

**National Science Foundation
Office of the Director**



Comments Received in Response to
NSF's Request for Input on
Section 7033 of the
America COMPETES Act

**Testimony on HACU's Behalf
by Antonio Flores**

NSF Listening Session of March 1, 2009

I'd like to thank Dr. Arden Bement for scheduling this National Science Foundation (NSF) Listening Session on the establishment of a Hispanic-Serving Institutions (HSI) Program within NSF and thank all of you for attending.

HACU has worked long and hard for the establishment of this program, and was very pleased when Congressmen Joseph Crowley of NY and Ruben Hinojosa of TX placed it within the America Competes Act. It is strongly needed, and HACU applauds NSF efforts for moving forward on this program with Listening sessions such as this, visits to HSIs, and the possible launching of a program this year.

As is well known to all of you, Hispanics in science, technology, engineering and mathematics (STEM) are far below their 15% of the national population, let alone their 17.5% of the traditional college age population, 18-24 year olds. Hispanics, at less than 8% of all Science and Engineering bachelor degrees, and even lower representation at the master's and Ph.D. levels, are dramatically underrepresented in the sciences and engineering. What is perhaps even more disturbing is that we have made very little progress over the past decade. Small increases in the absolute numbers have been too small to alter the percentages.

This underrepresentation persists despite the aspirations of Hispanic students: a higher percentage of Hispanic freshmen, 36%, than non-Hispanic Whites, 30%, intend to major in science and engineering. It persists despite the hard work of HSIs, which are less than 8% of all institutions of higher education, but have consistently produced about 33% of all Hispanic STEM bachelor degree graduates. The STEM success of HSIs with Hispanics is even more remarkable since, as a group, they continue to be severely under-funded, especially in federal science and engineering dollars, as the NSF has so well documented.

HSIs have proven to be an efficient and effective strategy for impacting Hispanic participation in STEM. It is simple. By definition, HSIs are institutions with 25% or greater Hispanic enrollment, so HSIs are the institutions where you will find Hispanics. If you wish to impact Hispanics, you need to go where they are and make those institutions as strong as possible. Despite their stellar performance, HSIs must do more, and can do more if given the necessary resources, such as those that an adequately funded and intelligently designed NSF HSI program can provide.

The issue is not just one of quantity: it is also one of quality and excellence. Our HSIs must have the resources to develop STEM talent of the highest caliber for our workforce, for graduate and post-doctoral programs and for the next generation of the professoriate. Often this means overcoming early deficiencies of poorly funded and poorly staffed school districts. Hispanics, like minority children in general, are more likely than white non-Hispanic students to attend poorer schools, take less science, and have teachers without appropriate educational credentials, especially in the sciences. HSIs can address these college readiness issues both by addressing teacher education in the sciences and by outreach programs that can supplement PK-12 schoolwork and head off later needs for remediation.

Therefore, HACU urges NSF to frame a program that accounts for the diversity of institutions in the HSI community, their different strengths and needs, and their potential for collaboration across types of institutions and levels of educational and research capacity. In this vein, HACU recommends the formation of local or regional consortia that incorporate these considerations and the importance of collaboration with PK-12 schools.

To better serve the students already in their classes, HSI faculty need the research and educational tools, professional development and human resources, local and cyber-infrastructure to provide enriching research and learning experiences. They need the research and educational resources to generate new

* The National Association for Hispanic Education is a component of the International Center for Higher Education & Philanthropy (ICHEP), established in 1995 as a nonprofit, tax-exempt 501(c)(3) Corporation.

knowledge through discovery and fully participate in the global, science and e-science STEM communities. The diversity of thought and perspective that Hispanics bring would help to fuel the creativity and innovation needed to do cutting edge science that drives the economy.

With innovation in STEM being the short and long-term basis for American competitiveness in a global, technological 21st century economy, America needs the broader participation of Hispanics. This is increasingly true as the number of international students in STEM continues to decline, and as our peculiar, counter-productive immigration policies prevent the U.S. from importing its needed intellectual resources; even if those resources are raised and educated, albeit not born, in the U.S.A.

Our expectations are high for Hispanics in STEM. We know that HSIs are a leverage point that can magnify the output of even a relatively modest input. We believe that an HSI program within the National Science Foundation can capitalize on that strategy and have a dramatic impact on Hispanic participation in STEM—and on American science—in this century. We are very excited and enthusiastic about the initial program that NSF is considering for implementation with due expediency. We look forward to hearing the suggestions, comments, and concerns of others here, confident that together we have the ingredients of success.

From: jean public [jeanpublic@yahoo.com]

Sent: Friday, January 30, 2009 1:54 PM

To: Hispanic Serving Institutions Stakeholder Input

Subject: Fw: discriminatory awards of tax dollars -public comment on federal register

i do not support this discriminatory idea of taking american tax dollars taken from all of the people to purposely discriminate and only spend on one color/race of people. this is wrong. this is discriminatory. this needs to be shut down.

b. sachau
15 elm st
florham park n j07932

From: ESPINOZA, SUSAN [sespinoza@mail.accd.edu]

Sent: Friday, February 13, 2009 3:19 PM

To: Hispanic Serving Institutions Stakeholder Input

Cc: DIMITRIU, DAN; O'CONNOR, JERRY; MC GILLOWAY, ROBYN; STAGGS, TEANNA; STANLEY, GEORGE; FARIABI, SAID

Subject: NSF-HSI program input

NSF Grants have been incredibly important to San Antonio College, which is an Hispanic Serving Community College. A Discretionary Engineering Education Program has allowed us to create and provide a Summer Bridge for 180 10th, 11th and 12th graders, who receive college credit for the courses they take, including Introduction to Engineering. The graduation rate for STEM students who have taken advantage of scholarships through our CSEMS/S-STEM scholarship program is more than four times the rate for the college as a whole. And our Advanced Technological Education grant has allowed SAC professors and 6-12 teachers from San Antonio's most disadvantaged school district to join together to improve and align their science course content and learn to use technology in the classroom. Most of the students participating/affected by our grants have been Hispanic.

What we have learned is that poor academic preparation at the secondary level, especially in math, is the biggest stumbling block for the predominantly low-income Hispanic population we serve.

If NSF wishes to open the STEM Career doors for Hispanic students with its HSI grants, it must support programs at community colleges (where most Hispanic students start their post-secondary educations) that help students recover (or learn for the first time) their math skills, including basic math and developmental skills. Intelligent, science-oriented students may be far behind in math simply because of preparation deficits or "holes" in their elementary and secondary educations.

Support for better math skills assessment and innovative "fast tracks" or modular delivery methods for math remediation must be a part of any successful efforts to increase the numbers of U.S. Hispanics who seek STEM careers in the US. Collegiate programs that reach into the high school population to expose them to math and science higher education and careers are also crucial.

SAC has the first MESA Center in Texas, but this effort, while highly successful for the 50 students who spend a great deal of time in the Center, is unfunded and, as a result, small and unstaffed. NSF support for MESA Centers at HSI's would help create the community of learners and the support systems that a STEM student (especially a minority STEM student without "social capital") needs in order to succeed in his or her STEM career.

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From: Brendan McNulty [bmcnulty@csudh.edu]
Sent: Tuesday, February 24, 2009 1:39 AM
To: Hispanic Serving Institutions Stakeholder Input
Cc: Karsten, Jill L.; Weixing Tong; Brendan McNulty
Subject: RE: New NSF program for Hispanic Serving Institutions

Dear Dr. Korsmo,

I am writing in response to a request from Dr. Jill Karsten and Dr. Roger Levine to provide some input for the upcoming NSF-HSI meeting in Washington DC. I am very happy to do so, and will simply break down our NSF-OEDG project into “what has worked” and “what hasn’t worked.” The observations below come from both the PI’s personal experience in the project, and from external evaluation (facilitated by Leslie Brock and Dr. Roger Levine of the American Institutes of Research).

Project title: Characterization and assessment of MTBE contamination of groundwater: Student immersion in a real-world problem (OEDG Track 1 Project; NSF-GEO 0503417 and 0741780)

PI’s: Dr. Brendan McNulty, California State University Dominguez Hills; Dr. Weixing Tong, California Regional Water Quality Control Board - Los Angeles Region

Project duration: June 1, 2005 to December 31, 2009.

WHAT HAS WORKED FOR STUDENTS

- stipends to conduct research
- opportunity to work closely with faculty
- being able to present at conferences, and the opportunity to travel
- receiving hands-on training in a field that leads directly to jobs
- getting research experience in context of a pressing environmental problem
- increased opportunity to attend M.S. or Ph.D. granting institutions

WHAT HAS WORKED FOR PI’S AND PROJECT IN GENERAL

- important for PI’s to be flexible
- multiple approaches work better than one
- development of new curriculum relevant to current job market (Hydrogeology; Groundwater Contamination, Environmental Geology)
- collaboration with other organizations, e.g., California Regional Water Quality Control Board - Los Angeles Region, CSUDH Center for Urban Environmental Research, Louis Stokes Alliance for Minority Participation (LSAMP) program at CSUDH

Another important consideration is that most of our students grew up in the South Bay – Los Angeles area, still live at home, and commute to campus. It is very important for many of them stay close to home and family. Notably, several of our recent or soon-to-be graduates have opted to attend CSUDH’s new Master’s program in Environmental Science. The draw here is that they can stay with their families and community and still pursue a graduate science degree.

WHAT HASN’T WORKED, OR PROBLEMS ENCOUNTERED

- time constraints (job, family, coursework)
- fading - or lack of - interest in the project
- major hurdle for some participants was completing a course in Hydrogeology
- PI’s giving too many training workshops prior to immersion in project

- PI's giving too many lectures prior to immersion in project

We have been able to adjust our training approach and pedagogy for the last three problems, but one of our biggest hurdles (the biggest, in fact) is student time constraints. Many students are stretched way too thin in regard to their multiple commitments/obligations, most of which are unrelated to their studies. We do not have a good solution here (other than being flexible and allowing students to come into and out of the project at their discretion), and we welcome input on this topic.

Please feel free to contact me regarding any aspects of our project.

Best regards,
Brendan McNulty
Professor
Earth Science Dept.
California State University Dominguez Hills
<http://www.nbs.csudh.edu/earth/brendan.html>



SACNAS
Society for Advancement of Chicanos
and Native Americans in Science

SACNAS

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www.sacnas.org

February 19, 2009

Dr. Fae Korsmo
Office of the Director
National Science Foundation
4201 Wilson Blvd,
Arlington, VA 22230

Dear Dr. Korsmo,

I am writing on behalf of the Board of Directors of SACNAS, of which I am the national President. We are writing in response to the request for stakeholder input concerning implementation of section 7033 of the America Competes Act, for your Public Meeting on March 1st, 2009.

Based on our experience over many years in dealing with minority students in STEM fields, we would suggest that there are important elements in attracting, and particularly in retaining these students in STEM fields. Not all institutions, nor even all institutions designated as HSIs, have in place the appropriate mechanisms for delivering some of these requisite elements for retention of Hispanics, Native Americans and other minorities as STEM majors. One such element is faculty identifiable by the students as role models and advisors, with whom students can identify, and who will give appropriate advice that speaks directly to student background and skills; another is formal and informal mentoring mechanisms, both professional-to-student and peer-to-peer mentoring; a third is the ability to engage students in meaningful research with appropriate guidance. The last, of course, is student aid funding, since most of these young people come from economically disadvantaged families.

SACNAS, as you know, is a society dedicated to advancing Hispanics/Chicanos and Native Americans in science by fostering their success in pursuing advanced degrees in science, engineering and mathematics. We are agents in carrying out the mission with which the America Competes act entrusts you. We see that the language used in the America Competes act in various sections includes "qualifying organizations" in addition to institutions. We believe it is the intent of the America Competes Act to be inclusive of organizations such as ours whose purpose is to assist Americans to attain advanced degrees in STEM fields. We are appreciative of the broadened language with which you describe the activities you consider relevant.

SACNAS has for the past several years held annual conferences attracting more than 2300 participants, about 2/3 of which are students. We have chapters at over 40 universities. We are very inclusive, with a representation that is approximately 9% white, 9% black, 7% Native American, 5% Asian and 70% Hispanic/Chicano STEM students, and for over half of those students our annual conference is their first scientific conference. Our surveys of the students attending our last conference showed that the mentoring and advising they received at our conference was considered

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by them to be better that the mentoring and advising they got at their home institution. For these and other compelling reasons, we believe and have evidence which indicates that we are an important element in helping these minority students achieve careers in the sciences. Organizations such as ours that have such a direct role in science student career success must be one of the elements important to the national goal of diversifying and increasing the scientific work force. SACNAS partners with several other organizations to maximize our ability to help students, and we have memoranda of understanding with several institutions including HSIs. The America Competes Act Authorization had as its intent to cover our activities as well as those of other kinds of institutions.

We look forward to working together with you on this important cause for America.

Sincerely,

A handwritten signature in cursive script that reads "J.D. Garcia". The signature is written in dark ink and is positioned above the typed name.

J.D. Garcia
President, SACNAS

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From: Anthony Carpi [acarpi@jjay.cuny.edu]

Sent: Wednesday, February 25, 2009 4:11 PM

To: Hispanic Serving Institutions Stakeholder Input

Cc: Korsmo, Fae L.; Nathan Lents; Jacob Marini; Lawrence Kobilinsky

Subject: NSF-HSI

Attachments: Stakeholder Input for NSF Section 7033 of the America COMPETES act.doc

Attached is a statement of input in response to the NSF call for input on section 7033 of the America COMPETES Act. The attached is formatted as a MS Word 2003 document, please contact me if an alternative format is required.

Thank you,

Anthony Carpi

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Deputy Chair

Department of Sciences

John Jay College, CUNY

445 West 59th Street

NY, NY 10019

212-237-8944

Stakeholder Input for Section 7033 of the America COMPETES Act

Submitted to: The National Science Foundation

Submitted by: John Jay College, the City University of New York

Prepared by: Anthony Carpi, Ph.D. and Nathan Lents, Ph.D.

