling in this case. For a 3D array of QDs, we show the formation of multibands from electron levels that correspond to a single QD and its interference with other QD dots in the array. The influence of distances between QD on the neutral exciton recombination energy was studied. These results agree qualitatively with ones obtained previously.

Poster Number: 75**Presenter:** Peggy Meszaros**Institution:** Virginia Polytechnic Institute and State University (GSE)**Email:** meszaros@vt.edu***Building Community Capacity to Bring Appalachian Females to IT Jobs***

Building community capacity is the collective effort of community members to have positive change occur. Our community change is to build capacity to bring females into IT jobs. This requires investing in the environment surrounding the girls and includes creating formal and informal networks, building social capital, and measuring capacity. Social ties, effective collaboration, and changing community perceptions are all relational aspects of social networks that create a significant part of community-based program sustainability. Sustainability is further enhanced as social capital is built through development of the AITES Portal, mini-grant activities, the Power of Partners DVD, posters, placemats, bookmarks, and networking cards. Outcomes after only two years show significant change in community perceptions of IT schemas and gender stereotypes.

Poster Number: 76**Presenter:** Susan Metz**Institution:** Stevens Institute of Technology (GSE)**Email:** susan.metz@stevens.edu***ENGAGE - Engaging Students in Engineering***

The overarching goal of ENGAGE – Engaging Students in Engineering is to increase the capacity of engineering schools to retain undergraduate students by facilitating the implementation of three research-based strategies to improve students’ day-to-day classroom and educational experience. Beginning in 2010, teams from 30 engineering schools (10 per year) will be working to implement ENGAGE strategies in the 1st and 2nd year when student attrition is highest. The following strategies were selected because research indicates that they improve retention of undergraduate engineering students, particularly women; and because they are enhancements rather than changes to the curriculum:

- Integrating into engineering courses, Everyday Examples in Engineering (E3s)
- Improving student spatial visualization skills
- Improving faculty-student interaction

Institutions involved in ENGAGE in 2010 include:

Kettering University
Purdue University
Rose-Hulman Institute of Technology
Stevens Institute of Technology
The Ohio State University
The University of Texas at Austin
University of Louisville
University of Maryland
University of South Carolina
Virginia Tech

ENGAGE schools are supported by:

- Two-day strategy implementation workshop
- Mini-grants
- Technical assistance from ENGAGE staff and consultants
- www.EngageEngineering.org
- WEPAN Knowledge Center

Poster Number: 77**Presenter:** Donna Milgram**Institution:** Institute for Women in Trades, Technology & Science (GSE)**Email:** donna_milgram@iwitts.com***The CalWomenTech Project: Using Surveys to Inform Retention Strategies of Female Technology Students***

What retention and support strategies do women students in STEM courses find most helpful? In 2009, the Institute for Women in Trades, Technology and Science (IWITTS) conducted a survey of female students in technology courses in which they are underrepresented across seven of the eight community colleges participating in the CalWomenTech Project and 60 female students responded. These surveys collected data on both current recruitment and retention strategies, focusing mainly on retention and what female students would like to see more of in the STEM classroom. Selected results from the newly compiled surveys are published here. Also discussed is how the survey results have been used to evaluate and inform support strategies employed by colleges to retain women in technology programs.

The CalWomenTech Project was highlighted by the National Science Foundation (NSF) following an expert panel review at the three year mark in December 2008 for demonstrating significant achievement and program effectiveness to the Committee for Government Performance and Results Act (GPRA) Performance Assessment. Retention strategies implemented by the eight community colleges participating in the CalWomenTech Project have led to a significant net increase in the completion rates of not only females, but also males, in several of the colleges. Both colleges that saw the largest increases in female completion rates, from 81% to 100% in 15 months and from 57% to 100% in 9 months, also saw a 20% increase in male retention.

Poster Number: 78**Presenter:** Carolyn Morgan**Institution:** Hampton University (HBCU-UP)**Email:** carolyn.morgan@hamptonu.edu***FORCE: Financially Oriented Research Calculus Experience at Hampton University***

With the current economic climate, it is crucial that finance related topics be incorporated into the education process at all levels. Information about the effectiveness of financial literacy programs at the college level has not been adequately examined. A survey of college students revealed that they wanted their universities to offer financial literacy information outside of the normal focus of financial aid (Cude et al. 2006). Though there was no general consensus regarding the mechanism by which financial literacy should be delivered, the most common request was to begin financial literacy during the freshman year. In addition, students suggested the development of a financial literacy center, student workshops, seminars and even the inclusion of financial education in required college courses.

The FORCE project outlines an education research investigation to answer the question: Does a proposed new model of curricular instruction focused on the integration of financial applications significantly increase achievement in calculus for STEM major? This study will investigate the impact of discipline-

related research projects on student learning outcomes in calculus and retention of STEM majors. Instruction and content will include design, analysis and financial applications and case studies.

The findings from this project will contribute to the body of evidence that increased academic achievement in calculus is a significant factor in retention of STEM majors. A carefully designed education research study will be implemented and evaluated. A study with mixed methods research paradigms will be employed.

Poster Number: 79

Presenter: Joy Morrison

Institution: University of Alaska (ADVANCE)

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Getting a Clear Picture

We received a Catalyst award in 2009 and have been working on collecting data, and doing primary research since September of that year.

The results of the institutional research, the survey of STEM faculty and the focus groups with both men and women are presented in our poster. It includes summary data from the survey of 304 faculty members, and a content analysis of the transcripts of four focus groups – two with male faculty and two with female faculty.

Preliminary results of salaries show decreasing differences between new male and faculty hires, particularly in one college with large numbers of STEM faculty. We will have similar data plotted from our five STEM colleges.

The poster will show our methodology of an institutional ethnography, and will have graphic results from the survey, the salary study and a selection of comments from the focus groups. We also interviewed deans, and women faculty who have left the institution, and a selection of comments will be on the poster.

Poster Number: 80

Presenter: Chandra Muller

Institution: University of Texas at Austin (RDE)

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High School Course-taking of Students Identified with Learning Disabilities

Students with learning disabilities face many potential barriers toward the completion of important high school courses: their own lower levels of academic achievement and self-efficacy, a greater likelihood of having other markers of social and academic disadvantage (e.g., low SES, racial/ethnic minority), and the stigma of a label that may negatively influence their course placement. We employ a large nationally representative database, Educational Longitudinal Study of 2002, to explore course-taking differences between identified and unidentified students. We find that students identified with learning disabilities complete fewer credits in academic courses and take lower level science and math courses, even in contrast to unidentified students with comparable backgrounds, academic histories, and early high school

academic experiences and achievement test scores. The largest gaps are evident in high school science and foreign-language courses.

Poster Number: 81**Presenter:** James Nimmo**Institution:** North Carolina Central University (CREST)**Email:** Tristan_Nimmo@msn.com***Continuous analytical solutions for strain applied to quantum dot and rings***

Several analytical strain matrix component solutions for quantum dot (QD) various geometries have been derived using principles of continuous mechanics. These strain calculations were used to determine the shift in electron energies for various QD and ring configurations and sizes (M. Grundmann et al. PRB 52, 11969 (1995)). In the presented work we propose simplified strain approximation for such calculations. This approximation is accompanied by the band gap model given in I. Filikhin et al. PRB 73, 205332 (2006). The results of our calculation are compared to those of previous ones. In addition, comparisons are made between 2D and 3D electron energy calculations. Finally the limits of continuous strain calculations are discussed.

Poster Number: 82**Presenter:** Keolani Noa**Institution:** Kapi'olani Community College (TCUP)**Email:** keolani@hawaii.edu***Roots, Resilience and Reach, an Ongoing Path to Diversifying the STEM workforce.***

This TCUP poster, Roots, Resilience and Reach, highlights a 5-year NSF supported effort to recruit, retain, and inspire students to participate in STEM innovative instructional and outreach programs at Kapi'olani Community College (KCC). One of the STEM program goals, to increase the number of diverse STEM students, especially Native Hawaiians, transferring to four-year degree programs, has shown significant growth in new Hawaiian STEM student enrollment, retention, and transfer. As of 2010, the program has recruited and supported 271 Hawaiian STEM students. The success of recruitment strategies shows 64% of the students signed up for the STEM A.S. N.S. degree students are of Hawaiian descent. The program has only been in existence since 2005, yet the numbers are staggering. The innovative experiences student have as they prepare to transfer give them the resilience needed whether in a challenging class or in leadership responsibilities within the STEM Center. Students have been successful in a broad spectrum of positions and their contributions, when they transfer are noted by our four-year transfer campuses. This poster will demonstrate the numbers of Hawaiian students and also highlight some of the culturally significant experiences and strategies used by the STEM program over the last five years.

Poster Number: 83**Presenter:** Laurie O'Brien**Institution:** Tulane University (GSE)**Email:** lobrien2@tulane.edu***The Cultural Construction of STEM Fields: Similarities and Differences between African American and White American Female College Students***

The present study investigated how the cultural construction of Science, Technology, Engineering, and Mathematics (STEM) fields as “masculine” contributes to the gender gap in STEM performance by creating social identity threat for women and social identity privilege for men. In addition, the present study examined critical consciousness as a potential source of resilience to the social identity threats encountered by women in STEM domains. Critical consciousness is a multi-faceted construct that includes the belief that gender differences are illegitimate, unstable, and that women share a common fate. Two hundred forty-five undergraduates (88 White men, 112 White women, and 45 Black women) completed the perceived masculinization of STEM IAT, a math and science test, ratings of enjoyment of STEM courses, and interest in visiting science museums. Female participants also completed a measure of critical consciousness. Results suggest that the cultural construction of STEM may indeed contribute to the gender gap in STEM fields. Perceived masculinization scores were highest among White women and lowest among Black women with White men scoring in between the other two groups. For White women, perceived masculinization of STEM was associated with poorer performance on the test whereas for White men perceived masculinization was associated with better performance. Among Black women, perceived masculinization was unrelated to performance. The results also suggest that critical consciousness may be a source of resilience for both Black and White women in STEM fields: women who scored high in critical consciousness were less likely to perceive STEM as masculine, scored higher on the test, reported greater enjoyment of science courses, and indicated more interest in visiting science museums. Subsequent analyses revealed that a sense of common fate with other women in STEM fields was more important than beliefs that gender differences in STEM are illegitimate and unstable. Future research should experimentally investigate whether increasing critical consciousness among women is a viable strategy for diminishing the gender gap in STEM fields.

Poster Number: 84**Presenter:** David Olowokere**Institution:** Texas Southern University (HBCU-UP)**Email:** olowokeredo@tsu.edu***Development of Virtual and Remote Laboratory for Engineering Technology Undergraduate Students***

From the earliest days of engineering education, hands-on laboratories have been an essential part of undergraduate engineering programs. Concepts taught through lectures are often complemented by laboratory experimentation. Hands-on education allows students to experience the backbone of science and engineering by conducting experiments, observing dynamic phenomena, testing hypotheses, learning from their mistakes, and reaching their own conclusions. Furthermore, interactive experimentation on real world plants improves the motivation of the students and develops an engineering approach to solve

realistic problems. On the other hand, the ever changing technological environment requires engineers and technologists to keep familiarizing themselves with new hardware layers as they emerge.

With the rapid development of the computer and Internet technologies, embedded microcontroller and firmware enable instrumentation to be reconfigured and controlled remotely. These functionalities have been shifting industrial and academia hands-on training towards online learning. Providing theoretical educational materials online is a relatively simple task, where several multimedia tools and editors such as HyperText Markup Language (HTML), and Extensible Markup Language (XML) that are available can be used to create courseware. Developing educational visualization and simulation environments online is hard, but they are worth the effort because they support self-driven learning. With the rapid development of communication technology, it becomes simpler to place “real” laboratory learning environments online. New possibilities in the way lab exercises are performed include the simulation environment lab, the automated data acquisition and the remote control of instruments, all of which are online. Currently, there are two approaches to conducting labs online, namely the Virtual and Remote labs.