February 25, 2009

Identification as Stakeholder

John Jay College is a senior college within the City University of New York with an enrollment of 12,896 undergraduate and 1,945 graduate students (fall 2007). The College is officially recognized as both a minority- and Hispanic-serving institution by the US Department of Education; 72% of undergraduates were members of qualifying minority groups (fall 2007), with Hispanics making up 43% of the undergraduate enrollment. In 2006, *Hispanic Outlook in Higher Education* recognized John Jay as the leading Hispanic-serving institution in the northeastern United States because John Jay enjoys the highest enrollment of Hispanics of any 4-year college in the Northeast and ranks #1 in the number of bachelor's degrees awarded to Hispanics. Fully 50% of our students claim to speak a language other than English at home and 18% of students identify Spanish as their first language. Further, as of fall 2007, 19% of undergraduates were single parents, nearly 65% were first-generation college students, and >52% of students come from homes earning less than \$30,000 per year.

Statement on evidence-based practices

Exposure to undergraduate research is one of the best predictors of success in post-graduate education and careers in science.^{1,2} These experiences provide undergraduates with a unique perspective on science as it is actually practiced.³ Unlike laboratory courses that are designed to give precise outcomes, undergraduates benefit from the realization that science is a process of exploration and discovery that does not follow a predictable path.⁴ Furthermore, the empowering experience of the scholarly research endeavor, along with the close mentor relationship that is fostered are likely key facets of the significant learning and career benefits enjoyed by undergraduates that participate in research.

Unfortunately, minority-serving institutions are among the least prepared in terms of available financial support and space to offer these experiences to students.⁵ Further, high attrition rates among Hispanics in science are not easily addressed by traditional programs. Hispanics and other minority groups often suffer from a long-term process of disengagement from school, stemming from a lifetime of low academic expectations and poor preparation in middle and high school.⁶ Further still, latino culture places a strong emphasis on familial and community bonds, and when Latino students fail to establish these bonds in college they are placed at high risk for failure.^{7,8} Compounding this problem, most Hispanic-serving institutions are commuter institutions. Noel has argued that student attrition is not linked to an institution *per se*, but rather to the quality of the relationships formed between an institution's faculty and students.⁹ Thus promoting close mentoring relationships between faculty and students, as is done in undergraduate research, is important for Latinos; but this must be done in a systematic and proactive way, in order to engage these students as early in their college experience as possible.¹

Over the past half-decade, we have worked to systematically change our approach to undergraduate research such that: 1) we engage students in their freshman year, 2) we train students on the nature and process of scientific research before they enter into research experiences, 3) we encourage close faculty-student relationships both in the lab and beyond, and 4) we follow these students through their college tenure encouraging them to pursue advanced science degrees after graduation. This program has met with tremendous success. Graduation rates from the program have more than doubled since 2003. The number of students applying to graduate and professional school has more than tripled in the same time period. Students consistently rate the program highly. And the success we have had with students acts to disseminate the program when upper classmen present and discuss their success to underclassmen.

Establishing a formal undergraduate research program at an individual institution creates community among the students and fosters a *culture of research* in which the students feel personally connected and personally invested in the larger scientific community. Further, upperclassmen naturally advise and mentor younger students, both in informal settings in the research labs, and in the formal settings of scheduled program meetings and events. Our particular undergraduate research program goes further still as our research-active upperclassmen often also work as tutors in our *Math and Science Resource Center*. This extends the "community of science scholars" further in ways that are often difficult to achieve at an urban commuter campus such as ours. Thus, by providing community, social bonds, and mentoring, all within the academic/scholastic science setting, we address the exact barriers that minorities and especially latinos face in their path to success in the sciences. And by integrating this community into the scholarly research life of our department, we naturally foster interest in, and ambition toward, graduate and professional study.

Our program is based on training students in the nature and process of scientific research. This is an important component of undergraduate research as most students enter college with minimal understanding of the scientific endeavor beyond methodical procedure.^{10,11} Unfortunately, the vast majority of students are never taught scientific process; instead, science is presented to them as a system of discipline-specific facts to be memorized. A growing number of studies point to the effectiveness of explicitly teaching the nature and process of science; however textbooks and traditional science classes

fail to provide any support in this area.¹² Thus explicit training in the nature and process of science in tandem with undergraduate research is a key component of this program.

We offer our experiences as evidence of best practice and we would highly recommend that NSF include undergraduate research as they develop a program in response to section 7033. Further, we strongly recommend that the Foundation keep in mind the special needs and situations of Latinos such that these programs be expanded on the individual institution scale and focus on community building. Special consideration should be given to the fact that the scientific disciplines of most interest to Hispanics, and those offered at Hispanic-serving institutions are not necessarily those that NSF traditionally supports. Thus, interdisciplinary science programs that do not easily fit into a pre-existing NSF area should be explicitly included.

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2. Russell, S.H., Hancock, M.P. & McCullough, J. THE PIPELINE: Benefits of Undergraduate Research Experiences. *Science* **316**, 548 (2007).
3. Seymour, E., Hunter, A.B., Laursen, S.L. & DeAntoni, T. Establishing the benefits of research experiences for undergraduates in the sciences: First findings from a three-year study. *Science Education* **88**, 493-534 (2004).
4. Aikenhead, G.S. Science Education: Border Crossing into the Subculture of Science. *Studies in Science Education* **27**, 1-52 (1996).
5. NSF. Scientific and Engineering Research Facilities at Colleges and Universities: 1998. Vol. NSF 01-301 (National Science Foundation, Division of Science Resources Studies, Arlington, VA, 1998).
6. Alexander, K.L., Entwisle, D.R. & Kabbani, N.S. The Dropout Process in Life Course Perspective: Early Risk Factors at Home and School. *The Teachers College Record* **103**, 760-822 (2001).
7. Skogrand, L., Hatch, D. & Singh, A. Understanding Latino Families, Implications for Family Education.
8. Hurtado, S., Carter, D.F. & Spuler, A. Latino student transition to college: Assessing difficulties and factors in successful college adjustment. *Research in Higher Education* **37**, 135-157 (1996).
9. Noel, L., Levitz, R. & Saluri, D. Increasing student retention: Effective programs and practices for reducing the dropout rate. *San Francisco: Jossey Bass* (1985).
10. Moss, D.M. Examining student conceptions of the nature of science. *International Journal of Science Education* **23**, 771-790 (2001).
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12. Dagher, Z.R. & BouJaoude, S. Scientific Views and Religious Beliefs of College Students: The Case of Biological Evolution. *JOURNAL OF RESEARCH IN SCIENCE TEACHING* **34**, 429-445 (1997).

From: Dr. Claudia L. Pinter-Lucke [clpinterluck@csupomona.edu]

Sent: Sunday, March 01, 2009 9:21 PM

To: Hispanic Serving Institutions Stakeholder Input

Cc: Dr. Donald F. Hoyt

Subject: NSF-HSI Stakeholder Input at HACU Conference

Attachments: CPP NSF Listening Presentation.doc

Hello

Here is the text of the comments offered by California State Polytechnic University, Pomona this afternoon.

Thank you again for the opportunity to make this presentation in person as part of the HACU meeting.

Sincerely,

Claudia

Dr. Claudia Pinter-Lucke

Associate Vice President, Undergraduate Studies Professor, Mathematics Department

(909) 869-3328

Fax: (909) 869-4395

Presentation for NSF Listening Session

Good Afternoon.

The message that Cal Poly Pomona would like to share with you is the importance of community; community in the classroom, in the lab, in the study hall, and in professional development.

This theme is exemplified at Cal Poly Pomona through the Science Educational Enhancement Service program, SEES, established in 1987 to provide support for underrepresented students in science fields. Services for students in SEES include a first year experience course, a common study hall, course-related workshops, as well as peer advising and mentoring. Since 1992, this program has graduated more than 500 students, who have gone on to earn 32 MD's, 7 DDS's, 20 Ph.D.'s, 61 MS degrees, as well as a number of high school and community college science teachers.

Data collected through this program confirms that this combination of activities designed to reinforce community while building academic skills improves the performance of undergraduate students. SEES students who start as freshmen have a retention rate 15% higher than under-represented students not in SEES, and a similarly improved graduation rate. Students who participate in the Academic Excellence Workshops, patterned after the Treisman model at UC Berkeley, perform at a higher level in introductory math, physics and chemistry classes: almost 50% earn grades of A or B in courses for which the average GPA for all students is about 2.15.

SEES students are also encouraged to participate in programs for upper division STEM students that offer faculty mentoring, professional development and financial support through research apprenticeships.

Three examples are the Howard Hughes Medical Institute, the California Wellness Foundation Health Professionals Program, and the Women's Educational Equity Act. Of the 20 students who participated in the Health Professionals Program, 75% graduated, with 55% accepted into health-related professional/graduate schools. Of the 35 women who participated in the Women's Educational Equity Act, 63% graduated in a STEM field within two years, compared with baseline data that indicates that 47% of such students leave the field without graduating.

Other programs, such as Maximizing Engineering Potential and the McNair Student Research Program anecdotally reinforce these results. The McNair Program, in particular, demonstrates the professional side to "community" - the value of role models, both serving as research mentors and presenters at professional conferences. In the last nine years, 166 students have participated, of which 134, or 81 % have graduated. Of those, 42 have gone on to doctoral programs.

To follow the successful path of the students in the SEES, MEP, and McNair programs requires the ability to track these students as they continue at graduate and professional schools. This is a difficult task, and NSF could provide essential assistance not possible for individual institutions. A centralized data tracking system similar to the tracking of participants in the NIH MARC Program would provide valuable quantitative data on the success of students in NSF and other programs after they leave their undergraduate institution.

What else do we need from NSF to promote community at a campus such as ours, a public comprehensive, primarily undergraduate institution? The NSF needs to take a broad view of student research, taking into account that some of our students have never been in a lab with modern equipment, and that just learning to use the equipment is a research experience for them. We need to be able to include assigned time and summer salaries in our proposals to offer the faculty the ability to maintain their connection with current work in their areas, as well as to spend time with students, in research and in mentoring. We need to be able to include funds for scholarships and summer stipends for research experiences so that the students don't need to work as much and can spend more time at school, and funds for travel so that students can interact with peers from other universities, and make contact with professionals that may influence their post-baccalaureate plans.

Finally, we would like to mention some grant programs on other campuses, which have components that support our theme of community and that we believe have the potential for great success. The Catalyst Program at Cal State University Northridge, funded by a NSF Geodiversity grant centers around integrated research groups, including MS candidates, undergraduates from CSUN and local community colleges, and local high-school students, that foster student research and provide peer mentorship. The Department of Homeland Security Science and Technology Directorate sponsors a summer internship program for faculty and student research teams to participate in the DHS Summer Research Team Program for Minority Serving Institutions. The team continues the research back on campus during the next academic year strengthening and extending the community bond begun during the summer.

Back at Cal Poly Pomona we are excited about a new Department of Education CCRAA grant to create a community "pipeline" for STEM students from high schools, through community colleges to Cal Poly Pomona, and beyond to graduate and professional school. Counselors and instructors are involved at every level, working with their peers and the student participants across the levels. We expect this effort to decrease the time to graduation and the number of courses taken, and increase these students' success after graduation.

Thank you for your time this afternoon.

From: Mr. Ortiz [alejandro.ortiz.velez@gmail.com]
Sent: Wednesday, March 04, 2009 4:20 PM
To: Hispanic Serving Institutions Stakeholder Input
Subject: Section 7033 of the America COMPETES

I am a student, and I am writing as a follow up to my participation on the National Science Foundation Listening Session on Section 7033 of the America COMPETES Act Hispanic-Serving Institutions and Science, Technology, Engineering, and Mathematics, on March 1 2009, Washington DC.

There I was compelled to participate because there were a series of “Doctors” and Administrators taking about students. What they believe is the best course of action. But in no place were the students on the speaker list nor were they encourage to participate. I heard a lot of numbers and statistics, but no real story of real students were spoken there.

Stories like the one from Lening Olivera, a born and bred Hispanic student from Puerto Rico. Who got his undergraduate degree from a HSI, went on to earn a Doctor Degree from another HSI, and now is head for a post doctoral fellowship in neuroscience in Montréal Canada. That is the quality of the students that go to HSI.

For years HSI have been doing more with less. If education were just a business, maybe this will be a fine proposition. But taken unto account what America COMPETES Act seeks and President Obama goal of having the highest proportion of college graduates in the world by 2020, doing more with less might not be enough.

My recommendations are:

There has to be some sort of tuition assistance that encompasses not only school dues, but texts, food, lodging, transportation, and all aspects of the student life.

Loan repayment or forgiveness programs should be available for those students who have perused studies and are working in the STEM field.

Fellowships and grants at a graduate level should be available to encourage undergraduates to continue advance studies in STEM.

Jobs need to be created in research settings, with competitive salaries and stable programs across the time of the academic life. A student in the STEM should be able to support itself as it earns valuable experience. Flipping burgers or greeting costumers at a mega store does not necessarily add to the value of the student development

Up to date research tools should be readily available. Such as databases, software, lab equipment, etc. a student must be given the necessary tools for its full development.

We need full time teachers. You can not expect to have a full time result with a part time investment.

NSF should listen to what the students need to say about the issues. Professors have their perspectives on the issues, and Administrative too, perspectives that necessarily do not reflect what the student really need to stay in a STEM programs. Remember “Nothing about us, without us”.

~Alejandro Ortiz



March 7, 2009

Dr. Fae Korsmo, Senior Advisor
<nsf-hsiinput@lists.nsf.gov>
Office of the Director
National Science Foundation
4201 Wilson Boulevard, Suite 1205
Arlington, VA 22230

RE: NSF–HSI Section 7033 of America Competes Act

I am writing with regard to Section 7033 of the America Competes Act.

I understand that the Act authorizes the NSF Director to establish a new program to award grants on a competitive, merit-reviewed basis to Hispanic-serving institutions to enhance quality of undergraduate science, technology, engineering, and mathematics (STEM) education at such institutions and to increase the retention and graduation rates of students pursuing associate or baccalaureate degrees in STEM. As indicated by NSF annual reports, STEM is a critical topic, brought into the limelight by 9/11, global competitiveness, and the so-called “quiet crisis” of an imbalance between supply of and demand for STEM talent.