Virtual lab is based on software such as LabVIEW, Java Applet, Flash or other software to simulate the lab environment. Remote lab by definition is the experiment which is conducted and controlled remotely through the Internet. The experiments use real components or instrumentation at a different location from where they are controlled or conducted. In this poster, we are going to demonstrate our last progress of the NSF HBCU-UP project.

Poster Number: 85**Presenter:** Becky Packard**Institution:** Mount Holyoke College (GSE)**Email:** bpackard@mtholyoke.edu***STEM Women and the Community College Transfer Pathway***

In this poster, we share highlights from our on-going project investigating how women get “on-track” to transfer to a four-year college or university using the community college transfer pathway in STEM fields, and also how they manage to stay on-track once they transfer. Survey data from over 100 women and interview data from over 50 women from multiple community colleges have been collected in a longitudinal study tracking their progress semester by semester for close to 2 years. Financial and informational barriers were noted; students could not afford to take classes that did not transfer. Recommendations for advising and useful resources are discussed.

Poster Number: 86**Presenter:** Alice Pawley**Institution:** Purdue University (ADVANCE)**Email:** apawley@purdue.edu***ADVANCE-Purdue Research: Toward more inclusive models to help us understand STEM faculty underrepresentation.***

ADVANCE-Purdue Research is a diverse team of researchers at Purdue University investigating existing models to understand women's underrepresentation in STEM tenure-track faculty careers, and developing new models more inclusive of the experiences of women of color. We are in the process of collecting data through two studies: Academic Career Pathways and Institutional Ethnography.

The Academic Career Pathways study aims to explore the potential of pipeline and chilly climate metaphors for understanding women's STEM faculty career paths, and develop new models and metaphors to be able to model more diverse faculty members' paths. We use oral history and participatory action methods to develop grounded answers to the questions:

- What metaphors/models do STEM faculty use when telling their own career stories? and
- What can we learn about diverse career paths and needs from these career stories?

An explicit and critical component of this study is to determine the applicability of these models to women of different ethnicities. We are in the data collection phase of this project.

While pipeline and chilly climate metaphors have helped uncover some forms of implicit bias, particularly that enacted unconsciously by individuals, we believe there is yet more to uncover embedded in the structure of our academic institutions. Our Institutional Ethnography study applies critical feminist sociological methods to the Colleges of Engineering, Science and Technology to explore the impact of Purdue's organization and policies through the experiences of people, particularly women, who work within them. We are focusing on two policies: the promotion and tenure templates used to structure the curricula vitae of STEM faculty members; and the recently implemented parental leave policy. We use interviews, discursive analysis of texts, and participant observation to understand Purdue and its colleges' structure and organization by exploring how real individuals negotiate their "everyday world" via these structures and policies. Institutional ethnography is a critical method to use for understanding the experience of marginalized participants and will be a new contribution to the research on underrepresented minority women in STEM faculty positions. We are in the data collection phase of this project.

Poster Number: 87

Presenter: Virginia Perelson

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Assessing how Multimedia Transcripts affect the Academic Performance of Students with Disabilities

The Liberated Learning Consortium is an international research group dedicated to improving access to information through Speech Recognition based captioning and transcription systems. Key research priorities include increasing the availability of these emerging technologies to students with disabilities and understanding their impact in educational environments.

Speech Recognition (SR) technology has the potential to resolve and/or significantly impact STEM participation and performance for students with various disabilities.

SR can be used to automatically produce lecture transcripts. Traditional, human generated transcripts are typically created by listening to an audio or video source and manually typing what is heard. In this research, Multimedia transcripts are generated by various speech recognition based systems developed by the Consortium. Multimedia transcripts refer to SR-generated text that is synchronized with a spoken language source and possibly other media, such as slides, images, or video sources.

These lecture transcripts can be made available as study aids to supplement or enhance traditional note-taking practices and outputs. A core research interest is the educational impact of SR-generated lecture transcripts on students with disabilities in STEM (science, technology, engineering, and mathematics) learning environments.

This poster reviews research to assess the effects of multimedia transcripts of lecture notes on students' engagement, acquisition, and retention of information in STEM courses. Key lines of inquiry include:

- How do students with disabilities (i.e. learning disabilities, mobility, hearing, and visual impairments) benefit from the use of multimedia transcripts?
- Do specific groups experiences different levels of learning when provided access to multimedia transcripts of their college STEM lectures?
- What are the most effective ways for students to review and process lecture transcripts for maximum improvement of academic outcomes?
- Does access to multimedia transcripts help students to improve their abilities to review and process lecture content?
- How do multimedia transcripts impact learning as measured by students' performance on course exams, homework, quizzes, and standardized assessments?

Additionally, tangential innovative technology developments and achievements through collaborative experiences are highlighted, underscoring a belief that next generation solutions that enhance STEM participation result when Education, Industry, and not for profit contributions are aligned and goal directed.

Poster Number: 88

Presenter: Myron Peters

Institution: Louisiana State University (LSAMP)

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Louisiana State University:LS- LAMP Bridge to Doctoral Program

Through the Louisiana Alliance for Minority Participation (LAMP), the Louisiana State University Office of Strategic Initiatives (LSU/OSI) is pleased to announce a Fellowship opportunity available through the "Louis Stokes Alliance for Minority Participation -- Bridge to the Doctorate Program" (LS-AMP/BDP), an initiative of the National Science Foundation. Dr. Diola Bagayoko at Southern University and A&M College and Dr. Su-Seng Pang at Louisiana State University are the Principal Investigators (PIs) of the LSU/BDP, while Drs. Steven F. Watkins and Isiah M. Warner also of Louisiana State University are Co-PIs. This project is a direct and logical extension of LS-LAMP whose primary goal is to increase the participation of under-represented minorities in STEM disciplines and to ease the transition of these graduates into graduate school.

LSU/BDP offers: twelve fellowships at \$30,000/yr for two years; payment of tuition and fees; individualized faculty mentoring and coaching; participation in professional conferences and meetings; links to research and professional opportunities; and enriched academic services and support. The program is also an implementation and institutionalization of the 10-Strand Systemic Mentoring model developed by Dr. Bagayoko at all LS-LAMP institutions. The resulting reform-imbued enhancement of the teaching, mentoring, and research infrastructure of LS-AMP/BDP institutions and their ultimate institutionalization are expected to have an impact far beyond minority education, STEM disciplines, and Louisiana.

With the inception of the LSU/BDP program in Fall 2005, the following Fellows are a continuation of the BDP Program. Their awards for the 2008 – 2010 academic year; all of whom display great potential, sound judgment, good character and intellect. The LSU/BDP program coordinator can be reached at mcpang@mc.lsu.edu or via telephone by dialing (225) 578.2214.

Poster Number: 89**Presenter:** Elissa Poel**Institution:** Reaching the Pinnacle (RDE)**Email:** epoel@nmsu.edu***Reaching the Pinnacle: A Place for Students with Disabilities in STEM Careers***

Reaching The Pinnacle (RTP) as a leadership program funded through a grant supported by the National Science Foundation (HRD 0622930). RTP is housed at New Mexico State University, which located in the southwestern part of New Mexico. The project mission is to advance the participation of individuals with disabilities in Science, Technology, Engineering, and Math (STEM) careers. This state-wide program, including far West Texas, is a collaborative effort between professionals at the state colleges/universities and numerous school districts to form partnerships between secondary education teachers and post-secondary faculty that encourage growth, achievement, awareness, and opportunities for students with disabilities and STEM careers.

Project activities provide opportunities for students with disabilities to develop mentoring skills, self advocacy skills, and career goals while studying in STEM fields. Project mentors receive training, mentoring, and stipends to further their own academic achievement and the academic success of the high school students with whom they mentor. Other activities include a summer institute (RASSI) and Partner Projects. Project data and highlights will be presented.

Poster Number: 90**Presenter:** Michelle Porche**Institution:** Wellesley College (GSE)**Email:** mporche@wellesley.edu***Immigrant Students' Egalitarian Attitudes, Acculturation and Family Support Related to STEM Persistence***

Despite recruitment efforts to provide access and education to science, technology, engineering, and math (STEM) over the last 20 years, women and minorities continue to be underrepresented in many STEM career fields. However, first generation immigrant students in elementary and secondary schools represent an important overlooked resource of new American scientists and they may bring an expectation of gender and racial/ethnic equity that U.S. born girls and minorities experience as lacking.

We present first year cross-sectional results of a longitudinal mixed methods study designed to explore individual and structural factors (Jolly, et al., 2004) within a socio-ecological model (Bronfenbrenner, 1979, 2005) related to high school students' persistence in STEM. We include measures of acculturation and gender ideology to further understand patterns of persistence and we use thematic analysis for interview data with immigrant youth to examine the process of engagement in STEM and the role of family support and expectations for academic achievement. For the first wave of data collection 1024 students from five urban high schools, with either a science-themed focus or a strong science department, completed surveys in their science classrooms. A purposeful subsample of 53 students completed in-depth interviews with a semi-structured protocol on STEM interests and engagement, attitudes and experiences related to gender and racial/ethnic barriers to success, and family support.

The sample of racially/ethnically and socio-economically diverse students included 18% first generation immigrants from over 40 different countries, with varying levels of acculturation. As a group, these immigrant students were more likely to report interests in pursuing STEM college coursework compared to U.S. born peers. In a mediated model using logistic regression we found that immigrant status was indirectly related to increased odds for STEM college study, mediated through self-concept of ability in science and math. Female students had decreased odds of college STEM study (though in analyses where the sample was stratified by immigration status, there was only a difference for U.S. born students). Thematic analysis of interview data suggested that parents of immigrant students communicated specific goals for their children of not only general achievement expectations but also specific STEM-related career choices. Narratives suggested varying patterns of parental pressure to fulfill gender-specific roles compared to U.S. born peers, but underscored the parents' desire for greater opportunities for both male and female children than would be available in their country of origin. Results suggest the need for increased attention to inclusion of, and support for, immigrant students in the pool of new American scientists. In addition, further investigation of processes which foster engagement in STEM for immigrant students may help illuminate strategies that could be developed for encouraging persistence for U.S. born peers.

Poster Number: 91**Presenter:** Kay Porter**Institution:** Oklahoma State University (LSAMP-BD)**Email:** kay.porter@okstate.edu***Oklahoma PHD Camp***

Based on a similar concept developed at the University of California-Berkeley by Diana Lizarrage, OK-LSAMP's two day intensive hands-on workshop was designed to help scholars develop a "tool box" of skills for entering and succeeding in graduate school. Experienced educators and professionals from several Oklahoma Alliance institutions offered sessions on the selection and application process for

graduate programs, including online search strategies, writing goal statements, crafting resumes, and preparing for the GRE. Additional sessions incorporated one-on-one editing opportunities for participants. This inaugural camp was attended by 42 Oklahoma LSAMP Scholars from around the state. Based on the enthusiastic reception by scholars and presenters, OK-LSAMP plans to repeat the camp in future years.

Poster Number: 92**Presenter:** Rose Pringle**Institution:** University of Florida (GSE)**Email:** rpringle@coe.ufl.edu***Compounding Variables: Researching African American Girls' Positionality in Science and Mathematics***

The objective of this study is to explore how African American girls within impoverished communities position themselves in relation to science and mathematics and the impact of teachers, counselors and parents' positionality if any, on the girls' science and mathematics learning. For three years, we conducted focus group interviews with two cohorts of rising 6th graders, following them into two years of their middle school mathematics and science experiences. We videotaped the girls in their mathematics and science classes and conducted yearly interviews with their teachers, counselors and parents. In our research of African American girls' positionality in science and mathematics, our findings indicate that the girls' positionality as learners is not socially neutral but impacted by the interactions among factors such as the actions of adult stakeholders, societal perceptions and expectations, and the nature of learning experiences they are afforded. Consistent with the literature, how the girls position themselves is influenced by their actions as indexical claims, that is, how they define themselves and are defined relative to others. This definition is then mediated through their feelings of comfort or constraint, and ultimately their achievement as measured in academic terms. As naïve learners however, these feelings or perceptions are developed through participation in the discourse of science and mathematics, identification with the concepts, norms and morays, and development of expertise within the domains of the enacted curriculum. Data analysis indicates that school-wide policy and teachers' autonomous decisions impact both the regularity of delivery and quality of science and mathematics instruction for these girls, regardless of the race or gender of the teacher. Concomitantly, further data analysis reveals that although teachers are well intentioned, their perceptions and their lack of awareness of their roles in advancing African American girls as science and mathematics learners in many ways limit the opportunities afforded to these students.

Two significant findings characterize the outcomes of the study of counselors' positioning of the girls: (a) their genuine caring combined with lack of awareness of sociopolitical context and (b) reflexivity between their own social positioning as mathematics and science learners and how they position the girls. While the counselors in the study articulated concern and caring for the students, the counselors' actions did not always reflect an awareness of sociopolitical issues that marginalize the girls outside of mathematics and science learning. The counselors also demonstrated a lack of awareness of their own biases towards the girls' learning potential. The second finding relates to the reflexivity between the school counselors' own positioning as mathematics and science learners and their perceived roles as facilitators or non-facilitators of mathematics and science learning for students.

Our data indicate that low-income African American parents are more knowledgeable about their daughter's schooling than previously discussed in the literature. Additionally, this study broadens the definition of parent involvement, such as being a PTA member, communicating with the teaching staff or volunteering at various school events (Feuerstein, 2001; Hoover-Dempsey & Sandler, 1995). The research points to parent involvement encompassing parents helping students with their homework, encouragement to achieve even when the student is unsure of her ability and skills, and ascertaining resources to aid their children in the areas in which they struggle. Conceptualizing parent involvement from this perspective may contribute to bringing to the fore supportive parent behaviors that are often imperceptible to educators. Furthermore, the research also suggests that how African American parents position themselves as mathematics and science learners does not seem to create an obstacle to them promoting mathematics and science learning for their daughters.

Finally, few studies exploring African American primary school girls as mathematics and science learners have been developed by researchers of African descent, therefore an ancillary finding was related to the methodological paradigm and the synergistic discourse among the collective research team in which positionality becomes salient for both the research participants as well as the researchers. This facilitated a dynamic, reflexive process of knowledge construction between the researchers and the research investigation.

Poster Number: 93**Presenter:** Nargiza Rakhimova**Institution:** University of Florida (DGE)**Email:** rnargiza@ufl.edu***Catalyzing Institutional Change in STEM Education at the University of Florida***

There is a wealth of National Science Foundation (NSF)-funded projects at the University of Florida (UF). Although they share the common goal of educating, training, and preparing students for professional careers, there is little interaction between these projects. The I-Cubed Program at UF is a five-year NSF-funded project with the goal of fostering integration of student-based research and training programs in science, technology, engineering, mathematics (STEM) and social, behavioral, economics (SBE) disciplines. The Program addresses the integrative themes of broadening participation, the production of a globally engaged workforce and the integration of research and education. The I-Cubed Program promotes a vision for transforming graduate education through the integration of best practices from NSF training projects (IGERT Adaptive Management: Wise use of water, Wetlands and Watersheds; GK-12 Science Partners in Inquiry-based Collaborative Education II; IGERT Quantitative Spatial Ecology, Evolution and Environment; and the South East Alliance for Graduate Education and the Professoriate programs), as well as drawing on other resources both within and outside UF. The driving force of the program is the Graduate Student Advisory Council that helps prioritize students' interests and needs, as well as facilitate effective communication across campus. The internal faculty advisory and external advisory boards advocate for the synergy of research and professional training and internship opportunities for the benefit and advancement of all graduate students in science and social science disciplines.

Poster Number: 94**Presenter:** Rachelle Reisberg**Institution:** Northeastern University (GSE)**Email:** r.reisberg@neu.edu***Pathways to Work Self-Efficacy and Retention of Women in Undergraduate Engineering - Year 1***

Northeastern University, Rochester Institute of Technology, Virginia Polytechnic Institute, and the University of Wyoming are participating in a study (NSF grant #0827490) to determine the effect of self-efficacy and other factors on the retention of women in undergraduate engineering. The study examines the effect of gender on contextual supports to explain three dimensions of self-efficacy: work, career, and academic within undergraduate engineering. Contextual support is defined as the institutional support provided to students through a number of mechanisms, such as financial aid, mentorship, and participation in living/learning communities. Data has been analyzed from the first wave of surveys completed in the 2008-2009 academic year of sophomores in engineering from the four participating universities. The analysis reveals some significant differences by gender. With the exception of academic self-efficacy, which is significantly higher among males, every other significant difference favors females. As freshmen, women are not as confident as men about achieving success in their engineering major. However, they were found to have higher career self-efficacy and benefit far more from mentorship. They also exceed the scores of their male counterparts in five support dimensions: they report receiving more support from professional clubs and associations; are more involved in campus life; take more advantage of living/learning communities; and report that they not only receive more support from their friends but that their friends really matter to them.

Poster Number: 95**Presenter:** John Reutter**Institution:** J. F. Drake State Technical College (HBCU-UP)**Email:** john.reutter@drakestate.edu***Transforming Postsecondary STEM Education***

Drake State Technical College received its first HBCU-UP grant in 2006. The goal of the program is to increase minority participation in STEM careers by transformer curriculum, students, and teachers through curriculum reform, summer bridge activities, and faculty professional development. The results of the program after three years has been astonishing. The College's enrollment has grown 81% during that time. Enrollment in STEM courses has grown from 518 in 2006 to 1,567 in 2009, an increase of 200%. How was this growth accomplished? Drake State developed an innovative Summer Technology Institute for secondary school teachers that has resulted in a transformation of teacher attitudes toward STEM careers and their role in preparing students for postsecondary STEM education. This institute, along with the employment of "hands-on", interactive math and science curriculum, and an energetic, integrated multi-discipline summer bridge program have resulted in this transformation.

Poster Number: 96**Presenter:** Jan Rinehart**Institution:** Rice University (ADVANCE)**Email:** jan.rinehart@rice.edu***NSF ADVANCE Retention and Climate Programs: Rice University 2006-2011***

The Rice NSF ADVANCE Program enters its fifth year in 2010-2011. It has built momentum for climate change, diversity, and the inclusion of women at all levels of the institution. Through the ADVANCE programs and the concerted efforts of the ADVANCE PIs, a campus conversation has been sustained. As ADVANCE enters its fifth year, the focus will change to sustainability of these campus conversations, the ADVANCE programs, and how to move the goals of ADVANCE into the main stream university processes.

The ADVANCE poster will highlight three institutionalized programs that directly address Goal 2 of the ADVANCE grant: Create a positive and welcoming work environment for women at Rice. Both qualitative and quantitative evaluation data will be shared that demonstrate their value to the faculty and university. The programs are:

- Triad Mentoring Program for Women Faculty in STEM
- Department Chair Development
- Junior Faculty Development Workshop

Poster Number: 97**Presenter:** Naphtali Rishé**Institution:** Florida International University (CREST)**Email:** rishen@cs.fiu.edu***TerraFly: A High Performance Web GIS***

TerraFly users visualize aerial imagery, precise street name overlays, and various other overlays. Users virtually "fly" over imagery via a web browser, without any software to install or plug in. Tools include user-friendly geospatial querying, data drill-down, interfaces with real-time data suppliers, demographic analysis, annotation, route dissemination via autopilots, customizable applications, production of aerial atlases, application programming interface (API) for web sites.

The TerraFly project has been featured on TV news programs (including FOX TV News), worldwide press, covered by the New York Times, USA Today, NPR, and Science and Nature journals.

The 40TB TerraFly data collection includes, among others, 1-meter aerial photography of almost the entire United States and 3-inch to 1-foot full-color recent imagery of major urban areas. TerraFly vector collection includes 400 million geolocated objects, 50 billion data fields, 40 million polylines, 120 million polygons, including: all US and Canada roads, the US Census demographic and socioeconomic datasets, 110 million parcels with property lines and ownership data, 15 million records of businesses with company stats and management roles and contacts, 2 million physicians with expertise detail, various public place databases (including the USGS GNIS and NGA GNS), Wikipedia, extensive global

environmental data (including daily feeds from NASA and NOAA satellites and the USGS water gauges), and hundreds of other datasets.

Poster Number: 98**Presenter:** Kelly Roberts**Institution:** University of Hawaii, Center on Disability Studies (RDE)**Email:** robertsk@hawaii.edu***Pacific Alliance for Supporting Individuals with Disabilities in STEM Fields***

The Pacific Alliance for Supporting Individuals with Disabilities in STEM Fields Partnership (Pacific Alliance: <http://www.cds.hawaii.edu/pacificalliance>) at the Center on Disability Studies at the University of Hawai'i at Manoa has developed model "Communities of Practice" (COP). COP are teams of people who share a common concern or interest around a specific topic, such as supporting students with disabilities (SWDs) in STEM fields to learn how to identify goals, set priorities, cultivate resources, and access services and accommodations. The poster depicts the key elements of COP and how Pacific Alliance staff and partners are applying the COP concept to connect and network students with disability, persons in disability support areas, and faculty in STEM fields to achieve the project goals and objectives. The Pacific Alliance has established three COPs on targeted campuses, University of Hawai'i-Manoa, Honolulu Community College, and Windward Community College. Each COP has begun to identify needs, issues, and problems faced by students with disabilities in STEM fields within their community. Additionally, to facilitate the COP process, project staff have developed an "Essential Toolkit" a guide for COP members which will be available as a "handout" during the poster session.

Poster Number: 99**Presenter:** Rodrigo Romero**Institution:** University of Texas at El Paso (CREST)**Email:** raromero2@utep.edu***Cyber-ShARE Center of Excellence -- Sharing Resources to Advance Research and Education through Cyberinfrastructure***

The Cyber-ShARE Center brings together experts in computer science, computational mathematics, education, earth science, and environmental science. The team addresses the challenge of providing information to scientists and other users of cyberinfrastructure (CI) that will enable them to make informed decisions about retrieved resources and to have confidence in using results from CI-based applications. The Cyber-ShARE team conducts innovative research to facilitate the development of CI-based applications and increase their use by scientists by enhancing CI results with provenance information, trust recommendations, and uncertainty levels (areas that are recognized as essential for the success of CI); by creating scientist-centered tools and artifacts; and by contributing CI resources to appropriate CI portals. The Center's mission is to advance and integrate education and research in uncertainty, trust, and optimization in support of cyberinfrastructures and to develop scientist-centered software services and tools that encourage collaborative and interdisciplinary research approaches.