This Act is long overdue and NSF response is critical to the future of many. As you may know roughly one-fourth of the nation's kindergartners are Hispanic, evidence of an accelerating trend that now will see minority children become the majority by 2023.

Census data released last week also showed that Hispanics make up about one-fifth of all K-12 students. Hispanics' growth and changes in the youth population are certain to influence higher education capabilities in science, technology, engineering and mathematics. In colleges today, Hispanics make up 12% of full-time undergraduate and graduate students, 2% more than in 2006. Still, that is short of Hispanics' 15% representation in the total U.S. population.

With regard to the challenge posed by Section 7033, I wish to bring your attention to my publication with Stephen Mello (2007) that analyzes recent trends and patterns associated with Hispanic doctoral degree completion in STEM [<http://jhh.sagepub.com/cgi/content/abstract/6/4/305>]. We relied largely on NSF data that had not been published beforehand.

We suggest three essential ways to respond to Section 7033 of the America Competes Act:

First – reject references to Hispanic failure in the STEM pipeline.

Mello and I looked at national STEM issues from a minority perspective. Basically, we found that when STEM is discussed nationally, Hispanics are almost ignored. What little is said, frames Hispanic numbers as a pipeline issue, i.e. producing a dribble of numbers at the end of a large stream of resources. In report after report, we saw statements from American corporations, scientific organizations, public and private institutions, saying that Hispanics have little to show after efforts to strengthen the educational pipeline.

We argue that the STEM Pipeline perspective is self-defeating and a distortion of reality. It suggests that the shortfall in Hispanic numbers is due to their inability to take advantage of current programs and policies. This tends to suggest that Hispanics are the problem themselves. The Pipeline metaphor says

nothing of the programs themselves and the way they affect Hispanic access, motivation and hard work.

Second – address “barriers” faced by Hispanics in progressing through higher and higher levels of STEM education.

Our research and that of others show Hispanics making academic progress despite numerous barriers to achieving higher levels of STEM education.

According to a recent report: *Increasing the Success of Minority Students in Science and Technology*, (ACE, 2007):

- 1) African American and Hispanic students begin college interested in majoring in science, technology, engineering and math (STEM) fields at rates similar to those of white and Asian-American students, and persist in these fields through their third year of study, but do not earn their bachelor’s degrees at the same rate as their peers.
- 2) African American and Hispanic students majoring in STEM fields who persisted beyond the third year did not drop out, but were still enrolled and working toward a degree after six years.
- 3) A statistical analysis showed that majoring in STEM fields did not affect student persistence.
- 4) The variables strongly related to persistence for all students, regardless of major or race/ethnicity were full-time attendance, hours worked while enrolled, and rigor of high school curriculum.

The ACE analysis identified a number of key differences between students who completed a bachelor’s degree in a STEM field and those who did not in a five-year period.

- 1) Completers were better prepared for postsecondary education because a larger percentage took a highly rigorous high school curriculum.
- 2) Nearly all completers were younger than 19 when they entered college in 1995-96 compared with 83.9 percent of non-completers.
- 3) Completers were more likely to have at least one parent with a bachelor’s degree or higher.
- 4) Completers came from families with higher incomes.
- 5) Non-completers were more likely to work 15 hours or more a week.

According to Eugene Anderson, associate director of the Center for Policy Analysis at ACE and co-author of the report:

“We find that these students do pursue these majors and persist beyond the third year, but are not earning enough credits each year to attain a degree within six years. The challenge now is to move traditionally underrepresented students in the STEM fields toward timely degree completion by supporting these students—both academically and financially throughout their undergraduate careers (ACE press release).”

Furthermore, according to Anderson,

“Higher education institutions must know how to better identify those students who need support — and what type of support, both academic and financial — would be most helpful in order to be successful in the STEM fields. Institutions must also encourage students to work less and attend full time consistently. This is a major challenge because these are two areas institutions can do little to control. Also, the federal government must recommit to financial aid for the neediest students. (ACE press release).

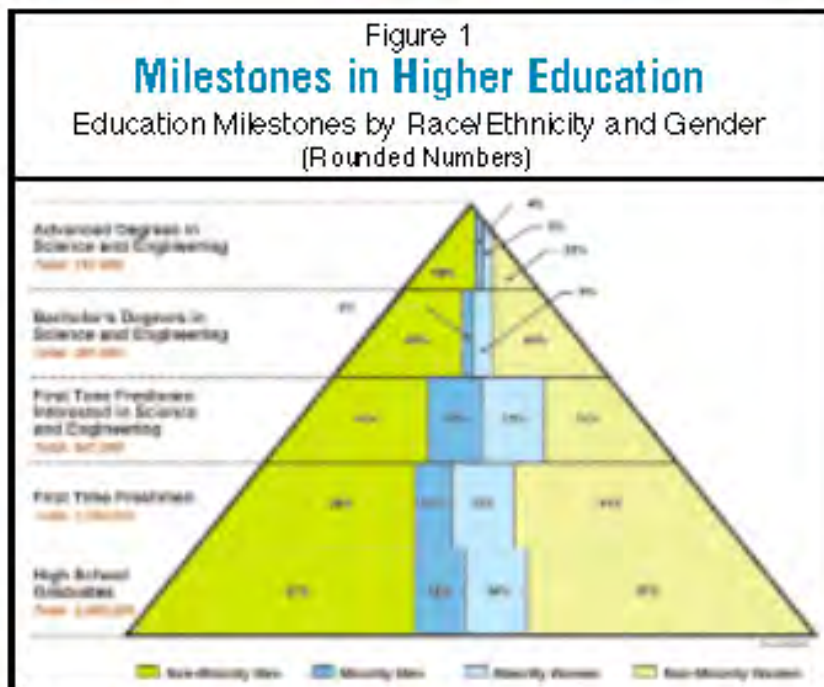
Third – Consider the challenge as widening the base of opportunity and reducing academic barriers as aiming for the heights of a STEM Pyramid.

We believe that the BEST perspective of the “Pyramid of Higher Education” allows for a closer

examination of needs and issues facing all students in STEM.

To illustrate this, we use the Pyramid that is posted at BESTs' website: "Building Engineering and Science Talent." See: "Bridges for All" [<http://www.bestworkforce.org/publications.htm>].

The Pyramid (depicted) shows a large base of students leaving high school, entering CCs, four-year Colleges and Universities. At higher levels, we see a natural tendency for fewer to proceed. But the



Pyramid also highlights critical stages ahead for those who want to become STEM professionals. Efforts are needed by NSF to develop broad ranging strategies, policies and funding for Hispanics.

In a report by Shulock and Moore (2007), more support is needed at community colleges. [Shulock, N. & Moore, C. (2007). Rules of the Game: How State Policy Creates Barriers to Degree Completion and Impedes Student Success in California Community Colleges. Institute for Higher Education Leadership & Policy. California State University, Sacramento. February 2007].

According to Shulock and Moore there is need to address "access-oriented policies." They identified five policies that have the unintended consequence of inhibiting degree completion. According to the authors:

"Four of the policy clusters involve finance, broadly defined to include laws and regulations that affect how much funding each college receives, how colleges can use their funds, the fees students pay, and the conditions of student financial aid eligibility... A fifth set of policies influences how students are advised and counseled to choose courses and make academic decisions. These policies are especially influential for under-prepared students (2007)."

Furthermore, Shulock and Moore see a need to assess policy implementation, such as the use of SAT and ACT scores for college admissions and availability of pre-college instruction in math and English.

In Conclusion

My study with Mello shows that overtime, since 1995, the numbers of Latinas/os completing STEM doctoral degrees has steadily increased, despite policy and access barriers.

As NSF directors examine ideas and proposals for Section 7033, keep these suggestions in mind:

1. Eliminate the STEM Pipeline argument from influencing NSF actions and policies.
2. Examine and address the barriers faced by Hispanics in access, finance, time to degree completion and counseling support.
3. Adopt a clearly Pyramid Perspective of Higher Education – with solid programs and policies and supportive structures in place, it will be possible to have more STEM professionals among Hispanics.

Finally, insist on good data and documentation showing what works for Hispanic STEM progression.

Thank you

Refugio

Refugio I. Rochin, Ph.D.
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From: Gates, Ann [agates@utep.edu

Sent: Wednesday, March 11, 2009 3:12 PM

To: Hispanic Serving Institutions Stakeholder Input

Cc: Sharma, Amy; Cuny, Janice E.; Contreras, Mary E.; Desh Ranjan; Domingo Rodriguez; Heather Thiry; John Fernandez; Karen Villaverde; Malek Adjouadi; Mohsen Beheshti; nayda santiago; Nestor Rodriguez; Pedro I. Rivera ; Richard Alo; Sarah Hug

Subject: NSF-HSI

Attachments: CAHSI-NSFListeningResponse3-11-09 submit.pdf

Dear Dr. Korsmo,

The attached file contains the comments submitted by the Computing Alliance of Hispanic-Serving Institutions regarding stakeholder input on Section 7033 of the America COMPETES Act. We would be happy to provide additional information if needed.

Best regards,
Ann Gates

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Memorandum

To: Dr. Fae Korsmo, Senior Advisor, Office of the Director, National Science Foundation
CC: Jan Cuny, Program Director of the NSF CISE Broadening Participation in Computing
From: The Computing Alliance of Hispanic-Serving Institutions¹
Date: 3/11/2009
Re: Stakeholder input on Section 7033 of the America COMPETES Act

This memorandum responds to a request to provide input regarding Section 7033 of the America COMPETES Act. That act authorizes the NSF Director to establish a new program to award grants on a competitive, merit-reviewed basis to Hispanic-serving institutions *to enhance the quality of undergraduate science, technology, engineering, and mathematics (STEM) education at such institutions and to increase the retention and graduation rates of students pursuing associate or baccalaureate degrees in STEM.*

Before giving the requested input, we provide a brief background of the Computing Alliance of Hispanic-Serving Institutions, ending with a summary of the recommendations and concerns that should be addressed.

Background

The Computing Alliance of Hispanic-Serving Institutions (CAHSI) is a consortium of seven Hispanic-Serving Institutions that are committed to the recruitment, retention, and advancement of Hispanic students in Computing. CAHSI has been funded by the NSF Computer and Information Sciences and Engineering (CISE) Broadening Participation in Computing Program since 2004.

CAHSI's core purpose is to create a unified voice and to consolidate the strengths, resources, and concerns of CAHSI institutions and other groups that are committed to increasing the number of Hispanics who pursue and complete baccalaureate and advanced degrees in computing areas. CAHSI provides assistance in a variety of ways: direction for initiatives that motivate Hispanics to pursue and succeed in computing careers, dissemination of best practices

¹ Ann Q. Gates (PI), University of Texas at El Paso; Malek Adjouadi (co-PI), Florida International University; Richard Aló (co-PI), University of Houston-Downtown; Mohsen Beheshti (co-PI), California State University-Dominguez Hills; John Fernandez (co-PI), Texas A&M University-Corpus Christi; Desh Ranjan and Karen Villarverde (co-PI), New Mexico State University; Domingo Rodriguez, Nestor Rodriguez, and Nayda Santiago (co-PI), University of Puerto Rico-Mayaguez

in education and research, and development of future Hispanic leaders. In addition, the group is fostering a community that shares resources, establishes collaborations in research and education, and lends support to partner institutions.

Comments and Recommendations

Recommendation: Support for Alliances.

Discussion: It's important to note that not all HSIs are the same and, as a result, have different needs. There are cultural distinctions between subgroups of Hispanics (e.g., Mexicans, Puerto Ricans, and Cubans), and the impact of those cultural characteristics result in different challenges. *Supporting alliances such as CAHSI allows the collective to disseminate best practices that address recruitment, retention and advancement of Hispanics in computing, and to evaluate and assess the adoption of those practices to better understand the factors that affect successful adoption and impact.* CAHSI efforts are beginning to show positive results after three years, e.g., the proportion of students who enrolled once in CAHSI target courses, and were successful upon their first enrollment, increased from 2004 to 2007. This difference was significant for Hispanic students ($z=2.135$) and for all student groups.

CAHSI disseminates its practices to institutions that then adapt them to fit their needs. As an example, many CAHSI member institutions have added a course in their curriculum for students who have not taken the first course in the computing major, so as to expose them to computing and attract them to the field. The course has been adapted to meet the needs of different institutions: one configuration used for liberal arts students emphasizes storytelling, another targeting pre-engineering students focuses upon creative problem solving through multimedia, and another is framed as a preparatory course for majors with minimal programming experience. CAHSI members are helping each other, while acknowledging the differences among our institutions and the populations they serve.

Recommendation: Support for students.

Discussion: One difference between an Hispanic student and a majority student is their exposure to activities that better prepare them for the university. In many cases, Hispanic students are the first in their family to graduate, and there is much demand on the student's time because of domestic pressures, e.g., contributing to the family's income or caring for parents or siblings. To support students who are studying in STEM areas, it is imperative to have programs that foster environments in which students develop professional, technical, and communication skills that help them succeed, and can conduct research at R1 universities and laboratories. While it's important for students to attend the best research institution, students often prefer to study at an HSI or MSI because of obligations, economic considerations, and the competitiveness of graduate school. Programs that support research collaborations with R1 universities and laboratories are critical for deepening the intellectual growth of novice researchers. It is also imperative to have programs that establish avenues for adequate financial support to students in need, especially for scholarships, graduate fellowships, post-doctorate support, and conference travel scholarships.

Recommendation: Separate programs or tracks within a program to address different parts of the education continuum and different types of institutions.

Discussion: There should not be an expectation that initiatives can address all parts of the education continuum. Different types of people are needed to confront the challenges of K-12, the two-year institutions, the institutions that focus on undergraduate education, the

institutions with only master's programs, and those with Ph.D. programs. Initiatives that focus on K-12 are essential to increasing the number of students in STEM in higher education.

Recommendation: Focus on programs that target building capacity in the department or institution.