The Center has three interdisciplinary subprojects in which researchers and students, both undergraduate and graduate, from the Departments of Computer Science, Geological Sciences, Environmental Science, Mathematical Sciences, and Teacher Education participate in a synergistic environment to advance the state of the art in their corresponding disciplines. Subproject 1, which is entitled “Believing and Accepting Cyber-Results” and is led by Dr. Pinheiro from the Department of Computer Science, has as a main goal to gain user’s confidence in workflow execution results by enhancing results with provenance information, trust recommendations, and levels of uncertainty. Subproject 2, which is entitled “Integrated Analysis for Development of 3-D Models of Earth Structure” and is led by Dr. Velasco from the Department of Geological Sciences, has as a main goal to determine physical properties of the Earth by advancing data fusion of distinct information sources and by studying and developing techniques and approaches for integrating data with varying accuracy and sensitivity. Subproject 3, which is entitled “Advancing the Utility of Cyberinfrastructure in Environmental Science” and is led by Dr. Tweedie from the Department of Environmental Science, has as a main goal to address the challenge of optimizing data streams and sensor arrays in ecological and environmental networks through case studies targeting improved characterization of environmental phenomena and processes. In addition, the Center has an education and training component which is focused on developing the next generation of scientists and engineers as proficient CI users. To reach this goal, the Center offers research experiences for undergraduates, organizes a Distinguished Lecture Series, offers workshops, participates in outreach activities, and performs other educational activities.

Poster Number: 100**Presenter:** Madeleine Rothberg**Institution:** WGBH National Center for Accessible Media (RDE)**Email:** madeleine_rothberg@wgbh.org***Universal Design for STEM: Use our resources and make your own!***

Resources for science and math require special approaches for accessibility. This poster highlights two NSF-funded projects at WGBH. TEACHERS’ DOMAIN is a library of rich-media science resources for K-12 and higher education that support standards-based teaching and learning. NCAM has added descriptions to the video and images in the middle school life sciences strand. NCAM is also making these resources accessible for users who prefer large text and/or high contrast views, students who have difficulty hearing audio via captions, and students who require keyboard controls for their preferred assistive technology.

NCAM also offers information to help you create more accessible educational materials. The Guidelines on Effective Practices for Description of Science Content within Digital Talking Books will help you create effective written descriptions for science and math images to make them accessible to students who are visually impaired. Free training is available to help you use the guidelines.

Poster Number: 101**Presenter:** Jen Schmidt**Institution:** Northern Illinois University (GSE)**Email:** jaschmidt@niu.edu

Examining the Role of Situational Factors and Gender in Motivational Processes among High School Science Students

Drawing upon theories of Self Determination and Emergent Motivation, males' and females' experience in high school science classrooms was compared. The Experience Sampling Method was used to collect data from students over a period of 10 days. Outcomes included measures of engagement, success, anxiety and self-esteem. Males evidenced greater success and self-esteem in science, while females experienced more anxiety. Situational motivational factors (affect, challenge, task relevance, autonomy and competence) were associated with outcomes in expected ways, but gender moderated of many of these relationships. For example, while challenge was positively associated with engagement for males, this relationship was negative for females. Results are discussed in terms of the utility of a motivational perspective for exploring gender gaps in science.

Poster Number: 102

Presenter: Matthew Schneps

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Is a Hammer Better Than a Screwdriver? Debunking a Hidden Assumption in Education

The answer to the question “is a hammer better than a screwdriver?” is obvious. It depends. When evaluating whether one thing is better than another, the context absolutely matters. A screwdriver can be used to pull out a nail, and a hammer can be used to pry up the lid on a paint can. Whether one tool is better than the other can only be determined in reference to the task at hand. There is no way to absolutely determine whether one is better than the other.

Unfortunately, education doesn't always follow this maxim. In schools we tend to compare students on absolute scales, and then mark them as if one student is better than the other, without considering the specific context that defines the basis of the test.

Here, we describe new research demonstrating that people with “learning disabilities” can sometimes outperform typical learners in contexts that are important for STEM. Specifically, we present evidence that shows that scientists with dyslexia are better able to detect black holes in astrophysical data, and that college students with executive function impairments are able to learn in contexts visual where students from Harvard fail. This work shows that while some students may perform poorly in school, these same students may perform at high levels in the contexts relate to tasks important in STEM. The implication of this research for the reform of education practice is discussed.

Poster Number: 103

Presenter: Brian Schwartz

Institution: The Graduate Center of the City University of New York (GSE)

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The Work of Women Scientists: An Innovative Publishing Project

The Project Director is Shirley Mow in association with Florence Howe and Gloria Jacobs. The goals and objectives are to:

1. Produce four highly innovative, researched-based books, which present science content in interesting and engaging ways, which speak directly to young women, and address critical gender-biases.
2. Produce accompanying guides for teachers, counselors and parents, individuals who have enormous influence on young women throughout their early years.
3. Create a multi-level outreach effort through national and regional partners to reach a wide audience of high school and college-age young women as well as their teachers, parents, other mentors, and the general public.
4. Conduct comprehensive and on-the-ground market research to ensure highest quality end products and to guarantee the widest possible dissemination and use of the books we produce.

To date three books of our four-book objective have been published:

Base Ten by Maryann Lesert. A novel about two young Ph. D. physicist-astronomers who make significant scientific contributions. Both envision themselves as future astronauts. One achieves her goals while the other finds herself putting her dreams on hold while she marries and raises children. On a solo trip into the wilderness, she discovers a way to combine both worlds. .

Women and Science: Then and Now (2009), by Vivian Gornick. In 1983, Gornick produced a groundbreaking study of 100 women scientists, documenting the discrimination they faced at all levels. 25 years later, she interviewed many of the same women and discovered that although not enough had changed, women both young and old continue to defy stereotypes, persist in pushing the boundaries of possibility, and remain passionately committed to the work.

The Madame Curie Complex: The Hidden History of Women in Science by Julie Des Jardins. A lively, well-documented history of key women scientists, some individually famous, some not as widely-known. Most striking is the historical endurance of the Curie 'complex,' the idea that a woman has to be better than a man if she is to be a scientist. At the same time, Jardins makes clear, women have often brought a different way of doing things to scientific inquiry, moving research forward in important ways – even when they're not given credit for it.

The forth book, *The Taste of Molecules*, by Diane Fresquez, is to be published later this year.

In October 2008, a website www.underthemicroscope.com, was launched with the aid of IBM. Under the Microscope is the online component of the Women Writing Science project at The Feminist Press. It features personal stories of women about their experiences in science, interviews with women scientists, blogs, resources and links to related sites. The site promotes the books published, sections of which will be available online for general public reading. In January (2009), www.underthemicroscope.com was selected as the 'Site of the Week' by eSchoolnews, a popular education website. The website has been collecting and making available stories from women involved in science, interested in science, and those who are maintaining or pursuing careers in science fields. We are hoping these stories will become part of

a survival guide full of the best advice for women entering science, technology, engineering and math fields.

Project directors and the book authors have offered presentations about the NSF project and books at dozens of national meetings in the past two years.

Poster Number: 104

Presenter: Kathy Sears

Institution: Midwest Crossroads AGEP (AGEP)

Email: ksears@purdue.edu

The Midwest Crossroads Alliance for Graduate Education and the Professoriate (AGEP)

Since its inception in 2004, the Midwest Crossroads AGEP has developed and enhanced student opportunities in the effort to complete its primary mission of collaborating to help address this challenge to broaden participation in the STEM graduate education. The Midwest Crossroads Alliance partnership of Purdue University (PU), Indiana University (IU), and Northwestern University (NU) draw upon the strategic Indiana-Midwestern sector to: 1) create a supporting regional BS-to-PhD infrastructure in STEM disciplines; 2) leverage STEM PhD programs and initiatives; and 3) create and strengthen pathways to the professoriate.

Our alliance has developed a knowledge base of successful strategies that include mechanisms to significantly increase minority student admissions, ensure effective mentoring, increase rates of retention and position a greater number of minority graduate students for successful degree completion. Some highlights of our portfolio of cross-alliance initiatives include:

- dynamic university partnerships
- leveraging of alliance partner resources
- expansion of summer undergraduate research opportunities
- bridging students from college to graduate programs
- collaborations with other AGEP alliances
- expansion of institutional change initiatives among alliance members
- enlisting the support from 369 AGEP professors across the alliance

As we complete the fifth year of the program, we will continue our established key elements of programmatic operation that include building partnerships with LSAMP and regional undergraduate and minority-serving institutions, conducting off-campus visits, coordinating undergraduate summer research programs for graduate recruiting, building peer networks through minority student organizations, acclimating new students academically to graduate school, organizing study groups, creating joint conferences, and promoting Preparing Future Faculty programs.

Poster Number: 105**Presenter:** Jaetae Seo**Institution:** Hampton University (CREST)**Email:** jaetae.seo@hamptonu.edu***Doctoral Research on Multifunctional Optical Nanomaterials***

The RISE program at Hampton University (HU) has two research thrust areas including multifunctional nanometals for optical applications and rare-earth (RE) activated nano-composites for photonic applications. The research activities in multifunctional nanometals include second-order hyperpolarizability of Ag nanoparticles and Ag/Au coreshells, cubic nonlinearity of Ag nanoparticles and nanoprisms, and flocculation analysis of bio-inspired Au nanoparticle self-assembly for national security and biophotonic applications. The research activities on RE-activated nano-composites include red emission properties of europium-doped GaN powders by a Na Flux method for multifunctional applications of polycrystalline ceramic lasers, flat-panel display devices, and fluorescence sensors. Cooperative activities between the two thrust areas have greatly enhanced the research and educational infrastructure in optical science and nanophotonics at HU. The educational activities in the HU's RISE program are focused on involving doctoral students from the Department of Physics, and providing research experiences to undergraduate students to enhance the pipeline for advanced degree programs in STEM disciplines. Furthermore, RISE faculty also participated in outreach activities for K-12th grades. The research findings and results of this RISE program were disseminated through journal publications and conference presentations. Some selective highlights of the research are described below.

Recently, strong surface plasmon resonance of metallic nanoparticles (NPs) or coreshells in a visible spectral region is of great interest in photonic applications for bio-optical sensors, photo-thermal tumor ablations, saturable absorbers, and optical power limiters. The optical modification and functionalization of metallic NPs enable the development of photonic nanotechnology. The cubic optical nonlinearity and second hyperpolarizability of Ag NPs and Ag/Au coreshells as a function of concentration in a near resonant region have been investigated using polarization-resolved degenerate four-wave mixing (DFWM).

The coreshell approach of nanometals is often used to stabilize an unstable core material or to shift the surface plasmon resonant (SPR) spectra, which may modify their nonlinear optical properties because of the change of effective dielectric constants and sizes. Figures 1 (a) and (b) show the transmission electron microscopy (TEM, JEOL JEM-2010) images of Ag NPs with the average size of ~13.3 nm and Ag/Au coreshells with ~5.8 nm for core and ~6.9 nm for shell. Unlike the spherical bimetallic alloys, the core and shell boundaries of Ag/Au are clearly distinguishable as shown in the inset image of figure 1 (b). The Ag NPs and Ag/Au coreshells were uniformly distributed in toluene. The absorption spectra of Ag NPs and Ag/Au coreshells are presented in figure 1 (c) and (d), respectively. The strong absorption spectra at ~424 nm for Ag NPs and at ~477 nm for Ag/Au coreshells are attributable to the SPR effect. The absorption spectra of Ag/Au coreshells depend on the change of effective dielectric constant of Ag and Au, and boundary collisions of electrons, which leads to the change of SPR peak and width.

Figure 1. TEM images and absorption spectra of Ag NPs ((a) and (c)) and Ag/Au coreshells ((b) and (d)).

Figure 2 shows the effective third-order nonlinear optical susceptibility of samples as a function of concentration. The second hyperpolarizabilities, $\chi^{(3)}$, were extracted from the slope of the concentration dependent $\chi^{(3)}$ in figure 2, and were estimated to be $\sim 8.12 \times 10^{-38}$ m⁵/V² and $\sim 1.77 \times 10^{-38}$ m⁵/V² for Ag NPs, and $\sim 1.28 \times 10^{-39}$ m⁵/V² and $\sim 9.41 \times 10^{-40}$ m⁵/V² for Ag/Au coreshells using parallel and orthogonal DFWM, respectively.

Figure 2. (a) Effective third-order nonlinear optical susceptibilities of Ag NPs and (b) Ag/Au coreshells as a function of concentration.

The averaged second hyperpolarizability of Ag NPs was almost two-order higher than that of Ag/Au coreshells, even though the SPR peak of Ag/Au at 477 nm was located closer to the excitation wavelength than that of Ag at 424 nm. Since the imaginary part (and real part) of dielectric constant of Ag are smaller (and larger) than those of Au in a visible region, the decay time of surface plasmon oscillation in Au NPs may be faster than in Ag NPs, which causes the third-order nonlinear optical susceptibility of Ag/Au coreshells to be lower than that of Ag NPs (core) itself.

The combinational analysis of both flocculation parameter and peak shift of SPR on bio-activated Au nanometals was carried out for biophotonic applications []. Maximum changes of extinction and SPR peaks between Au and Au-biotin-avidin were ~ 0.3 and ~ 1.2 , and 6 nm and 53 nm, respectively, with particle concentrations of $\sim 1 \times 10^{-5}$ mol/m³ and average diameters of ~ 4 to ~ 23 nm. Shifting of the SPR peak of colloidal special Au nanoparticles well explained by the Mie theory, and that of extinction spectra of self-assemblies was known as a collective nature of the aggregate response. The lowering extinction of Au self-assembly could be attributed to a shadowing effect. In contrast, smaller Au nanoparticle assemblies, for example $D \sim 4.5$ nm, did not exhibit the lowering extinction compared with that of bare Au colloidal particles, that implied a shortening collisional dephasing rate of Au self-assemblies. However, the flocculation factors of bio-inspired Au assemblies for various sizes of ~ 4 to ~ 23 nm were just increased comparing to extinction integration of bare Au colloidal nanoparticles. It indicates that spectral red-shift and broadening can be major contributions to increase the flocculation factors for larger particle sizes, and damping rate decrease, and red-shift are possible contributions to flocculation factor increase with smaller sizes.

Temperature dependent and time-resolved photoluminescence (PL) studies were performed on the red emission properties of Eu doped GaN powders prepared by a Na flux method. The Eu³⁺ doped GaN powder showed bright red emission (~ 622 nm) at room temperature, which corresponds to the intra-4f Eu³⁺ transition $5D_0 \rightarrow 7F_2$ []. It was observed that under above-gap excitation the integrated Eu³⁺ PL intensity was quenched by a factor of ~ 20 for the temperature range 10 to 300 K. In contrast, the emission lifetime was only slightly temperature dependent with an average value of ~ 242 μ s at room temperature. Photoluminescence excitation (PLE) measurements performed in the visible spectral region revealed a weak defect-related and broad excitation band superimposed by narrow intra-4f absorption lines of Eu³⁺ ions. Moreover, PLE studies for the $5F_0 \rightarrow 7D_0$ transition demonstrated the existence of multiple Eu³⁺ centers in the investigated GaN powder.

Figure 3 shows the overview PL spectrum of GaN:Eu powder at room temperature. The luminescence was excited using a He-Cd laser (325 nm), which corresponds to above-gap pumping. The Eu doped GaN powder showed strong red Eu³⁺ emission at ~ 622 nm corresponding to the $5D_0 \rightarrow 7F_2$ transition. The

FWHM linewidth of the 622 nm emission was ~ 2.5 nm at 300 K. Several weaker intra-4f Eu^{3+} emission lines arising from the 5D0 and 5D1 levels were also observed as indicated in figure 3.

The integrated PL intensity and lifetime of the red emission at ~ 622 nm under above-gap and below-gap excitations are depicted in figure 4 (a) and (b), respectively. Using above-gap excitation, the integrated red PL intensity was quenched by a factor of 20 at 300 K relative to its low temperature value. On the other hand, the integrated Eu^{3+} PL intensity decreased by only a factor of 8 between 10 and 300 K for resonant pumping. The average PL lifetimes for both excitation wavelengths reduced only slightly (~ 10 -15 %) over the same temperature range indicating that non-radiative decay processes weakly affect the Eu^{3+} PL. Therefore, the temperature dependence of the excitation process seems to be the dominant mechanism for the observed PL quenching.

Figure 3. Room temperature PL spectrum of Eu doped GaN powder under 325 nm excitation.

Figure 4. Temperature dependence of the (a) integrated PL intensities and (b) PL lifetimes of GaN:Eu powder under above-gap and below-gap excitations.

Poster Number: 106

Presenter: Ruta Sevo

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Lessons Learned from 'Extension Services' Grantees 2005-2009: A National View

The National Science Foundation program needed to know more about a relatively new investment. Grants of \$2.5 million for five years went to nine projects between 2005 and 2009. Was it working? What was the experience in the field? What were successes and frustrations, and especially, lessons learned?

The goal of the NSF program is to improve the capacity of our educational systems to attract and graduate more diverse students in science and engineering, especially females, in answer to a national talent crisis.

The concept of Extension Services was to build capacity among educators to understand new research findings, adopt proven practices that fit their culture, and adopt a more data-driven approach to improving the diversity of students in science and engineering education. The concept is modeled on agricultural extension services, which were highly successful in the diffusion of new ideas and new tools that came out of research.

Extension Services are networks created to deliver innovations in education to the field. They create a cadre of experts, trainers, consultants and lead teachers who facilitate change, introduce programs and approaches already established to be effective, provide technical assistance, and help evaluate results.

Nine grantees are working with 35 undergraduate computer science departments, 30 engineering colleges, 10 science-rich museums, 9 state Departments of Education, 14 after-school youth-serving organizations, 6 engineering education associations, 8 community colleges in California, 10 counties in Appalachia, and 1500 girl-serving after-school programs. Contact information is provided.

Poster Number: 107**Presenter:** Anup Sharma**Institution:** Alabama A&M University (CREST)**Email:** Anup.sharma@aamu.edu***HBCU-RISE: Research Infrastructure in Advanced Materials and Nanophotonics***

The HBCU-RISE Grant # 0927644 at Alabama A&M University aims to develop research infrastructure in the areas of advanced materials and nanophotonics. AAMU has a doctoral program in physics with emphasis in areas of optics and materials sciences. Some of the research projects which are supported include: nanostructured binary materials and their application to chemical sensing, growth of novel triboluminescent crystals and their application to structural health monitoring, preparation of rare-earth ion doped oxyfluoride nanostructured glasses and their application to luminescent devices, development of high-yield organic solar cells sensitized with metal nanoparticles, two-photon biophotonic nanomaterials for cancer diagnostics/treatment and nanopatterned polymer substrates for plasmonic chemical sensors. The American Physical Society has recognized AAMU as one of the four leading institutions for graduating under-represented minority students for Ph.D. in physics. Development of proposed infrastructure will help maintain this position by attracting topnotch students for graduate research. As an additional activity to accomplish this we hold an annual one-week Workshop and Short Course in Advanced Materials and Nanophotonics/Nanotechnology especially for undergraduates and faculty in HBCUs.

Poster Number: 108**Presenter:** Clark Shingledecker**Institution:** Wright State University (RDE)**Email:** clark.shingledecker@wright.edu***OSAAdayton: Ohio's STEM Ability Alliance Dayton QUAD***

Wright State University is the lead institution of the NSF RDE-funded Ohio's STEM Ability Alliance that was formed to increase the attainment of STEM degrees and careers by persons with disabilities. OSAA has used its QUAD model to organize two regional collaborations of a university, one or more community colleges, science and engineering employers and k-12 schools that seek to provide longitudinal support for students with disabilities (SwD) as they traverse critical junctures along the pathway toward productive STEM careers.

OSAADAYTON is the QUAD lead by Wright State University that includes Sinclair Community College, teachers and transition coordinators from SW Ohio high schools, and major STEM employers including Wright Patterson Air Force Base. This poster presentation features several innovative projects undertaken by OSAADAYTON that have shown promise as potential evidence-based best practices for transitioning 11-12 grade SwD into college STEM majors and for supporting academic success and critical personal and professional development while SwD pursue STEM degrees. These include on-campus experiences for high school SwD, the Ability Advisor individualized college student support program for providing access to academic and personal assistance as well as STEM program

enhancements, an operating model involving close collaboration with the university Office of Disability Services, and the Scholars Dollars focused incentive program.

Poster Number: 109**Presenter:** Marie Shoffner**Institution:** University of Virginia (GSE)**Email:** mfs2f@virginia.edu***The Influence of Belonging, Engagement and Support: Math Self-Efficacy Among Middle and High School Girls and Boys***

Social Cognitive Career Theory (SCCT; Lent, Brown & Hackett, 1994) formed the theoretical foundation of this three-year project. Our poster presentation will describe findings from two years of quantitative data, in which we determine the following: (1) differences in perceptions of math self-efficacy, belonging, and outcome expectations for pre- and early adolescents when compared by grade, gender, and race (for each wave of data); (2) the explanatory power of belonging, perceived supports, and outcome expectations in predicting math self-efficacy; and (3) differences in belonging, perceived supports, outcome expectations and self-efficacy as children progress from 5th to 6th, 7th to 8th and 9th to 10th grades. There were 300 students who completed surveys during the first wave of data collection and 231 students during the second wave. Of these, 182 were participants in both waves of data collection.

Poster Number: 110**Presenter:** Chrystal Smith**Institution:** University of South Florida (ADVANCE)**Email:** casmith5@mail.usf.edu***Alliance for the Advancement of Florida's Academic Women in Chemistry and Engineering (AAFAWCE) NSF ADVANCE-PAID Award***

This poster is an overview of the major NSF ADVANCE-PAID activities currently being undertaken by the Alliance for the Advancement of Florida's Academic Women in Chemistry and Engineering (AAFAWCE). AAFAWCE is a collaboration of five Florida state universities: University of South Florida, Florida State University, the University of Florida, Florida Agricultural and Mechanical University and Florida International University. The mission of AAFAWCE is to increase the representation and promote the advancement of academic women in chemistry and engineering, thereby developing a more diverse science and engineering workforce. In Year 1, the planning stage of the award, AAFAWCE's activities included: 1) Train-the-Trainer Faculty Recruitment Practices Workshop designed to present practices that maximize the likelihood that diverse, well-qualified candidates for faculty positions will be identified, and, if selected, subsequently will be recruited, retained, and promoted at participating universities, 2) Train-the-Trainer Mentorship Workshop to instruct participants on how to establish and successfully implement campus mentoring programs, and 3) The administration of an online Faculty Climate survey designed to gather baseline data about faculty experiences in engineering, chemistry, and physics departments.

Poster Number: 111**Presenter:** Gail Smith**Institution:** CUNY Graduate Center (AGEP)**Email:** gsmith@gc.cuny.edu***CUNY AGEP Alliance: Creating The Future Of The STEM Professoriate***

The City University of New York (CUNY) is the Lead Institution in the CUNY AGEP Alliance with the New Jersey Institute of Technology, Polytechnic of New York University and Stevens Institute of Technology. Participating doctoral programs include biochemistry, biology, chemistry, computer and information science, earth and environmental sciences, engineering, mathematics, physics, psychology, speech-learning- hearing sciences. Phase I (1999-2004) focused on recruitment, enrollment and retention. Phase II (2004-2010), while continuing to stress these areas, focuses on professional development, degree conferral, and career placement at both postdoctoral and professorial levels, and creating sustainable institutional change.