Discussion: The question of programs focused on the institution versus individuals has two major dimensions – effectiveness and legality. In examining the effectiveness dimension, funding for programs focused on institutional transformation, according to Dr. Bryant York, ultimately delivers more product than funding requests submitted by individuals. On the legal side, it is less risky to target specific classes of institutions than specific classes of individuals. Institutional transformation can change the administrative and management structure of academic institutions to better facilitate broad participation.

There are a number of programs that have been effective in the past and should be considered--and possibly broadened—when looking at program that targets Hispanics. One program in particular is the CISE Minority Institution Infrastructure (MII) Program that supported development of research and education infrastructure and allowed faculty support. All but one of the HSIs that form CAHSI have been funded through the CISE Minority Institution Infrastructure (MII) program. That program allowed the HSIs to develop research infrastructure, capabilities, support of graduate and undergraduate students involved in research, and Ph.D. programs. This was critical for raising the research stature of universities, such as Florida International University, New Mexico State University, University of Puerto Rico Mayaguez, and the University of Texas at El Paso. The program also helped build human capital, particularly in the areas of recruitment and retention of Hispanics at all educational levels, and established teaching and research laboratories. While this has benefited all participating CAHSI HSIs, it had particular impact on Texas A&M Corpus Christi and the University of Houston Downtown in their transition from teaching to teaching/research institutions. The initiatives funded by the MII program have made a difference in the number of students graduating in baccalaureate programs in science, technology, engineering, and mathematics areas.

Summary

Broadening participation of Hispanics requires sustained investment in the development of HSI graduate programs, faculty, student, and infrastructure. HSIs play an important role in increasing the number of students who choose computing as a career and continue to graduate school. Indeed, Ph.D. granting HSIs are key to improving the number of Hispanics who enter the professoriate. Funding is essential to sustain the quality of research and education at these institutions and to establish collaborations that broaden students' research experiences. In addition, increasing the number of Hispanic faculty who can serve as role models is critical. HSIs must be able to assemble an attractive package in order to attract qualified Hispanic faculty. The thin spread of resources makes this problematic, creating, then, a classic Catch-22: it is difficult to recruit good faculty when the funding of programs such as CISE MII were cut, and HSIs cannot compete for regular funding without good faculty.

A summary of areas to provide funding include:

1. Support alliances that sustain strong collaborations that address the recruitment, retention, and advancement of Hispanics.

2. Build and sustain strong graduate programs at HSIs, through programs such as the HBCU RISE and Centers of Excellence programs;
3. Support graduate research fellowships and provide Hispanic graduate students with educational and research experiences at other institutions;
4. Support undergraduates who are involved in research;
5. Recruit, retain, and advance Hispanic faculty, in particular those at HSIs;
6. Enhance professional development of faculty at HSIs who involve Hispanic students in research;
7. Sponsor authentic RI-HSI research collaborations that are partnerships between equals; and
8. Build technological and human infrastructure through programs that target departments in STEM fields.

CAHSI partners believe that the following concerns must be addressed in order to broaden participation effectively:

1. Pedigree problem. Three fallacies exist: a) it is imperative that minorities attend an R1 institution for their Ph.D. in order to have credibility; b) faculty at minority institutions are not capable of conducting quality research; c) students and faculty are at minority institutions because they were not accepted at another institution. Clearly, this plays into peer review and funding decisions. CAHSI recognizes the importance of promoting a new model of thinking that is devoid of these wrongheaded ideas.
2. Accountability. Accountability falls into two categories. One is the funded institution that receives money to advance the cause of Hispanic students and faculty, while the second is the institution that receives funding in partnership with HSIs. Mechanisms should be installed to monitor fund usage.
3. Merit review system and advocacy. It is essential that there be fairness in the merit review system, especially in programs in which RIs and minority institutions compete. It is our belief that pre-judgment and lack of knowledge concerning the capabilities of minority institutions distorts the merit review unless strong advocates are present. We are not convinced that involving faculty from minority institutions on panel reviews is enough to solve the problem.
4. Collaborations. Genuine partnerships are not built over proposal writing; they are built over time and require mutual respect.

From: Jessica Kunkler [jkunkler@aaas.org]
Sent: Friday, March 13, 2009 2:36 PM
To: Hispanic Serving Institutions Stakeholder Input
Cc: Alan Leshner; Shirley Malcom; Yolanda George; burgesda@bc.edu
Subject: Letter regarding HSI
Attachments: NSF HSI Letter.pdf

Dr. Korsmo,

Please see the attached letter regarding HSI.

Thank you,

Jessica Kunkler

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March 13, 2009

Dr. Fae Korsmo
Senior Advisor
Office of the Director
National Science Foundation
4201 Wilson Boulevard
Suite 1205
Arlington, VA 22230

Re: NSF-HSI

At the suggestion of the AAAS Committee on Opportunities in Science (COOS), I am writing in response to the Notice of Public Meeting and Request for Stakeholder Input published in the Federal Register, Vol. 74, No.19, Friday, January 30, 2009 regarding Section 7033 of the America COMPETES Act.

The AAAS COOS applaud the goal of Section 7033 of the Act and agree that the goal of enhancing the opportunities for Hispanic students in the STEM fields is essential.

However, it is worth noting that Hispanic American students are enrolled both in Hispanic Serving Institutions and in non-Hispanic Serving Institutions where 44% of all Hispanic students are enrolled. It is thus important to provide funding that supports the STEM (science, technology, engineering and mathematics) education and career aspirations of Hispanic students through whatever organizational structures providing such support.

The AAAS COOS want to call to your attention the unique opportunities and programs offered by professional scientific societies such as the Society for the Advancement of Chicanos and Native Americans in Science (SACNAS), an affiliated organization of the American Association for the Advancement of Science (AAAS). Professional societies offer many career and research development programs and activities targeting Hispanic undergraduates in the STEM fields regardless of their enrollment in a Hispanic Serving Institution. SACNAS, for example, has been recognized by the NSF and others with major mentoring awards, including the Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring.

We encourage you to open up the competition for peer-reviewed grants in this Act to such excellent non-profit organizations that can provide unique and important student mentoring, faculty development and other programs consistent with the goals and aims of

Directorate for Education and Human Resources Programs

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the Act. Expanding the program for the award of competitive, merit-reviewed grants to non-profit organizations with a proven track record of success will enhance the opportunities for all Hispanic STEM students.

Sincerely,

Shirley M. Malcom
Shirley M. Malcom, Ph.D.

Dr. Pete E.C. Markowitz
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Thank you for the opportunity to speak to you today. We have seen many perspectives on opportunities at Hispanic serving institutions. All have the common theme of improving undergraduate STEM education at Hispanic serving institutions, a critical issue for those here today.

I am Pete Markowitz and, as detailed in the request for stakeholder input, I would like to provide you with details on our transformative model for physics education outreach at Florida International University. Florida International University is an urban, public, research institution with over 38,000 students located in Miami, Florida. FIU is the nation's largest producer of Hispanic Bachelor's and Master's degrees recipients. South Florida is a diverse region, home to large minority populations that include many recent immigrants from Latin America, the Caribbean, and South America. It includes the fourth and sixth largest public school districts in the country. Many FIU students come from the region, resulting in a 60% Hispanic as well as a 60% female population that matriculates at FIU. Thus FIU provides a unique opportunity to develop models for working with students who are traditionally underrepresented.

Within this diverse population, we have successfully built a thriving research and learning community that has resulted in both increased participation as well as better prepared undergraduate physics majors. The foundation of our model is to combine research validated curriculum with cutting edge physics research and embed these components within a student centric combined high school and university community. Critical to our success has been support from multiple NSF directorates, a sustained commitment from FIU's administration, and a talented multi disciplinary research team.

Our transformation began in 2003 with the CHEPREO project, the Center for High Energy Physics Research and Education Outreach, an NSF project funded by the physics, education, and computation directorates. The goal of the project is to do cutting edge particle physics research at CERN enabled by cutting edge networking and grid computing; all of which serve as a vehicle to energize students and teachers to bring them into physics and the sciences. It also supported implementation of research validated pedagogy at both the high school and university levels, specifically incorporating techniques that attract and retain under represented minorities and women, as well as establishing a physics education research group to quantify the impact of the reform. The education outreach research team includes Physics Department and College of Education faculty, sparking transformation in the physics and education programs while creating the foundation for broader science and mathematics.

The CHEPREO team has built a vibrant research and learning community that deploys "Modeling Instruction" into the classroom. Modeling Instruction is a research-validated, guided inquiry pedagogy that engages students as scientists as they build their physics understanding, and at the same time provides students and teachers the opportunity to engage the frontier of science at CERN's Large Hadron Collider. Modeling Instruction has been deployed both into the local high schools and at FIU, providing a common framework from which to grow the community. CHEPREO supports teacher professional development and year round activities that bring teachers, students, and faculty together on a regular basis. Teachers employing Modeling have seen more than a factor of 2 improvement in students understanding when compared to traditional teachers, as measured by the Force Concept Inventory. Thus CHEPREO has created pathways for students to seek physics and physical sciences careers, while better preparing them for success at college.

The reform continues at FIU, where Modeling Instruction is used in several studio-based sections of introductory physics. Here students enjoy even further improved conceptual understanding as compared to traditional students, roughly a factor of 2.5 at FIU. These reformed classes also have led to significantly improved student success that reaches across both gender and ethnic boundaries, averaging a factor of 4 improvement in DFW rates (students receiving D's, F's, or Withdraw/Drops) as compared to traditionally-taught students. Further, the Modeling class has achieved a significant measurement of increased student favorable attitudes towards physics and physics learning, which is the first reported increase in an introductory physics course in the country, as measured by the Colorado Learning About Science Survey.

The CHEPREO community, through supporting both high school and university Modeling classes, creating opportunities for high school students and teachers and especially undergraduates, and providing pathways and stewardship for all participants, has increased interest in physics and education. The FIU Physics Department has seen a 240% increase in intended and declared physics majors and a 400% increase in physics bachelor's degrees, when recent three-year averages are compared to the early 1990's. Thus multiple measures illustrate the transformative nature of the CHEPREO-supported reform at FIU.

The CHEPREO model is being employed as the foundation of additional multi-disciplinary education reform, going beyond physics and education and into other science and mathematics departments. To extend the model to explicitly target physics teacher preparation, FIU operates one of five active PhysTEC sites. PhysTEC's goal is to produce models for becoming deeply engaged in the production of more and better prepared science teachers who are committed to interactive, inquiry-based approaches. These efforts have been further leveraged as FIU was recently awarded an NSF Noyce project, which provides financial incentives and teacher to content area majors, in exchange for teaching in high-needs districts. The FIU Noyce project extends the PhysTEC framework to include mathematics, chemistry, and earth sciences students. Clearly, the NSF-funded CHEPREO project has led to transformation at FIU and South Florida, transformations that will continue as the CHEPREO model extends to engage additional sciences and mathematics.

Thus I would advocate that the HSI undergraduate STEM project include elements that we have determined to be critical in our reform deployment. Elements include:

- Research validated curricula and pedagogies that empower all students, included underrepresented groups.
- Frameworks that create multi-level research and learning communities.
- Access to cutting-edge research that motivates participation.
- Sustained institutional commitment to reform, from the department to the university President.
- A multidisciplinary education research team that encompasses stakeholders in all STEM departments and provides stewardship of the educational discipline.
- Multiple mode research methodology to determine effectiveness of efforts and provide formative assessment.
- Outcomes must include a national dissemination model with thorough documentation to allow reliable deployment with reproducible results.

From: Ontaneda, Carlomagno [mailto:ontaneda@ADM.NJIT.EDU]
Sent: Friday, March 13, 2009 6:02 PM
To: Korsmo, Fae L.
Subject: My solution : FW: [USLatinoIssues] Check out What Will It Take To Increase Hispanics in STEM? Money, of Course

Dr. Korsmo, I would like to share with you my solution to this problem, please read attachments.
Carlomagno

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-----Original Message-----

From: USLatinoIssues@yahoogroups.com [mailto:USLatinoIssues@yahoogroups.com]On Behalf Of GUILLO@aol.com
Sent: Tuesday, March 03, 2009 9:47 PM
To: NJEducation@yahoogroups.com; USLatinoIssues@yahoogroups.com
Subject: [USLatinoIssues] Check out What Will It Take To Increase Hispanics in STEM? Money, of Course

What Will It Take To Increase Hispanics in STEM? Money, of Course

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Status Quo Is for the Birds

NJIT Puts Hispanics on the Path to Engineering

Rather than accept the circumstances that contribute to low Hispanic college enrollment, Carlomango Ontaneda has made it his personal mission to inform minorities of the academic opportunities available to them. "Status quo is for the birds," said Ontaneda, assistant director of recruitment at the New Jersey Institute of Technology's Educational Opportunity Program. "I'm going to create my own demand."

A recent study by the National Action Council for Minorities in Engineering (NACME) revealed that less than 6 percent of African-Americans and Hispanics take pre-calculus and physics their senior year, prerequisites for consideration at prestigious engineering schools. "The pool of potential students for engineering shrinks if we don't create our own demand," Ontaneda said. "I'm not ashamed to say that this is the solution because this is the only way to overcome the situation. We cannot expect students to know these things."

For Ontaneda, creating demand begins at home — that is the student's home. Empowering the family, especially parents, with vital information on the available academic tracks is an essential factor. As the SHPE adviser, he also describes the valuable professional exposure that comes with organizational membership. "Parents of the student will gladly pay the membership fee and conference registration," he said. "But if we leave it to the student to rationalize how important it is to be part of SHPE, we will have a minimum."

Pre-college preparation is also key to creating demand. Through direct mailing, about 13,000 Hispanic and African-American juniors and seniors, who take the PSAT, receive information on NJIT's EOP, engineering programs and student organizations. The Pre-College Academy for Science and Technology at NJIT is also presented as a means for students, who need advanced mathematics, to take college credit courses during the summer and on Saturdays of their senior year. They are also made aware of how SAT scores greater than 1,200 can translate into scholarship eligibility. Still, reaching Hispanics is a challenge.

"In New Jersey, especially among Hispanics, less than 25 percent of juniors take the PSAT," said Ontaneda reflecting on a recent PSAT analysis, "and that is because they aren't encouraged to take it. We have to work diligently to make sure we have more students

taking the PSAT, so the direct mailing can reach more students."