Poster Number: 112**Presenter:** Jarret Smith**Institution:** Tennessee Technological University (RDE)**Email:** jlsmith28@tntech.edu***RDE REU Supplement: Fidelity of Implementation***

Student investigators researched the fidelity of implementation of the Effects of Teaching with Tablet PCs with Asynchronous Student Access in Post-Secondary STEM Courses on Students with Learning Disabilities (TTASA-SWLD) [#0726449]. Investigators completed a literature review, interviewed both faculty and team members at Tennessee Technological University, and reviewed records of student access of recorded lectures. Conclusions were drawn on the degree to which the research implementation was consistent with the research design

Poster Number: 113**Presenter:** Gerhard Sonnert**Institution:** Harvard University (GSE)**Email:** gsonnert@cfa.harvard.edu***PRiSE: Persistence Research in Science and Engineering***

Project PRiSE (Persistence Research in Science and Engineering) has examined the factors that predict beginning college students' career intentions. Having collected a nationally representative sample of ~7,000 of Introductory English students, the project examines differences in background and high school experiences between the "science persisters" and "non-persisters" among students who have just entered college. This will enable us to identify factors that might contribute to a student's decision to pursue or not pursue a STEM field in college. Here, we present preliminary findings about students' educational pathways, about gender differences in course-taking patterns in high school, and about racial/ethnic differences in the choice of intended careers and in sources of career satisfaction.

Poster Number: 114**Presenter:** Jo-Ann Sowers**Institution:** Regional Research Institute, Portland State University (RDE)**Email:** sowersj@pdx.edu***A Randomized Study of the Impact of STEM Mentor with Disabilities on High School Students with Disabilities***

The STEM Peer Mentor Project is conducting an exploratory randomized clinical trial investigating the extent to which systematic interaction with STEM mentors with disabilities promotes the STEM-related career planning knowledge, self-efficacy, engagement and performance of high school students with disabilities. The second aim of the STEM Peer Mentor Project is to specify efficacious STEM peer mentor program methods and evaluation strategies, based on the study's summative and formative findings, which can be used to advance adoption of STEM peer mentoring and to provide the foundation for further controlled study of the intervention with additional students under differing conditions.

The study features a two-independent group, randomized block, repeated measures design utilizing multiple-agents, multiple methods, and established protocols and measurement methods. In alignment with the solicitation, the proposed project is examining specific, measurable outcomes focusing on gains in student knowledge (STEM career planning); changes in student behavior (engagement in STEM courses, activities); changes in student attitude (self-efficacy); and changes in student success (school performance). Data is collected at baseline, at the conclusion of intervention, and at 4-months post-intervention. Preliminary data and lessons learned will be shared.

Poster Number: 115**Presenter:** Brandy Spears**Institution:** Tennessee Technological University (RDE)**Email:** blspears21@tntech.edu***RDE REU Supplement: Faculty Perceptions Of Long-Term Project Benefit***

A student investigator worked with the Project Statistician for the Effects of Teaching with Tablet PCs with Asynchronous Student Access in Post-Secondary STEM Courses on Students with Learning Disabilities (TTASA-SWLD) [#0726449]. A survey collected information from instructors in the control and experimental groups regarding the perceived long-term benefit that the tablet provides for students with learning disabilities. Their collective opinions were modeled using a technique implemented by actuaries and engineers in situations where little to no historical information is available.

Poster Number: 116**Presenter:** Andresse St. Rose**Institution:** AAUW (GSE)**Email:** strosea@aauw.org***Why So Few? Women in Science, Technology, Engineering, and Mathematics***

Women make up half the U.S. workforce and are now well represented in many previously “male” fields. In an era in which women are increasingly prominent in medicine, law,

and business, why are so few women becoming scientists and engineers? This poster will be based on a new NSF supported research report by the American Association of University Women (AAUW) that tackles this question.

Why So Few? Women in Science, Technology, Engineering, and Mathematics draws on the large and diverse body of academic research on women in science, technology, engineering and mathematics from the last 15 years. The report identifies key findings that help to inform our understanding of issues that contribute to the underrepresentation of women in science and engineering fields. It profiles eight different research projects, all of which offer compelling evidence that social and environmental factors—including stereotypes, bias, and the climate of university science and engineering departments—act as barriers to women’s full participation in these fields. Practical recommendations for parents, educators, and employers to attract—and keep—girls and women in STEM also emerge from the findings.

Poster Number: 117**Presenter:** Cary Supalo**Institution:** Pennsylvania State University (RDE)**Email:** cas380@psu.edu***Independent Laboratory Access for the Blind***

The Independent Laboratory Access for the Blind (ILAB) project, based at Pennsylvania State University and sponsored by the National Science Foundation’s Research in Disabilities Education program, is developing a suite of talking and audible laboratory tools to foster hands-on, independent, multi-sensory learning experiences for students with blindness or low vision. Through a partnership between ILAB and Vernier Software & Technology, most Vernier laboratory probeware is now capable of communicating information in speech or audible tones. This was achieved by interfacing Vernier’s Logger Pro data-collection software package with the Job Access for Windows with speech (JAWS) text-to-speech computer screen reader application. This interface was made possible through new JAWS script files, designed by the ILAB team. The interface utilizes a series of hot key strokes to obtain real-time probe readings, access to statistical information, data table navigation, and more. Also developed by ILAB, through the Electronics Shop in the Chemistry Department at Penn State, are several hardware devices, including a submersible audible light sensor (SALS), color analysis laboratory sensor (CALS), and scientific talking stopwatch (STS). All these tools have been field tested at 12 mainstream high schools and one residential school for the blind across the U.S. The JAWS/Logger Pro interface recently became commercially available from Independence Science LLC. Other ILAB tools are in the process of being licensed for commercial use

Poster Number: 118**Presenter:** Vladimir Suslov**Institution:** North Carolina Central University (CREST)**Email:** vsuslov@nccu.edu***Configuration-Space Faddeev Calculation For Proton-Deuteron Observables At Energy $E = 3$ MEV.***

A new computational method for solving the configuration-space Faddeev-Noeys-Noble-Merkuriev equations for the Nd breakup scattering problem [1] has been applied to consider the elastic pd scattering. To perform numeric calculations for arbitrary nuclear potential and with arbitrary number of partial waves retained, we used approach proposed in [2]. For a chosen set of basis states the Coulomb interaction is included by rigorous manner (although it has been expanded in partial waves). To calculate pd scattering observables we applied the charge independent nucleon-nucleon potential AV14. Our results on the polarization observables are slightly different from those of benchmark calculations [3] obtained with the charge-dependent nucleon-nucleon potential AV18 and Coulomb cut-off approximation.

Poster Number: 119**Presenter:** LeeAnn Sutherland**Institution:** University of Michigan (RDE)**Email:** lsutherl@umich.edu***Applying Universal Design for Learning Principles to Technology-Supported Middle and High School Inquiry Science Curricula***

Collaborators have developed and tested a web-based, Universal Design for Learning edition of 6th grade chemistry (IQWST) and 10th grade biology (Foundation Science) units. Even these well-designed instructional materials can pose barriers for students with learning disabilities or others who struggle with the literacy demands of science. The affordances of digital technologies can address a range of learning needs including differences in how students perceive and comprehend information; how they approach learning tasks, navigate learning environments, and express what they know; and how they engage in learning. A design-based research process supported the development and revision of the two units. This poster presents the results of both user- and pilot testing in two contexts: an urban middle school and an urban vocational-technology high school. This work contributes to a growing body of research on the role of technology-based instructional materials in reducing barriers to science learning for all students.

Poster Number: 120**Presenter:** Yongan Tang**Institution:** North Cantral University (CREST)**Email:** tangy@nccu.edu***Light in Metallic Hole Arrays***

We investigate the transmittance spectrum as functions of the periodicity of the array and of the thickness of the metal film. It is possible to obtain a desired transmittance wavelength by designing the periodicity of the array structure and/or the thickness of the metal film. The localized surface Plasmon propagates

through the holes, since the refractive index of the hole is different from the refractive index at the entrance of the hole and the exit of the hole, therefore, the two sides of the thin metal film can be viewed as two reflectors, one can treat these kind of hole structure of a metal film as a subwavelength Fabry-Pérot cavity. The physics of the light in metallic hole arrays is important to various potential applications, which include biosensors, optical filters, optical detectors, and photovoltaic solar cells, etc., of these metallic hole array structures.

Poster Number: 121**Presenter:** Doyle Temple**Institution:** Hampton University (CREST)**Email:** doyle.temple@hamptonu.edu***NSF CREST Center for Laser Science and Spectroscopy***

Hampton University has established a multidisciplinary CREST Center for Laser Sciences and Spectroscopy (CLaSS), which builds upon the existing scientific resources and faculty expertise available in laser spectroscopy. The vision of the center is to develop a world-class, multidisciplinary laser spectroscopy research and education center that is a new national resource at an HBCU. The Center integrates research, education, research training, and outreach in selected areas of science and engineering. The mission of CLaSS is to increase the number of advanced degrees (M.S. and Ph.D.) in important areas of science and technology awarded to underrepresented groups.

The goals of the CREST Center at Hampton University are to: 1) develop a multidisciplinary research center that will use laser spectroscopic techniques to advance the fundamental understanding of selected problems at the forefront of both the physical and biological sciences, 2) enhance the undergraduate and graduate curriculum by integrating research training into the curriculum providing students with a solid foundation in topics pertaining to laser spectroscopy in science and engineering, 3) involve students in an extensive program of research training and professional development including participation in international conferences, internships with our industrial partners, seminars presented by eminent scientists, and intensive training in scientific writing and presentations, and 4) develop innovative pre-college and undergraduate outreach programs that motivate students' interest in pursuing careers in science and engineering. The pre-college K-12 outreach program are conducted in close collaboration with the Hampton and Newport News public school systems.

The CREST Center involves the participation of a diverse group of faculty from the Departments of Chemistry, Electrical Engineering, and Physics at Hampton University, as well as scientists at other national and international institutions, industries, and government agency laboratories. The specific subprojects are: 1) Fluorescence Spectroscopy and Laser Crystal Development, 2) Nonlinear Spectroscopy of Semiconducting Nanocrystals, and 3) Laser Remote Sensing.

Poster Number: 122**Presenter:** Robert Todd**Institution:** Georgia Institute of Technology (RDE)**Email:** robert.todd@coa.gatech.edu***SciTrain: Science and Math For All***

Funded by a grant from the National Science Foundation award number 0622885, SciTrain helps high school science, computing, and math teachers provide quality education for all students, including those with disabilities. The project includes research and instruction for teachers on how to make courses, classrooms and labs more accessible. As a result of a formative survey of teachers' needs and focus groups, this training is delivered to K-12 teachers in a "just-in-time" format - participants receive modular content on the web organized by disability type and by subject area, so they can refer to it easily when they find a student with a particular disability in their class.

SciTrain uses Universal Design for Learning (UDL) as a basis for all instruction materials. It includes modules specifically targeted at addressing the needs of students with:

- Learning Disabilities
- ADHD
- Mobility and Dexterity Disabilities
- Deafness and Hearing Issues
- Visual Impairment and Blindness

In order to judge the effectiveness of the SciTrain learning materials, the project initiated a series of longitudinal studies with public high school teachers of STEM. Results of these studies compare the ideal strategies recommended by SciTrain, strategies actually implemented by teachers, and the barriers or learning styles addressed. Results from studies have been used to edit and update the online modules via a continuous, iterative design process.

Poster Number: 123**Presenter:** Alade Tokuta**Institution:** North Carolina Central University (CREST)**Email:** atokuta@nccu.edu***Human Behavior Recognition***

This work is focused on the recognition of human behavior obtained in different type videos obtained using visible light, infrared light, near infrared light, and to assess the impact of the different types of light on the recognition performance and propose new algorithms for those type videos. Human behavior recognition using visible light video has been extensively investigated in the past, but there is no literature on research utilizing infrared and near infrared video.