NJIT's EOP consists of an intense summer session that previews the fall semester. Students who earn a grade point average of 3.0 or higher by the end of the fall semester are candidates for INROADS, which provides summer internships in related fields. During the junior year, qualified students can also apply for the federally funded McNair Achievement Program, which exposes them to research, and have the option to participate in a B.S./M.S. program.

Although NJIT's EOP only accepts 115 students annually (40 percent of which are females), those who are turned away aren't forgotten, but serve as seeds for future demand. "It's not the end of the world," Ontaneda tells them, "it's only the beginning." He then directs them toward an alternate route, the pre-engineering program at a local community college, which in two years will lead them back to NJIT as juniors. Also, the partnership extends internship and SHPE-NJIT benefits to them.

Ontaneda said that his efforts have reversed EOP's stigma from a program that helps "less-qualified" students to one that cultivates student potential regardless of academic obstacles or financial disadvantage. In fact, he said that the valedictorian at one high school refused to come to NJIT unless she was admitted through EOP.

In describing the most dynamic result of his approach, Ontaneda uses the co-generation of energy as an example. In co-generation, rather than allowing the steam byproduct of a gas turbine to escape into the atmosphere, it's rechanneled into another device that produces more energy than in the first process.

"If students have the privilege of going through EOP, their energy, rather than going out into the 'atmosphere' during the summer, can go into a summer internship at the end of freshman year via INROADS," Ontaneda said. "The students return as energized sophomores. And if the students also attend SHPE conferences...they will have a better perspective on the engineering field."

Neither "divine intervention" nor the "goodwill of the high school establishment" can be counted on to improve the plight of Hispanic students, Ontaneda said. "We have to create our own demand. If we don't, we are going to be in the same vicious cycle." ■



Carlomango Ontaneda

www.njit.edu/eop
 www.njit.edu/publications/video/eop.ram

SHPE • August/September 2002



*Cynthia Camacho, Senior
Major: Biomedical Engineering*

Cause: Thanks to the opportunities she's had at NJIT, Cynthia Camacho is going places. As a junior, she conducted research into the use of text-summarizing software to enhance accessibility for people with disabilities. As a senior, she worked with a team of students to design a collagen hydrogel used to stimulate an environment that cells are exposed to in the human body.

Effect: "All of the research, internships, and learning experiences that I have undertaken at NJIT have helped me grow professionally. They have helped me develop the communication, networking, management, and most importantly, the leadership skills necessary to succeed in today's workforce."

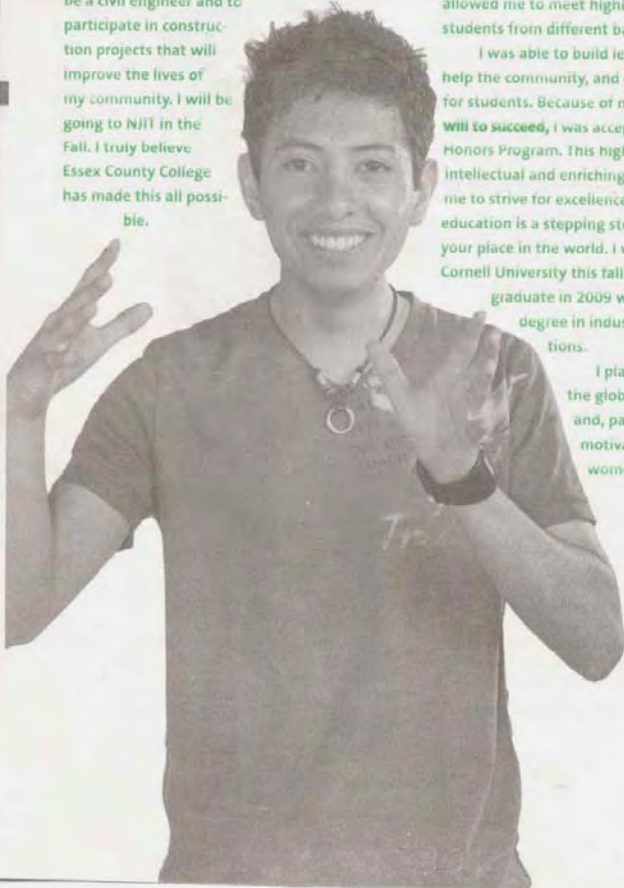
research

AT ESSEX, ACADEMIC EXCELLENCE IS AN EVERYDAY REALITY. OUR BRIGHT, HIGHLY MOTIVATED STUDENTS ARE DETERMINED TO SUCCEED.

▼ SEBASTIAN VIEIRA

I was a member of the Phi Theta Kappa Honor Society and took part in the creation of the Technology Club at ECC. I was also President of the Latino Student Union. As the head of this club, I was able to spearhead several cultural events whose purpose was to stimulate diversity and awareness within the student body, faculty and our community.

During my second semester at ECC, I was awarded a Presidential Scholarship. This opportunity allowed me to be a full time student and obtain two degrees at once – an associate degree in engineering, and a certificate in computer aided design. My aspiration is to be a civil engineer and to participate in construction projects that will improve the lives of my community. I will be going to NJIT in the Fall. I truly believe Essex County College has made this all possible.



► GESSIKA INNOCENT

My name is Gessika Innocent. I am 20 years old. I graduated from Essex County College in June with an associate degree in business administration. ECC helped me conquer my fear of achieving excellence.

I decided to attend Essex County College because I wanted an institution that would help me grow. It offered small size classes, compassionate faculty members, and a diversity which created a wonderful learning experience. It was also very affordable.

While at Essex, I became very involved on campus. I served as vice president of the campus chapter of Phi Theta Kappa, which allowed me to meet highly competitive students from different backgrounds.

I was able to build leadership capabilities, help the community, and serve as a role model for students. Because of my achievements and **will to succeed**, I was accepted into the College's Honors Program. This highly structured, intellectual and enriching program motivated me to strive for excellence. I have realized that education is a stepping stone that facilitates your place in the world. I will be attending Cornell University this fall where I plan to graduate in 2009 with a bachelor's degree in industrial and labor relations.

I plan to be a leader on the global stage of business and, particularly, to motivate and empower women across the globe.



▲ EVE JOSEPH

My name is Eve Joseph and I started at Essex County College in August 2004, majoring in accounting. Over the years, I have learned that you need more than intelligence to succeed in life – you must possess the **will to succeed**.

At Essex County College, I took advantage of the opportunity to excel scholastically and help others. I was the treasurer of the Haitian Student Association for two years and have also worked as a tutor-mentor with the Summer Bridge Program in 2006. I joined the College's Honors Program where I excelled and was an active member of Phi Theta Kappa. I served as an advisor and an accounting/math learning associate in the Learning Center of the College where I shared with other students my knowledge in these fields.

I graduated from Essex County College in June 2007, and I will continue my education at Rutgers University this fall. I plan to earn my BS degree in accounting/finance and become a Certified Public Accountant. I also hope to apply to an Ivy League graduate school to obtain my MBA in finance and commercial business.

An Academic Force to be Reckoned With

Essex County College continues to win major accolades in the academic community as a force to be reckoned with. For the second consecutive year, Essex students were named to the first team All-USA Community College Academic Team. The students, Jose Medina and Kerry McCann, followed in the footsteps of Claudia Ordonez in 2005 and Susan Stepney in 2001.



JOSE MEDINA THE PERFECT MATCH



It's easy to see why 20-year-old Jose Medina—and his family—believe in the American dream.

As the oldest of four children, Jose and his family simply could not afford the cost of a four-year college. Attracted by Essex's highly regarded engineering program, Jose discovered the perfect match—his interest in technology and Essex County College.

Two years later, Jose not only graduated as valedictorian with a perfect 4.0 GPA, but also as the first Essex student to earn the prestigious Jack Kent Cooke Foundation Undergraduate Transfer Scholarship. Awarded to only 38 students in the United States, the prize provides up to \$30,000 a year to cover three years of baccalaureate study.

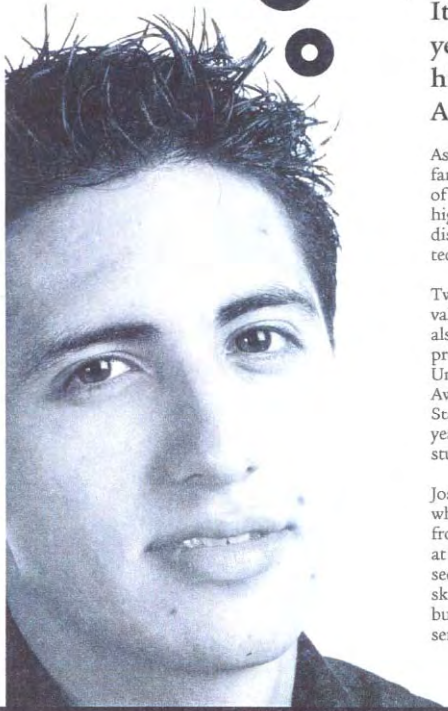
Jose was 14 with limited English proficiency when he and his family came to the U.S. from Ecuador. With the help of ESL courses at Bayonne High School, he graduated second in his class. At Essex, he honed his skills while excelling not only academically, but in all facets of the school experience. He served as vice president of Phi Theta Kappa

Honor Society and the Latino Student Union, as well as a Student Government Association Senator. Through his efforts, a Technology Club is now a vibrant new student organization.

Admitted to a number of prestigious four-year schools, Jose decided to transfer to Georgia Institute of Technology, where he will continue to pursue his goal of becoming a bio-mechanical engineer.

Meanwhile, the Medina family will continue to be a factor at Essex. Younger brother Sebastian will be entering this fall.

"Hard work is rightfully recognized at Essex, and this fine school granted me access to quality education at an affordable price."



From: Alvarez, Maria E. [malva279@epcc.edu]
Sent: Friday, March 20, 2009 5:20 PM
To: Hispanic Serving Institutions Stakeholder Input
Cc: nsf-hsiinput@lists.nsf.gov
Subject: NSF-HSI

Attachments: EPCCNSFHSI.docx

Dear Dr. Korsmo:

Please accept the attached comments in response to NSF-HSI's stakeholder input request.

Maria E. Alvarez, Ph.D
Professor of Biology
El Paso Community College
Biology District-Wide Coordinator
MBRS-RISE and MSEIP Program Director
(915) 831-5074

Solicited Comment on NSF-HIS, Federal Register, Vol. 74, No. 1974, pg. 5687, January 30, 2009

Among Hispanic-Serving Institutions (HSI), two-year colleges play a significant role in providing a college education for all minorities, Latinos in particular. According to the American Association of Community Colleges (AACC), more than half of all minority students and half of all U.S. undergraduates attend community colleges. The lower tuition, personalized support programs and flexibility of schedules contribute to the high enrollment of minority and disadvantaged students at two-year colleges. The mission of community colleges has changed dramatically in the last few years. They have evolved from two-year terminal degree-granting institution to comprehensive colleges that prepare students transfer to a university to pursue a higher degree.

El Paso Community College (EPCC) is a multi-campus two-year HSI located in Far-west Texas. EPCC serves a 25,000, 85% Hispanic student population. EPCC has been a pioneer in terms of providing students with the tools to succeed in STEM fields. Two grants from NSF initiated the development of EPCC's science infrastructure by providing funds to renovate a laboratory providing state-of-the-art equipment to engage students in scientific research projects. The EPCC faculty strongly believes that involving students in research is the ideal way to excite about science as the principal way to reveal to them the true, investigative nature of science. Two additional grants from NIH (EARDA and MBRS-RISE) provided stipends for faculty development activities and for students to participate in research and research training activities, tutoring, and supplemental instruction. In addition, it provided support for travel to present their findings at national meetings.

Some of the achievements accomplished over an eight years period include:

- 160 students have participated in research activities
- RISE students delivered **82 posters or oral research presentations at 32** national and regional professional scientific meetings, and received **eleven awards**

- 30 students continued their education to earn a bachelor's degree and four received an M.S. degree. Six of them are enrolled in Ph.D. programs at prestigious universities including Washington University in St. Louis, Baylor and U.T. Houston Health Sciences Center, and three are in medical school
- The retention rate of RISE participants was 97% , which exceeds the 64% value for non-RISE Biology and Chemistry students
- The transfer rate of RISE students was 93%, which is higher than the 14% value for non-RISE Biology and Chemistry students
- The overall GPA average for RISE-NRDP participants was 3.2, compared to 2.82 for non-RISE Biology and Chemistry students
- The average grades for RISE participants was 3.5 in Biology, 3.6 in Chemistry, and 3.0 in Math compared to the averages for the general population of 2.7,2.7, and 2.3, respectively

Although several federal programs attempt to increase the college graduation rates of minority students, significant progress will not be made until the problems are addressed through a more comprehensive approach that reaches out to the K-12 school system. Alarming data on this scenario has been accumulating in the last few years (NCLR, 2007). The high school graduation rate for White students is 75%. However, only an estimated 53.2% of Hispanic students entering the 9th grade will complete the 12th grade and graduate with a regular diploma. Minority children are more likely to attend schools that serve largely low-income students, schools where fewer resources are available, and fewer rigorous academic courses are offered. Furthermore, school districts with the highest percentage of minority children receive significantly less funding than districts with the *fewest* minority students.

Because of its community focus and emphasis in college education at the first and second year level, community colleges are in an ideal position to partner with K-12 school districts to address some of these problems. The **Early College High School (ECHS)** Initiative is a new approach that provides students with the opportunity to combine high school and college in a rigorous as well as supportive environment (www.earlycolleges.org). The participating schools are designed to permit it minority and low-income students to simultaneously earn a high school diploma and one to two years of transferable college credit (in some cases an Associate's degree)—tuition free.

Since 2002, 250 Early College Schools have been established and now serve over 100,000 students each year. Every Early College partners, with either a two-year (72%) or four-year college (28%). ECHS curricula and activities, provide students a smooth transition to engage competitively in college course work. Since most Early Colleges are located within a college campus, high school students and teachers have immediate access to the resources of a college environment promoting students' identity as traditional college students.