We captured thirty types of motion using visible, infrared, near infrared cameras at same time to create a video database. Each type of motion was performed by about fifty persons of varying ages. Five motions

were also captured using different illumination to determine the impact of illumination on the recognition. The video database contains 4115 video files and it is the largest and best resolution database so far.

We have used several methods such as space-time features, spatio-temporal bag-of-features, space-time gradient-based features and optical flow based features to obtain feature from the videos captured, and also applied algorithms proposed in literature including biologically inspired, sparse space, on space-time interest points to test the performance on our own video database. Based on the comparison of those methods and algorithms, we found most existing methods do not provide satisfactory results on infrared and near infrared video. Among these methods, biologically inspired and sparse space provide better experimental results on infrared and near infrared video, but there are still shortcomings in these methods. Biologically inspired needs a large amount of time to obtain the features from the video, but it has a good correct rate of recognition on most database and the results are similar to the results provided in most papers; on the other hand, sparse space is much faster than biologically inspired, and from the latest results on data from our experiments, it has a better performance than biologically inspired in some circumstances (e.g. on our visible database).

We have improved on the biologically inspired method to increase correct rate of recognition and efficiency, and proposed a combined spatio-temporal domain algorithm which seem to yield better results and time performance especially on our database. In this algorithm, we used scale-adapted space-time interest point as features detector. For each given point, computed feature descriptor Cuboid for a 3D video patch centered and concatenated the gradients computed for each pixel in the patch into a single vector. Then principal component analysis is used to project the feature vector to a lower dimensional space. We also tried other combined methods with different feature detectors (e.g. Harris 3D, Hessian) and feature descriptors (e.g. Cuboid, HOG/HOF, HOG3D) and figured out some methods are helpful to solve the problem. We plan to investigate new combine methods for human behavior recognition especially for infrared and near infrared video in the future.

Poster Number: 124

Presenter: Lorraine Towns

Institution: The City University of New York Graduate Center (AGEP)

Email: ltowns@gc.cuny.edu

CUNY AGEP Alliance: Creating The Future Of The STEM Professoriate

The City University of New York (CUNY) is the Lead Institution in the CUNY AGEP Alliance with the New Jersey Institute of Technology, Polytechnic of New York University and Stevens Institute of Technology. Participating doctoral programs include biochemistry, biology, chemistry, computer and information science, earth and environmental sciences, engineering, mathematics, physics, psychology, speech-learning- hearing sciences. Phase I (1999-2004) focused on recruitment, enrollment and retention. Phase II (2004-2010), while continuing to stress these areas, focuses on professional development, degree conferral, and career placement at both postdoctoral and professorial levels, and creating sustainable institutional change.

Poster Number: 125**Presenter:** Eileen Trauth**Institution:** Pennsylvania State University (GSE)**Email:** etrauth@ist.psu.edu***Millennials and Gender Typing of IT Skills***

The second phase of an empirical study of gender stereotyping in the STEM field of information technology (IT) examines gender stereotypes applied to IT skills by college age students enrolled in IT courses. A total of 1,010 students (24% female, 75% male, 1% transgender) completed an on-line survey. On a scale of 1 (feminine) to 5 (masculine) students were asked to rate a list of 36 skills related to the IT profession (that were produced from the literature in Phase I of this project). The results identify three clusters of skills: masculine (includes computer programming, database and networking); feminine (included communication, working in teams, ethics, global and cultural awareness, and openness to new experiences) and gender neutral (included initiative, ability to work under pressure, critical thinking and problem solving). The findings of a gender neutral category of skills warrants further investigation regarding possible changes in gender stereotypes about the IT profession by Millennial students.

Poster Number: 126**Presenter:** Edgar Troutt**Institution:** The City University of New York Kingsborough Community College (DUE)**Email:** edgar.troutt@kbcc.cuny.edu***Virtual Enterprise: Entrepreneurial Skills for STEM Majors***

There is currently an increased emphasis on stimulating innovation and supporting future entrepreneurs in the United States, especially in BioTechnology. ARRA provides incentives such as tax-breaks for small businesses and increased funding for research and science. Recognizing the critical need for technological innovation and advances, U.S. corporations are also investing in Science, Technology, Engineering, and Math (STEM) education. It is necessary to provide the proper foundation for the next generation of entrepreneurs to enable them to transition their innovative ideas into successful products and business ventures. This requires the embedding of business and entrepreneurial skills into curricula. Kingsborough's answer is the STEM-Virtual Enterprise (VE) program. VE has students simulate the staffing and operation of a business, supported by a technology platform and an international network. The program has been used around CUNY in a multitude of disciplines. Through a \$750,000 grant from the National Science Foundation's Advanced Technology Education program, the first BioTechnology VE has entered the curriculum. vebt-Capstone is the Bio-Technology Virtual Enterprise. The course has students work with an existing disease to simulate the development of a drug. This drug will be rapidly taken from conceptual stage, through regulation, pricing, packaging and sales. At the end of the course, the BioTechnology students keenly understand their importance within the larger enterprise.

Poster Number: 127**Presenter:** Tandra Tyler-Wood**Institution:** University of North Texas (RDE)**Email:** tandra.wood@unt.edu***Using Simulations to Prepare Future Science Teachers in an Inclusion Classroom.***

This poster will review the effectiveness of using a simulated science classroom (simSchool) to prepare teachers to work with students with disabilities in an inclusion setting. Researchers at a large midwestern university evaluated the use of a web-based simulated classroom, simSchool, with future teachers, to determine if use of the simulated classroom influences future teachers' perceptions of inclusion and teacher preparation. The primary purpose of this study was to examine the effectiveness of participating in simSchool for improving teacher preparation. The Teacher Preparation Survey measured gains in teacher preparation. Additionally, data were collected regarding the instructional delivery method of the simulation training. Researchers compared face-to-face training sessions with training which involved watching online videos. Findings revealed that students who participated in the teaching simulation scored higher on the teacher preparation survey and valued simulations and computer games more than a control group. Online training appeared as effective as face-to-face training for simSchool participants.

Poster Number: 128**Presenter:** R. N. Uma**Institution:** North Carolina Central University (CREST)**Email:** ruma@ncsu.edu***Energy-Efficient Routing Protocols in Wireless Sensor Networks***

We present energy-efficient routing protocols for wireless sensor networks. We consider a wireless network where the nodes have a heterogeneous energy profile. Such a situation arises in cooperative autonomous mobile robotic systems. The main objective in our algorithms is to maximize the lifetime of the network. We evaluate the performance of our algorithms experimentally through OMNeT++ and present our results.

Poster Number: 129**Presenter:** Doreen Valentine**Institution:** Rutgers, The State University of New Jersey (ADVANCE)**Email:** dvalen@rutgers.edu***RU FAIR ADVANCE Programming Mechanisms: "Grass-roots" Models for Institutional Transformation***

At Rutgers University, RU FAIR ADVANCE has implemented three "grass roots" programming mechanisms to improve retention of women faculty in academia, facilitate women's professional leadership development, and promote institutional change: RU FAIR Professorships, Mini-grants, and Life-Cycle grants.

RU FAIR Professorships are awarded to senior SEM women whose professional and programming goals align with the initiatives and goals of the ADVANCE grant and who are interested in partnering with the RU FAIR ADVANCE team in creating an enduring impact at the level of institutional transformation. Each professor is expected to serve as a university leader who fosters mentoring, promotes diversity, facilitates communication among our geographically dispersed faculty, and mediates between faculty and administration. Proposals for the Professorship detail mechanisms for improving conditions for the retention of women and other underrepresented groups in specific units and strengthening existing women's networks by fortifying their ties to all relevant campus networks.

Mini-grants provide a tool for shorter-term programming. They are awarded to female and male faculty at both junior and senior levels who plan to enhance the participation and advancement of women SEM faculty at Rutgers. Mini-grant proposals have included plans to organize professional development workshops, provide mentorship, develop social networks or strengthen existing social networks, and bring potential hires to the university as guest speakers. Mini-grant funded programs function at the department and school level to both assess and fulfill target, individualized needs related to enhancing the overall climate for women.

Life-cycle grants are available to Rutgers faculty (tenure-track or tenured, male or female) in SEM disciplines who are at critical junctures in their professional careers and who face potential significant impediments to their research productivity because of personal life events (either those that they are currently experiencing or those that they have experienced that still are affecting research and other professional responsibilities). The award of these funds is intended to ensure that the pace of research slows as little as possible, and that faculty facing life transitions can continue their research and teaching responsibilities even when events in their personal life are making or have made significant demands on their time and other personal resources.

Methods vary for evaluation of impact and success, but include online and paper surveys, focus groups, and interviews. Administering and implementing each of these granting programs has allowed the development of best practices around a model for institutional transformation. In addition, the outcomes of these mechanisms are directly related to one or more of the five focal-point initiatives of RU FAIR ADVANCE.

Poster Number: 130

Presenter: Carolyn Vallas

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Virginia-North Carolina Louis Stokes Alliance for Minority Participation

As the demography of the United States continues to shift, the Virginia-North Carolina Louis Stokes Alliance for Minority Participation (VA-NC LSAMP) has committed itself to the National Science Foundation's initiative of broadening participation amongst underrepresented populations in the science, technology, engineering, and mathematics (STEM). Since the implementation of this grant in 2007, the VA-NC LSAMP has continually strived to grow the number of STEM baccalaureate degrees awarded to students from underrepresented populations. Over the first two years of the grant period, the four

Historically Black Colleges and Universities and the four Doctorate-Granting Universities that comprise the VA-NC LSAMP have increased the number of underrepresented students that have graduated with STEM degrees by 28%. Within this strong public-private institutional partnership, LSAMP “best practices” have implemented to recruit and retain underrepresented populations within the STEM disciplines. By the end of 2012, the VA-NC LSAMP intends to aid in creating a diversified 21st century STEM workforce by increasing the number of underrepresented students that earn STEM baccalaureate degrees.

Poster Number: 131**Presenter:** Dhadesugoor Vaman**Institution:** Prairie View A&M University (CREST)**Email:** drvaman@pvamu.edu***Modeling and Design of Robust and Scalable Network Architecture for QoS Assured Multi-Service Applications***

Mobile ad-hoc networks (MANETs) and sensor networks offer a wide variety of important applications that could have a significant impact throughout society. But they operate under a set of unique constraints and requirements, bringing in new challenges (e.g., bandwidth and energy constraints, multi-hop connectivity, network lifetime/ availability, etc.) that go far beyond existing theories and algorithms. Moreover, with an increasing threat to data due to terrorism, scams and viruses, there is a need to develop assured security for reliable exchange of information across the network using multi-service applications with a wide range of data rates and reliability requirements. The overall goal of this research is to develop techniques for efficient information management and dissemination, information assurance, and indoor situational awareness modeling for battlefield and first responder applications. This project broadly addresses the areas of:

1. Modeling and design of cross layer link adaptation for multimedia and multi-resolution (scalable) data transmission;
2. Designing algorithms to protect the anonymity of friendly nodes (and their position, location and tracking) while identifying the malicious nodes and prevent their occurrence in the multi-hop routing path;
3. Modeling and designing resource efficient distributed network management system for scalable MANET and sensor networks with maintaining quality of service (QoS) assurance of multi-service applications;
4. Modeling and design of “indoor situational awareness system” with robots for visualization and tracking robots with external sensors and radios;
5. Real time simulation and test-bed development of scalable integrated network architecture for QoS assured multi-service applications.