Many ECHS and minority students do not have role models within their families as their parents never attended college or completed a high school education. As a result, college culture is not something that they have been exposed to. Furthermore, many of them do not have the financial resources to even consider going to college. Providing an opportunity for these students to earn two-years worth of college credit for free may be the catalyst they need to obtain a college degree.

Preliminary data indicates that the ECHS initiative is succeeding:

- Attendance rates for early college students average **over 90 percent**, indicating high levels of student engagement and commitment to the academic program.
- Grade-to-grade promotion rates in Early College Schools **exceed 90 percent**.
- Early College Students outperform students in their districts on state mandated math and English language arts exams (see graph, below).
- The Early College High School Initiative began in the 2002-03 school year. In 2006, the first three schools granted diplomas to 115 students. In 2007, more than 900 students graduated from 18 early college schools.

- Eighty five percent of Early College graduates earned at least a semester of transferable college credit. Ten percent earned either two full years of college credit or an Associate's degree.
- More than 60 percent were accepted to four-year colleges, exceeding national rates for similar populations.
- More than 250 early college graduates have earned merit-based college scholarships. Five have earned the prestigious Gates Millennium Scholarship, scholarships awarded annually to 1,000 high-achieving, low-income students.

EPCC established an ECHS with a STEM focus in 2008. Five hundred middle school students in El Paso's largest school district applied from which 125 were selected through a lottery process. EPCC applied and successfully obtained funds from the Department of Education's MSEIP program to act as a bridge between the ECHS and the university to provide STEM enrichment activities for the ECHS students similar to what the RISE program provides for college students. The MSEIP program provides year-round activities for the students where they are exposed to invited speakers, summer mini-research projects, exposure to state-of-the art instrumentation including scanning electron microscopy, recombinant DNA technology, and faculty development activities. Since initiation of this program in October 2008, sufficient student performance or graduation data is yet to be accumulated to prepare a meaningful analysis; however, based on experience obtained so far, it seems evident that the MSEIP program will be at least as successful as the RISE program.

NSF programs have traditionally offered strong support for four year universities and graduate schools when trying to improve STEM education. Most of NSF's funding for two-year colleges has been through the ATE program that focuses on technical two—year degrees. In order to increase the number of minority and disadvantaged students pursuing and obtaining advanced degrees in STEM fields, key and ample resources *must* be provided to students as early as possible. Thus, it *is recommended that NSF places special emphasis on providing funding for two-year colleges, specially for two-year HSIs that partner with K-12 school districts with large minority enrollment.* Funding should support *undergraduate education STEM initiatives that* include all four activities listed in this solicitation including funding for research training, instrumentation and remodeling. Since community colleges enroll more than half of minority students and about 60% of female students in the U.S., and the colleges' main focus is early undergraduate education, they are the ideal type of institutions having a strong potential to increase the number of minority and underrepresented students entering the STEM pipeline with the tools to succeed.

Maria E. Alvarez, Ph.D
 Professor of Biology
 El Paso Community College
 Biology District-Wide Coordinator
 MBRS-RISE and MSEIP Program Director

From: Julio Blanco [jblanco@csb.edu]
Sent: Monday, March 23, 2009 12:15 AM
To: Hispanic Serving Institutions Stakeholder Input
Subject: NSF-HSI

Attachments: Blanco - NSF-HSI Stakeholder Input.pdf

Dear Dr. Korsmo, please find attached a file with my comments about NSF-HSI. I thank you for the opportunity to provide input into this process.

I wish you success.

Best regards.

Julio

Julio R. Blanco, Ph.D.
Dean of the School of Natural Sciences and Mathematics
California State University, Bakersfield



**School of Natural Sciences & Mathematics
California State University, Bakersfield**

13 SCI
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Dr. Julio R. Blanco, Dean

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Email: jblanco@csub.edu



March 22, 2009

To: NSF Director

Re: Stakeholder Input on Section 7033 of the America COMPETES Act

It is a welcomed new development that Hispanic-serving institutions (HSI) will be provided an opportunity to compete for funds allocated through the America COMPETES Act. The National Science Foundation (NSF) is soliciting comments from the stakeholders before establishing the guidelines for this new important program.

California State University, Bakersfield (CSUB) is located in the County of Kern, California, about 100 miles northeast of Los Angeles. CSUB with 7000 full time equivalent students (FTES) is one of 23 campuses in the California State University (CSU) system, the largest undergraduate higher education system in the nation. Nearly fifty percent of the population of Kern County is Spanish speaking. Yet, the number of total baccalaureate degrees granted to Hispanics in 2007 in Kern County is 13.5 percent compared to 26.6 percent in California. Only 23.9 percent of all high school graduates are academically prepared to attend a 4-year college compared to 35.5 percent in California.

The School of Natural Sciences and Mathematics (NSM) includes the following departments: Biology, Chemistry, Computer Science, Geology, Mathematics, Nursing, Physics and Pre-engineering. NSM serves about 1400 FTES and has about 700 majors in the sciences and mathematics. NSM offers a bachelor of science (BS) in all these disciplines as well as a bachelor of art (BA) in natural science. NSM also offers masters of science (MS) in biology, geology, and nursing, and a master of art (MA) in teaching mathematics. NSM is planning to add BS in computing engineering, engineering and MS in computer science and natural science.

About 45% of the student population at CSUB is Hispanic and this figure continues to grow each year. A large fraction of CSUB students are the first in their family to attend college regardless of ethnic background. Interestingly, females are the majority at CSUB representing about 60% of the student body. The number of students majoring in the sciences and mathematics is overall small and the percentage among the Hispanic population is even lower. It is a national priority to increase the number of Hispanics and other unrepresented minorities (UM) entering science, technology, engineering, and mathematics (STEM) fields. While the number of Hispanic and other UM students pursuing STEM degrees is known, best practices that could lead to an increase in the number of Hispanics selecting STEM degrees are not readily available. In what follows I offer my personal observations and recommendations based on 20 years of working in higher education both as a faculty member and an administrator.

It is readily accepted that in general it takes several generations to influence the culture and values of a population. It is recommended that this new NSF-HSI initiative will be sustained for many years to secure a long term impact among Hispanics and other UM. It is accepted that if the first generation of a population completes a baccalaureate degree and experiences a successful career, these individuals will in turn insist that their descendants achieve higher thus reducing ethnical differences among those working in STEM.

It is well recognized that Hispanics and other UM that are high achievers in high school and choose STEM will find no difficulty being accepted at the most celebrated universities. In fact, there is fierce competition among the top research universities to attract these students. Thus, as a result of Section 7033 of the America COMPETES Act it is recommended that efforts should be directed at students that are less likely to select a STEM career. These prospective students often are academically underprepared and consider a STEM path beyond their realm of possibilities.

It is also broadly accepted that all students are more likely to choose a STEM path when participation in research is made available during the first year at college and even earlier. Anecdotally, the academy has a large collection of personal stories detailing how underperforming and underprepared students do overcome great barriers and succeed when help and mentoring are provided. It is recommended that stipends for undergraduate students participating in research be awarded to all interested students that meet the university admission requirements and not just to those with high grade point average (GPA).

At a primarily undergraduate institution, as most HSI campuses are, the first mission of the faculty member is to teach these students. Almost all the CSU faculty members in tenure-track positions hold a Ph.D. and are well qualified to undertake a research project. Many four-year, primarily undergraduate universities, require a teaching load which is larger than what is required at the average research university. The size of classes is also increasing with minimum additional instructional support. The clerical and technical support staff is with high frequency inadequate to allow a new tenure-track faculty member to establish and maintain a record of research after their appointment in these institutions. It is recommended that the NSF-HSI initiative recognizes the need to allow faculty members to use award funds to secure assign time during the regular academic year in addition to summer salary.

It is recommended that NSF-HSI funding be used to help faculty members establish research facilities in their areas of expertise through the acquisition of equipment and infrastructure improvements and/or modifications. These facilities would be primarily used to train undergraduates in the scientific method and expose them to state-of-the-art techniques and research methods that only a Ph.D. trained faculty member can provide. NSF-HSI funding would serve two purposes: (1) It would assist the goal of attracting Hispanics and other UM to STEM through research opportunities and (2) would help faculty members establish a research facility that might later increase traditional NSF opportunities.

It is recommended that NSF-HSI measures success in this new program differently. For example, presentation of research at national professional conferences by NSF-HSI-sponsored undergraduate students might serve as a model to establish faculty success together with retention and satisfactory student progression towards the degree.

It is more likely that untenured (most recently hired) faculty members would take greater advantage of this NSF-HSI program. It is also recommended that faculty members in the higher ranks that have not established undergraduate research facilities early in their appointment should also be afforded this opportunity. For example, applying for an NSF-HSI-sponsored sabbatical leave that aims at establishing undergraduate research at their local institution might increase the number of faculty members engaging Hispanics and other UM in STEM.

The overall aim of the American COMPETES act is to increase retention and graduation rates of students pursuing degrees in STEM. It is important to offer a variety of elective courses that will keep Hispanics and other UM engaged in the discipline of their choice. In two- and four-year institutions courses are frequently canceled when enrollment falls below a certain minimum. It is recommended that NSF-HSI funding be made available to increase the number of electives that can be offered at an institution regardless of class size. Elective courses are taught by faculty with expertise in the subject area and often Hispanic and other UM student retention increases when they participate in courses that broadens the discipline.

On a broader sense, it is recommended that NSF explore the possibility of offering through video conferencing and/or other long distance technology courses taught at research universities. It would help to connect Hispanic and other UM to research universities and increase the number of students entering Ph.D. programs.

It is also understood that there is a strong need to develop the pipeline at the 9-12 grades and earlier. Students in 9-12 grades will make a decision about what career path to pursue. These students can be reconnected with STEM if meaningful experiences are provided in high school. For example, CSUB, and in particular NSM, is engaged in a public/private partnership since 2007 that provides a four-week opportunity during the summer to participate in STEM research. A few high school students and teachers directly interact with an NSM faculty member and undergraduates and/or graduate in developing and executing a research project. There are no lectures, no exams. High school students are exposed to a university research setting and are required to make a presentation at the end of this experience. The teachers develop professionally and are exposed to research that likely they lacked in their undergraduate training. The program started with just over 20 high school students in 2007 and in 2009 over 150 students and 30 teachers have asked to participate. The program pays a modest stipend to students and teachers and it is recommended that the NSF-HSI initiative permit the development and/or continuation of such summer programs as we find it is attracting Hispanics and other UM in large numbers to STEM.

It is equally important to provide research experiences to students and faculty members in 2-year colleges. It is recommended that NSF-HSI offer partnering opportunities among 2-year and 4-year colleges. Faculty in 2-year colleges should be encouraged to partner with faculty in 4-year universities and establish meaningful links that encourage transfer, and increase retention and graduation rates of Hispanics and other UM.

It is recommended that NSF develops recruitment materials that provide a positive image of Hispanics and other UM in STEM careers. It is important that these materials connect STEM careers with jobs and show life-earning potential. Equally, high schools should be encouraged to make available pre-college requirements for STEM paths. NSF might consider a national database of universities with established NSF-HSI-funded projects that students can access on-line.

NSF-HSI will have a broad educational impact in the regions where implemented further advancing the NSF mission. I take this opportunity to thank NSF for providing this opportunity to comment as the implementation guidelines are being developed.

Respectfully,



From: Marinez, Diana [Diana.Marinez@tamucc.edu]
Sent: Monday, March 23, 2009 10:41 AM
To: Hispanic Serving Institutions Stakeholder Input
Subject: NSF-HSI comment submission

Attachments: nsf ltr.doc

Attached please find my comments for the proposed HSI NSF grant program.

Dr. Diana I. Marinez
4400 Apache Dr
Okemos, MI 48864
diana.marinez@tamucc.edu
(517) 349-9287
(361) 728-9097 cell

4400 Apache Dr
Okemos, MI 48864
March 23, 2009

Dr. Fae Korsmo, Senior Advisor
Office of the Director
National Science Foundation
4201 Wilson Boulevard, Suite 1205
Arlington, VA 22230

Dear Dr. Korsmo,

This communication is being submitted in response to comments sought by NSF as cited in the January 30 announcement that appeared in the Federal Register regarding the NSF intent to establish a grants program directed to benefit the Hispanic Serving Institutions.

Having retired in 2006 from the position as Dean of College of Science and Technology at Texas A&M University Corpus Christi, a HSI, I wish to offer the following comment for your consideration.

First off, please note that the group of Hispanic Serving Institutions (HSI) is insufficiently well defined to consider the group as monolith, other interpretations notwithstanding. The definition provided by the federal government to define a member of this group has not been revisited in some years and the qualifying requirement of 25% of Hispanic enrollment is by itself inadequate to single them out. Not only is this qualifier inadequate in determining which institution is best meeting the intent of the definition, to serve the Hispanic student population, but attaching to the definition, "HSI associate members" leads to much confusion. To be sure, such institutions as Penn State, detracts from I believe is the primary purpose of HSI.

The reason I propose a second requirement is that by and large, the presence of a relatively large Hispanic student enrollment does not occur necessarily because of a positive outreach by the University to the Hispanic community. Instead, the relatively high Hispanic student enrollment occurs as a result of being in the right place at the right time. What NSF should seek is not what an HSI states as a commitment but rather ideas evidence by experience on what HSI-based efforts ensure the graduation of a satisfactory number of Hispanic students with a competitive STEM education. So stated, it reflects the increasing

concern for the high drop out rate of Hispanic students from completing the undergraduate experience. In the past, this alarm has been sounded as regards Hispanic student graduation in general all along the education pipeline. For whatever reason, this alarm has now struck home in the STEM college education sector.

As a result, I believe the first priority in establishing the proposed NSF program is conducting a survey to determine which of these institutions programming is consistent with the NSF mission in increasing Hispanic STEM students. This capability survey would reveal a HSI's ability to deliver a competitive program leading to an increase in the number of STEM graduates. The survey would do well to involve a development group that would include accomplished Hispanic STEM professionals selected from among academe, NGO, and corporate sectors. The effort would be directed to determine which among this set of schools have the commitment and dedication to STEM as evidenced by the success in graduating Hispanic/Latino students who have mastered a STEM curriculum. In the best light, it would be critical to identify the extent to which any HSI uses an established relationship to cultivate STEM students from among local high schools and community colleges.

The suggested survey could be followed by a request for proposals from HSIs that would describe how any one of them intends to meet the challenge incorporated in the America Competes Act. The HSI should be asked to include a convincing statement in the proposal on a dedication to provide the services that will optimize Hispanic students' receipt of an undergraduate degree in STEM. This would include citing the availability of credentialed faculty as well as STEM courses or even a plan to increase the number of faculty and courses. Ideally, NSF would ultimately select a few, say four-proposals from among a competitive review of submitted proposals. An advisory group of 4 to 6 knowledgeable individuals should be deployed to conduct on-site assessments of the responsive proposals submitted to assess the capacity and determine the potential of a particular HSI to leveraging external support to deliver a substantive increase in the number of STEM graduates. The promise of an HSI able to sustain and continue improvements in the graduation in number and quality of graduates is to be taken into account in assessing potential. Innovative and well-reasoned thrusts to augment the STEM graduation process shall be a strong feature of meritorious proposals. Examples include partnering with community colleges that have established a record of serving a large Hispanic enrollment; efforts to develop and maintain working relationships with pre-college schools and their communities to promote STEM learning; undergraduate research experience; a faculty reward system that rewards such efforts by the faculty; a strong and demonstrated commitment by the Dean and upper administration; and a demonstrated track record in STEM education of Hispanic students, all examples which NSF already considers important.

Unless the funds targeted for the envisioned program is large, the relative small number of meritorious proposals would allow for providing the support that would not restrict the selected institutions from a fair opportunity to meet its commitment. It would be important to include use of a National Visiting Committee to assist the selected institution in meeting objectives as well as other advisory committees. The activity of the four funded institutions could serve as a pilot effort to build upon and share with other HSIs. NSF should consider providing five year support for each. The award will stipulate that regular site visits are to be conducted to ensure the best advice is being followed to meet outcomes.

I stand willing to assist NSF in this effort and am pleased that such a program is being developed.

Sincerely,

Dr. Diana I. Martinez
Dean Emeritus, Texas A&M University
Corpus Christi
Professor Emeritus, MSU

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From: Ramon Barquin III [rbarquin3@barquin.com]
Sent: Monday, March 23, 2009 3:38 PM
To: Hispanic Serving Institutions Stakeholder Input
Cc: Korsmo, Fae L.; Carlos Hamill; Ramon Barquin; Teresa de Dios
Subject: NSF-HSI: Atlantic College input to Section 7033 of the America Competes Act.

Attachments: Atlantic College input to NSF March 23 - Section 7033 America Competes Act.doc

Dear Dr. Korsmo;

Enclosed we send Atlantic College's written feedback on Section 7033 of the America COMPETES Act. Feel free to let us know if we can be of further help to the National Science Foundation in this initiative.

Best regards,

R. Barquin III
Board of Directors
Atlantic College Inc.

March 23, 2009

Dr. Fae Korsmo
Senior Advisor, Office of the Director
National Science Foundation
4201 Wilson Boulevard, Suite 1205
Arlington, Virginia 22230, USA

Re: Written comments to the National Science Foundation on Section 7033 of the America COMPETES Act

Dear Dr. Korsmo

Atlantic College is a young Hispanic-serving, science and technology institution located in the Greater San Juan Metropolitan Area of Puerto Rico, and accredited by the corresponding State, Regional, and Federal accrediting agencies. The university was founded in 1983 by Ambassador Ramon Barquin as a non-profit educational institution that has grown from 125 to 1500 students today. It is the only academic institution recognized with an EMMY, awarded for Technological Excellence, and currently is an ACICS Honor with Distinction Institution.

According to our knowledge, Atlantic College is the only Hispanic institution with focus on digital design, digital animation, and videogames as a science. Atlantic College currently has 340 undergraduate students enrolled in the Bachelor of Science in Digital Animation, and 100 in the Bachelor of Science in Videogames Design. Atlantic College has a Graduate and Undergraduate student body of 717 in the program of Digital Graphics Design.

Atlantic College also confers associate, baccalaureate, and master's degrees in other traditional education programs in Business Administration, Accounting, and Computer Information Systems. Atlantic College's placement experience is one of the highest in the territory with over 70% employability. Our student retention is 95%, and 98% of its graduates recommend the institution.

Why is Atlantic College participating in this NSF initiative?

We are here to learn and participate in this National Science Foundation (NSF) opportunity, which will give us guidance in how we should grow Atlantic College to meet the science and technology demands of these United States by the Hispanic community. Atlantic College's entire population is Hispanic, a historically underrepresented community, and thus the Hispanic-servicing institution classification. The university can also qualify as a Minority and High Hispanic Enrollment institution. Further, it can benefit from NSF's Strengthening Institution Program and Section 7033 of the America COMPETES Act.

We strongly believe that there are tremendous opportunities for our students in the area of science and technology in digital design, videogames/simulators, and animation to satisfy the demands of the pharmaceutical, aerospace, and defense industries, amongst others in Puerto Rico, and the Continental United States. For example, it is a widely known fact that simulators have taken over many of the traditional activities performed in industries across the board. Flight simulators are used by the Armed Forces and contractors to design, test, and validate products and services, and later train its human resources. The pharmaceutical industry, which has one of its most important manufacturing facilities in Puerto Rico, can use simulators to support their own research and development and improve their speed to market, increasing safety, efficiency, and competitive advantage.

Until recently, the digital graphics design and animation was not considered an integral part of the knowledge economy. However, today it is essential component of the growth and opportunities to develop a competitive advantage in the above referenced industries. A well crafted program with support from NSF can provide the necessary resources to increase professionals in the S&T field, and contribute to the economic recovery of the Nation. Therefore, Section 7033 provides a unique opportunity to include Hispanics, as part of an underprivileged community that has not traditionally participated in the science and technology fields, to become part of this national effort to strengthen the United States leadership in STEM worldwide.

What can be done?

The NSF has to design a strategy to make learning Science, Technology, Engineering, and Mathematics (STEM) fun. NSF must engage visual and multimedia resources like Digital Sciences and Arts to advance the teaching of STEM. Further, NSF needs to attract, develop, nurture, and strengthen faculty resources in these interest areas at all levels.

To support STEM initiatives, NSF should assign funds, their fair share, to the historically underrepresented Hispanic community. Grants and institutional development support to Hispanic-serving institutions should increase. Once these programs are available, additional support should be channeled to underprivileged institutions to market and attract historically underrepresented communities to STEM programs.

It is essential to increase student aid in these fields. Programs for mentorship, fellowships, school-to-work, industry partnerships, and internships need to be strengthened. Concurrently, support a National marketing campaign to attract students to STEM programs. Work with trade and membership associations like HACU to support Hispanic-serving institutions. Furthermore, develop and support Private Public Partnerships (PPP) in STEM education.

Conclusion

The National Science Foundation has an excellent opportunity to support the Hispanic population, which will soon become the majority population in the Nation. Section 7033 of the America COMPETES Act provides a unique environment to develop a program that can strengthened STEM while developing a

competitive advantage. NSF can exercise the much needed leadership to regain a US-based competitive advantage, and strengthen the ties with Hispanic America through knowledge creation and sharing.

We greatly appreciate the opportunity to provide oral and written insight on Section 2033 of the America COMPETES Act to the National Science Foundation. Our board is excited in participating in this and future NSF events. Furthermore, we look forward to work with NSF in broadening the opportunities for Hispanic in the Science & Technology fields.

Best regards,

Ramón Barquin III
Board of Directors

rb/

Cc: Ramon Barquin II, President of the Board of Directors of Atlantic College
Carlos Hamill, Vice President of the Board of Directors of Atlantic College
Teresa de Dios, President, Atlantic College

From: Terrell, Delia [dterrell@utep.edu] on behalf of Osegueda, Roberto A. [osegueda@utep.edu]

Sent: Monday, March 23, 2009 7:22 PM

To: Hispanic Serving Institutions Stakeholder Input

Subject: NSF-HSI

Attachments: NSF -UTEP.docx

I enjoyed attending the NSF HSI Listening Session held in Washington DC earlier this month and hearing from both NSF and representatives from other HSIs. In response to the request regarding Section 7033 of the America COMPETES Act, The University of Texas at El Paso has prepared a document that elaborates on some of the points that I made at the session.

Roberto Osegueda

NSF Listening Talking Points

Brief History of NSF Minority Program Funding for UTEP

In the mid-1980s UTEP began receiving funds from NSF's minority institutions programs, at first primarily from the Research Improvement at Minority Institutions (RIMI) program. The first RIMI grant (\$201,455) was awarded to Arturo Bronson (then Metallurgical Engineering) in 1984. Between 1984 and 1996, UTEP received 11 more RIMI grants, totaling more than \$2.8 million. Particularly in the early years, these RIMI grants were very large ones for UTEP; indeed the Bronson award was twice the size of any previous award to UTEP listed on the NSF awards database, which goes back (for UTEP) to 1969. RIMI awards not only funded research per se but also major pieces of instrumentation (e.g., an electron microprobe in Geology and the geotechnical testing facility that became the basis for CTIS). NSF itself ended the RIMI program shortly after the 1995 competition.

In 1988, Andrew Bernat from Computer Science received a small planning grant from NSF's CISE Minority Institution grant program. That planning grant led to the awarding of a full Center grant (\$1.6 million) in 1990. Ann Gates (1995, \$1.2 million) and Patricia Nava (2003, \$750,514 and 2007, \$447,149) have also received awards from that program.

UTEP's biggest (circa \$5 million over five years) award prior to 1990 was the NSF-funded Minority Research Center of Excellence in Materials Science (MRCE) grant. A competitive renewal award was made in 1993, bringing UTEP another \$5 million over five years. MRCE bought equipment, provided research support to faculty and students, and brought in some new faculty lines in Physics and Metallurgical and Materials Engineering. MRCE was renamed CREST (Centers for Research Excellence in Science and Technology) in the 1995-1996 timeframe. In 2007, Ann Gates received a \$2.2 million CREST award for the Cyber-ShARE Center of Excellence.

Model Institutions for Excellence (MIE)

Developed a few years before the HBCU-UP and TCUP programs, NSF's MIE program contained elements that may serve as a model for a future HSI program. UTEP received a planning grant for the MIE program in 1994, with the implementation grant (\$20.3 million) awarded in 1995. Additional funding of \$2.5 million was received in 2003. MIE has supported students, enhanced faculty development, and promoted curricular reform. Key components of the program include:

- The Circles of Learning for Entering Students (CircLES) program, which combines orientation, enhanced advising, and clustering of students in core courses;
- The Academic Center for Engineers and Scientists (ACES), which gives students a place to study with other students, use electronic equipment like laptop computers, network with students in their majors, and receive much needed tutoring services;
- The Center for Effective Teaching and Learning (CETaL), which is a driving force for faculty development across campus and also provides services to teaching assistants and undergraduate peer leaders;
- A curriculum reform program that has focused on the development of modular approaches to pre-calculus and calculus; and
- An active Research Experiences for Undergraduates (REU) Program.

UTEP's MIE program has proven very successful in transforming undergraduate STEM education on campus. Using baseline data from 1993-1994 (as was done in Systemic Research, Inc.'s publication documenting the first 10 years of MIE), UTEP has increased STEM enrollment from 2,850 in Fall 1993 to 3,924 in Fall 2008. Even more impressive is the fact that STEM baccalaureate degree production increased from 258 in 1993-1994 to 702 in 2007-2008, an almost three-fold increase that reflects increased retention of students, particularly from the first to second year, brought about by MIE programs. Time to degree has also reduced dramatically from more than seven years to about five and a half years. Of particular importance in both retention and reduction of time to degree has been the implementation of an intensive mathematics review course as part of UTEP's STEM summer orientation program that often enables students who would have placed into developmental math, which does not count toward their STEM degrees, to begin their UTEP careers in college-level mathematics.

Lessons Learned from Other NSF Funded Programs

UTEP has taken advantage of several other NSF programs to improve students' preparation for and success in college and to create a diverse, quality faculty to provide such students with outstanding STEM education.

- K-20 Initiatives—Since 1994, NSF's almost \$45 million investment in El Paso's K-20 educational system through the Urban Systemic Initiative/Program and the Math Science Partnership (MSP) has, among other accomplishments, increased the number of high school students taking advanced math and science courses, increased test scores across the board, improved the preparation of pre-service and in-service teachers, and aligned curricula K-16. Thanks to MSP, UTEP's tenure and promotion policies now give appropriate recognition to faculty who make significant contributions to math and science education. All these efforts represent a collaboration among UTEP, El Paso Community College, the three major school districts in El Paso, City and County government, and community agencies.
- University of Texas System Louis Stokes Alliance for Minority Participation (LSAMP)—Since 1992, NSF has invested more than \$18.5 million on programming to enable all UT System academic components increase the number of underrepresented minority students receiving baccalaureate degrees in STEM fields and entering graduate programs. Led from the beginning by UTEP, LSAMP demonstrates the importance of linkages between universities and two-year institutions, having

pioneered bridge programs to ease the transition of students from partner community colleges to UT System universities. LSAMP has also demonstrated the importance of providing research opportunities to minority students in encouraging them to undertake graduate studies. The UT System LSAMP has more than met its goals in graduating minority students.

- **ADVANCE**—In 2003, UTEP received an almost \$3.5 million ADVANCE Institutional Transformation Award that has underscored the importance of faculty development to individual and institutional success. Since that time, the numbers and percentages of women faculty in STEM departments have increased significantly in STEM fields. Thanks in part to the Faculty Mentoring Program for Women, with more than 130 participants, are being recommended for promotion and tenure in greater rates. Impact Seminars helped both women and men faculty members develop integrated plans for career success. ADVANCE has also affected University policy, with all four Colleges that house Advance departments have implemented a formal third-year review for tenure-track faculty members, and a policy for extending the tenure clock is now part of UTEP’s Handbook of Operating Procedures.