Intellectual Merit:

The underlying theme of the proposed research is to improve the efficiency of secure multiservice and multi-rate communications in wireless networks through careful consideration of cross-layer design principles and end-to-end network optimization. Combined expertise of the faculty in communications theory, wireless networking, signal processing, and control theory allows solving the research problems in the above areas for applications in wireless ad-hoc networks. It is anticipated that the outcomes of this research will fill some important gaps in the current understanding of the fundamental limits and design trade-offs in MANET and sensor networks, enabling this growing field to fully realize its potential.

Broader Impact:

Given that the next-generation military and commercial wireless communication systems need to support a multitude of services with a wide range of data rates, reliability, latency, and security requirements, we believe that successful implementation of the research project will have a wide ranging impact in the design of future wireless networks. The proposed project will also provide educational training to students and professionals through research and hands-on experience. It will support enhancement and increase the production of graduate (MS and Ph.D) theses/dissertations and undergraduate senior design projects in electrical and computer engineering at PVAMU.

The ECE department at PVAMU has recently established a bridge to doctorate program with Tuskegee University where the minority students and women who successfully complete their Master's degree in electrical engineering are provided an opportunity to enter into the doctoral program in PVAMU. The proposed collaborative research with Tuskegee University will strengthen the existing collaborations among faculty and students at these two HBCUs and will further improve the knowledge base of women and minority students at the undergraduate, master's and doctoral levels of engineering education so that they can compete in the job market in industry, academia and government.

Poster Number: 132**Presenter:** Judy Vesel**Institution:** TERC (RDE)**Email:** judy_vesel@terc.edu***The Signing Math Dictionary (SMD) for Kids Project***

The poster will describe the goals of the project and illustrate the interactive features of the SigningAvatar® accessibility software that have been incorporated into the SMD. Designed for students in the elementary and middle grades who are deaf and hard of hearing and use sign as their primary method of communication, the poster will also show the integration of these features into a mobile iPod version. Preliminary research findings for the completed SMD will be shared.

Poster Number: 133**Presenter:** Gordana Vlahovic**Institution:** North Carolina Central University (CREST)**Email:** gvlahovic@nccu.edu***Potential field data analysis in the Eastern Tennessee Seismic Zone***

The Eastern Tennessee Seismic Zone (ETSZ) is an intraplate continental region located in the eastern part of North America and constitutes, after the New Madrid Seismic Zone, the second most active region of the continent east of the Rocky Mountains. It consists of a NE-trending, 300 km long and 100 km wide, belt of diffuse seismicity and is characterized by relatively low magnitude earthquakes occurring at mid-crustal depths. As a consequence, the rupture never propagates up to the ground surface and no obvious relationship seems to exist between the earthquake distribution and the faults known from geological mapping. Yet, that distribution appears to be significantly correlated with seismic velocity variations inferred from body-wave tomography and with observed potential field anomalies, thus suggesting some control of the seismicity by geological contrasts at depth. In this work, we attempt to investigate the possible links between the seismic activity of the ETSZ and its crustal structure by means of potential field data analysis. We applied Euler deconvolution technique to total magnetic field intensity data. The preliminary results provide magnetic basement depth estimates which can be compared to the variations of the velocity field inferred from tomographic inversion. These results, as well as information compiled from surface geology, available seismic profiles and well-log data, will ultimately be integrated into a geospatially referenced database and will be used to constrain structural models of the region.

Poster Number: 134**Presenter:** Shannon Walton**Institution:** Texas A&M University (LSAMP)**Email:** shannon@tamu.edu***LSAMP - Louis Stokes Alliance for Minority Participation: The Texas A&M University System***

The Texas A&M University System Louis Stokes Alliance for Minority participation (TAMUS LSAMP) is a partnership comprised of Texas A&M University (TAMU), Texas A&M University, Corpus Christi (TAMUCC), and Prairie View A&M University (PVAMU). The TAMS LSAMP has been active since the initiation in 1990 and is considered to be a pioneer alliance. Beginning November 2007, the alliance began its fourth phase of NSF funding. In Phase IV, the primary focus is directed on preparing the students to engage in research, providing opportunities for qualified students to participate on research projects supervised by faculty members and encouraging students to present their research results at science and engineering conferences. Phase IV is geared towards building on the efforts of Phase III in addition to building strong ties with the community college partners to recruit URM students into STEM majors and providing international experiences for students to increase and diversify the pool of globally trained STEM graduates.

Poster Number: 135**Presenter:** Matthew Wiswall**Institution:** NYU (GSE)**Email:** mwiswall@nyu.edu

Women in Science from High School to College: Evidence from New York City Public School Students completing degrees, great variation by gender remains between the courses of study that men and women select. Specifically, women are substantially less likely than men to major in a science, technology, engineering or mathematics- (STEM) related field. Using data on two cohorts of New York City high school students, we explore the ways in which high schools shape the "stem-readiness" of girls, setting the stage for their entrance into and success in STEM fields in college.

This paper considers three broad questions. First, do girls go to different high schools than boys and are they less likely to attend specialized STEM high schools? We find that girls are about 7-9 percent less likely to attend STEM schools than boys, with this gap in attendance robust to the inclusion of other explanatory variables including race, language, 8th grade scores, and middle school attendance. We also find that distance to STEM high schools from the student's residence plays an important role in the selection of schools, and this is true for both boys and girls. This finding suggests that increasing the availability of STEM schools would encourage more girls to attend STEM schools.

Second, is there a gender gap in STEM course taking? We find that girls in NYC high schools are more likely to take STEM courses than boys, even controlling for other confounding factors. However, it appears that STEM high school attendance has little causal effect on these course taking patterns.

Third, are there differences in "STEM-readiness" at the end of high school? Our results suggest high school choices and curricula are important factors in solving the STEM gender gap. Students who attend a STEM school have higher NY state Math z-scores on average. The effect of STEM schools on other outcomes, however, is ambiguous. Again, there seems to be no evidence of any significant differential impact for girls. Regardless of where they go, girls appear to do better than boys: they have, on average, higher NY state Math z-scores, are more likely to take this and other science exams, and are more likely to graduate from HS.

Our findings suggest that STEM schools are equally good for boys and girls, and that girls who attend STEM schools are not differentially disadvantaged relative to the boys at these schools, at least with respect to the high school test and graduation outcomes we examine. But, on average, girls are less likely to attend a STEM school; therefore, considering how factors such as distance to a STEM school affect the choice of high school, may be relevant for a better understanding of women's progression along the STEM pipeline.

Poster Number: 136**Presenter:** Marvin Wu**Institution:** North Carolina Central University (CREST)**Email:** mwu@nccu.edu***Properties of III - V Semiconductor Quantum Dots Produced by Ultrafast Pulsed Laser Ablation***

Semiconductor quantum dots (QDs) exhibit unique optoelectronic properties that may improve the performance of devices ranging from solar cells to photodetectors. We have employed ultrafast pulsed laser deposition (PLD) to produce InAs, GaAs and InP QDs with sizes ranging from 2 nm to > 20 nm at low temperatures on non-lattice matched substrate, illustrating the versatility of the PLD technique. The effects of laser fluence, laser pulse width and inert backing gas pressure on the size and optical properties of QDs deposited on mica, silicon and glass substrates by ultrafast PLD were investigated. Atomic force microscopy shows that QD size is highly dependent on parameters that affect the local plume density. High laser fluences and backing gas pressures result in increased QD sizes, consistent with the nucleation and growth of the QDs in the plume of ablated material near the target surface. Size distributions of the QDs were fairly narrow (~ 15% of the mean size), but higher fluences lead to increased production of extremely large (> 50 nm) particles. Nanoparticle formation occurs at lower fluences with fs pulses than with ps pulses, likely due to the increased ablation rate. Picosecond pulses also lead to slightly narrower size distributions, possibly due to the larger effect of pulse to pulse intensity fluctuations on the ablation rate with femtosecond pulses. Data from Raman spectroscopy, optical absorption and photoluminescence measurements performed on the smaller QDs are consistent with the expected properties of crystalline QDs exhibiting strong quantum confinement.

Poster Number: 137**Presenter:** Denise Yates**Institution:** Illinois LSAMP; University of Illinois at Chicago (LSAMP)**Email:** dyates@uic.edu***Membership in the Global Scientific Community***

The Illinois Louis Stokes Alliance for Minority Participation was established in 1993. The Alliance membership includes 14 institutions : Chicago State University (lead Institution), DePaul University, Governors State University , Illinois Institute of Technology, Illinois State University, Northeastern Illinois University, Southern Illinois University – Edwardsville, Southern Illinois University – Carbondale, University of Illinois at Chicago, City Colleges of Chicago (Kennedy-King College, Olive-Harvey College, Harry S. Truman College, and Wilbur Wright College), South Suburban College and St. Augustine College. Students awarded LSAMP Bridge to the Doctorate fellowships through programs hosted by the University of Illinois at Chicago and Southern Illinois University – Carbondale have enrolled more than 50 PhD students in STEM disciplines since 2006.

Poster Number: 138**Presenter:** Yevgeniya Zastavker**Institution:** F. W. Olin College of Engineering (GSE)**Email:** yevgeniya.zastavker@olin.edu***The Engineering Skill-Set Perception Gap: A Case Study of First-Year Engineering Students***

To improve the standing of the United States in today's globalized world, our nation must develop and increase its talent pool by vastly improving the K-16 educational system as well as by recruiting and retaining top students in STEM (Science, Technology, Engineering, and Mathematics) education (NAS, NAE, and IoM, 2007). Current research emphasizes the critical role of curricular and pedagogical practices implemented in the first year of student post-secondary instruction (Laoulache, R. N., Pendergrass, N. A., and Crawford, R. J., 2001; Mills, J.E. and Treagust, D.F.). The most effective curricula and pedagogies have been found to consider students' personal learning goals as well as course perceptions and appreciation of its value in academic work and career aspirations. (Etkina, E., et al., 2006; Anders, C. and Berg, R. 2003). Integrating research-based findings about student perceptions with best practices in teaching and learning methodologies may help to maximize learning outcomes, assist in student recruitment, and increase retention in the STEM workforce. To this end, this study is guided by the following questions: What are students' perceptions of the skills required for engineering? How do students' perceptions of learning goals differ from intended curricular goals? How does this perception gap affect students' assessments of the course value?

This work employs grounded theory to analyze interviews with six male and six female first-year students from a small technical undergraduate institution, the data collected as a part of a large mixed-methods multi-site study of students' engineering experiences. Two introductory "gateway" engineering courses are investigated. The Physics Laboratory course seeks to teach students how to design and perform open-ended experiments. It provides students with an initial problem statement and open-ended experimental design. The Lab also allows for student flexibility and independence with minimal guidance. The Engineering Design course seeks to teach students about the design process. With close guidance throughout the course, students tackle ill-structured, open-ended problems. Although both classes are assessed on final deliverables, the Engineering also incorporates the design process into the final evaluation.

Current findings indicate that the differences between the course structures result in the students understanding the course goals well in one class and poorly in the other. In the Physics Lab, a misalignment between student perception and intended curricular learning goals brings about student resentment of the course structure, while a more complete understanding of the stated course goals in the Engineering Design course, leads to favorable student impressions and increased interest. Furthermore, differences between students' perceptions of the skills and knowledge required by professional engineers and that defined by the Accreditation Board for Engineering and Technology (ABET) are evident. The data indicates a mismatch between student course goal perception and the intended course outcomes. Finally, overlap between the students' course goal perceptions and their definition of engineering is identified. How useful students believe the course to be is directly related to the extent of this overlap. Implications for introductory course design are discussed to clarify the course learning goals. Once the skills that students learn in class are related to the competencies outlined by ABET, students' perceptions

of engineering may be altered. It is hoped that the answers to the above research questions will contribute to the long-term goal of producing more competent engineers and increasing overall student retention rates.