Ideas for Future Initiatives (focused on Engineering)

UTEP believes that the production of engineers in the quantity and level of diversity the U.S. needs to maintain its global competitive advantage in technology innovation will require active partnerships among government, academia and industry. Thus NSF should establish initiatives to promote, initiate, or enhance collaborative activities between HSI’s and industry partners in the following areas: (1) outreach to K-12; (2) retraining of experienced engineers as K-12 teachers; (3) basic and applied research involving undergraduate students; (4) practice-based course and curriculum development pertinent to the needs of industry; (5) professional development for undergraduate students, including co-ops/internships, business/entrepreneurial skill development, and ethics training; (6) Engineers-in-Residence to serve as visiting “clinical” faculty at HSI’s; and (7) paid leaves for faculty to spend time in industry.

Since a significant number of students at HSI’s enter through community colleges, NSF should establish initiatives to promote, initiate, or enhance collaborative activities between HSI’s and community colleges to (1) ensure the seamless transfer of students from community college to university and (2) promote joint educational innovation around practice-based course and curriculum development. The UT System LSAMP can provide models for such initiatives.

Since there is abundant evidence that learning outcomes and retention/persistence increase when application is interwoven with theory, NSF should establish initiatives for educational innovations at HSI’s that (1) provide opportunities for the integration of professional practice skills into the undergraduate curriculum, (2) develop effective laboratory and design experiences and facilities, and (3) use modeling and simulation tools to enhance learning and prepare students for professional practice.

NSF should also significantly increase its efforts to enhance graduate-bound pipeline programs that target women, Hispanics, and other underrepresented groups, groups that represent the critical mass of the future STEM workforce in the U.S. In particular, efforts should be made to scale up NSF programs like the Bridge to the Doctorate and AGEP, which are aimed at improving the professional development of students who are planning on joining STEM faculty ranks.

Ideas for Future Initiatives (focus on Science)

To enhance the quality of STEM education and increase retention and graduation rates, NSF should enhance support for the following initiatives:

- Curriculum Development—provide support for the development of novel, multi-lingual, technology-infused delivery modes of instruction that will provide individual, just-in-time learning, learning that can take place anytime, anywhere.
- Student Peer Mentoring Programs—facilitate learning through student peer-mentoring and support, which also increases the learning and graduation rates of the peer mentors and encourages them to pursue STEM (9-16) teaching careers.
- Seamless Articulation—provide support for efforts to develop course articulation agreements for high schools (including Early College High Schools), community colleges, and four-year institutions to provide a seamless transition and enhance AA and BS degree completion.

To provide quality STEM education, colleges and universities must have quality faculty. Thus, UTEP recommends that NSF provide support so that faculty members may spend a year in another university, a national laboratory, industry, or a non-governmental organization at critical junctures in their academic careers, including years three or four in their six-year tenure cycle. To ensure currency in the discipline or to re-focus research activities, tenured faculty could also benefit from such experiences about five to seven years after tenure. NSF should also facilitate exchange programs among HBCU's, HSI's, TCU's, ANNH's, and AANAPIS's so that best practices at all institutions can be shared and to generate research and educational partnerships. Finally, NSF should find ways to prepare the future professorate for the 21st century by giving them the knowledge of teaching/learning skills they will need to teach the new 9-16 college community, which is likely to be characterized by ECHS and dual credit programs, among others.

Two other issues are worth addressing: NSF should consider providing greater support (stipends) for undergraduate researchers in two areas: (1) support for high school and ECHS students to participate in faculty sponsored/mentored basic and applied research projects and (2) increased support for community college and university undergraduates to participate in faculty sponsored/mentored, state-of-the-art basic and applied research. Finally, in the area of research infrastructure, what is needed most is the personnel infrastructure to support and maintain major instrumentation and funds to cover annual maintenance of the instruments.

Concluding Remarks

We at UTEP are deeply appreciative of all the support we have received from NSF. Thanks to that support, we are doing a much better job of educating students in STEM. We are also poised to advance to a new level, to Carnegie Tier 1 status. While reaching that status will require a focus on doctoral education and on research, particularly research that addresses the needs of the region UTEP serves, we will continue to honor the investment of programs like MIE by working steadfastly to improve the education we provide our undergraduate students.

From: Unnikrishnan, Raman [<mailto:runnikrishnan@Exchange.FULLERTON.EDU>]

Sent: Monday, March 23, 2009 8:06 PM

To: Korsmo, Fae L.

Cc: Unnikrishnan, Raman

Subject: Response: NSF Solicits Ideas for a New Program for HSIs: March23, 2009 Deadline for Submissions of Ideas

Importance: High

Dear Dr. Korsmo,

One of the major difficulties brought about by national agencies is the creation of an acronym that has plagued higher education. The acronym is “STEM.” The original purpose of the US Congress was to increase the number of engineers in this country to effectively address the burgeoning numbers of H1-B visas issued. Ninety percent of these visas are issued to engineers.

The programs MUST be focused on “Engineering and Computer Science.” By the STEM acronym, we have lost focus and the original intent became an opportunity for gamesmanship for anyone who has a part in this acronym. I have even heard political science people wanting a piece of the action because the title contains “science.”

If the US needs to compete successfully in the world arena where it is continuously losing ground, the funding agencies MUST begin to focus on “ECS” rather than STEM.

The other items where funding can make a difference are given below:

1. Increased funding for recruiting students into engineering & computer science
 - Strengthen partnerships between University and high schools
 - Increase awareness of engineering and computer science among Junior high & high school students and get these students excited about engineering and computer science through project-based classes and workshops
 - Summer research internship in engineering and computer science for high school students to conduct university-level research under the guidance of an engineering/computer science faculty
2. Increased funding for retaining students in engineering & computer science and for faculty development
 - Strengthen interactions between faculty and students
 - Develop sustainable support system for students
 - Fund and encourage ideas for effective teaching, instruction delivery, and for motivating students
 - Faculty development (mid-career/senior)

Another observation I’d like to make is the correlation between number of hours of outside work (always for low wages) and the heavy academic workload the student has in engineering. This is particularly a problem with first generation students who come from immigrant families. If we have scholarship opportunities for students so that they can limit the number of hours of work, we may be able to make a larger number of students succeed. We have studied this problem at length.

As an aside, I am including a recent paper we presented in increasing the retention of Latino students in engineering and computer science. Please see pages 20-31.

Please let me know if I can be of any help.

With best regards,



R. Unnikrishnan

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Learning Communities Improve Retention in Engineering and Computer Science

Raman Menon Unnikrishnan and Ricardo V. Lopez
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Abstract

As a comprehensive university, California State University, Fullerton (CSUF) serves approximately 37,000 students from a variety of cultures and backgrounds, with the recent increases tied to the immigrant population from Mexico as well as Central and South American countries. The majority of this surge has been from first-generation college students. The college, in an attempt to reverse its historical legacy for high student attrition, provides support and services that will help its diverse student population succeed academically and socially. The overall retention effort centers on a number of initiatives but this paper focuses on one such program, *The Engineering and Computer Science (ECS) Scholars Program* that is intended to create learning communities during the freshmen years. The *ECS Scholars* program is a learning community established in collaboration with Title V Retention Programs, the University Learning Center (ULC), the Center for Academic Support in Engineering and Computer Science (CASECS) and Freshmen Programs. The *ECS Scholars* program launched in the fall 2006 semester focuses on the academic success of *first-time freshman* (FTF) in engineering and computer science. While the ECS Scholars program is an at large initiative not aimed at any single community, its impact on underrepresented groups is found to be significant.

Introduction

It is evident that the demographics of FTF entering four-year institutions of higher education in the United States is more diverse and multicultural than in previous decades.¹ While undergraduate enrollment has increased 21% from 1995 to 2005, the percentage of female enrollment has increased 27% in the same period. In addition, the percentage of minority college students has also increased. Minorities constituted 15% of the college population in 1976 but by 2005 that rose to 31%. In 2003 the Supreme Court of the United States recognized that sex and race, if used only as a subjective basis in acceptance decisions, bestows educational benefits that impact all members of an institution's student population.² Research shows that a diverse student population produces graduates capable of having complex points of views as well as enhanced capacity to take multiple perspectives into account.³ Moreover, exposure to diversity allows greater cognitive insight and openness to enlist creative ideas from foreign cultures.⁴ Modern engineers and computer scientists are expected to possess such skills in order to be successful in an increasingly globalized work force. Even though the need for diversity is well understood, statistics show a decreased enrollment of Women, Hispanics, and African-Americans in undergraduate engineering and computer science programs.^{5,6}

Even when enrollment increases within these groups of FTF, thanks to aggressive recruitment efforts, retention and graduation rates remain relatively low.⁷ Tinto argues that there

is no unilateral solution for this “revolving door” at institutions of higher education, but the adaptation of *learning communities (LC)* is a well corroborated educational solution.

Learning Communities

In the simplest model of an LC a certain group of FTF participates in *block scheduling* i.e., register for the same classes that also meet at the same time.⁸ In another form, students take classes with a larger group of students unaffiliated to the LC, and then convene together in smaller discussion sections (Freshmen Interest Groups) facilitated by upperclassmen. More structured programs will congregate all students in one class that meets several times a week and conduct all instruction in one setting. Other settings combine facets of the aforementioned, and link students via a *first year seminar (FYS)* course. Joe Cuseo purports that FYS is “an integral part to success of all students, regardless of their level of academic preparedness.”⁹ Some LCs also have a service-learning component, a pedagogical approach that interweaves faculty and student intellectual ingenuity to solve social problems.⁸ Furthermore, LCs have three integral components: shared knowledge, shared knowing, and shared responsibility. Connecting courses so that they appear to be related promotes the networking of ideas and elevates thinking to a higher level (shared knowledge). Enrolling participants in the same classes induces social interaction and enhances intellectual interface, and allows students to care for the development of each other’s learning (shared knowing). Lastly, students who participate in LCs learn to become responsible for one another and become “mutually dependent” so that advancement is done as a cohesive unit with each member making contributions to the group (shared responsibility).

Learning communities have some key parts of the successful Treisman’s Model.¹⁰ In the early 1980’s Uri Treisman created programs that enlisted African-American students to excel in mathematics rather than a program created solely to help them evade failure. Like LCs, Treisman’s emphasis is on collaborative learning among the students through the use of “small group teaching methods.” Students are not just expected to be remediated, but expectations are raised based on what Treiman observed to be the strength of some groups of students on his campus: *their ability to merge academic and social lives*. Treisman argued that it was also important to have faculty sponsorship in order to “nourish” the program and enable it to survive. The same requirement applies to LCs. In addition to faculty, Tinto also states that successful LCs must recruit the services of student affairs professionals since they are usually trained to teach linked courses.⁸ Participation by both parties increases mutual appreciation between faculty and student affairs professional and enhances the services rendered to students in a coordinated manner.

In order to further corroborate the efficacy of LCs, Zhao and Kuh conducted a cross sectional study with the National Survey of Student Engagement (NSSE).¹¹ The validity of assessment of student participation in the NSSE is well established. The NSSEE specifically assesses: (a) possible link between student success and a particular learning community, (b) self-reported gains in the college experience and (c) overall satisfaction with the college experience. After sampling over 80,000 students across 365 four-year universities they found that participation in LCs is “uniformly and positively linked” with (a) academic performance, (b) engagement in worthwhile academic activities (faculty interaction, collaborative learning), (c)

increase college attendance and (d) general satisfaction with the college experience (personal and social development). Overall, they argue that learning communities significantly impact the educational and personal experience of FTF to a degree that persists throughout the undergraduate experience of that student.

The concept of learning communities as presented by the current literature is consistent with the needs of diverse undergraduate engineering and computer science students. Students in science majors are often stuck in a void while learning science and engineering.¹² This may occur because they are not meeting the cognitive levels expected by faculty, are not able to interpret mathematical models adequately, have English language literacy problems or simply were not exposed to the necessary prerequisite science knowledge in high school. The problem is augmented by the general lack of a refined pedagogical approach to science teaching in higher education as teaching is often centered on lecture style teacher-dominated approach. This approach lessens as students advance towards core content, but is pervasive in introductory courses for first year students. The same trend is true in engineering programs in higher education; students do not experience emphasis on cooperative teamwork (a key pedagogical approach in engineering education) until they reach higher level courses. Coll and Eames¹² support key factors that positively influence the efficacy of learning in engineering students, the influence of social interaction on a student's academic choices (student-to-student relationships), quality and nature of teacher-student relationship, quality of science instruction, quality of student-centered teaching, and incorporation of best teaching practices based on research.

Additionally, pedagogical solutions that seek to meet the needs of diverse engineering students should implement strategies that complement the typical steps they take when seeking help: first they reach out to fellow students for advice and then to their instructors, subsequently informal study groups and then finally formal learning services (tutoring centers, etc).^{13,14,15} These approaches should also accommodate their preference for interactive approaches to learning, more interaction with instructors and tutors, practical classes and emphasis on cooperative teamwork. Cronje and Coll assert that interactive approaches to learning enhances better comprehension of basic engineering skills, the appreciation for science, and an appreciation for the type of work conducted by a professional engineering or scientist. Similarly, successful computer science programs must provide a three dimensional perspective of potential careers in computer science.⁶ Fisher and Margolis assert that an environment must be created where these perspectives are "valued and respected." Four year institutions can apply a social context to computer science education by: interconnecting other disciplines to computer science, an emphasis on the interaction between humans and computers and a component that encourages the application of computer science skills to community issues. They recommend that the program should also address the self confidence issues of students.

Current Situation

The overall fall 2006 ECS FTF class had a 1-year retention rate of 49% whereas overall fall 2007 ECS FTF class had a 1-year retention rate of 53% showing a slight improvement. The overall fall 2006 ECS cohort had a 2-year retention rate of only 31%. These are appalling statistics.

Description of the ECS Scholars Learning Community

The ECS scholars LC has been in existence since 2006. Students participate in this program only during the fall and spring semesters of their first year; they are not provided intervention after their first year at CSUF. The program is currently sponsoring its third cohort. The ECS Scholars LC is designed for FTF majoring in engineering or computer science aimed at reversing the unacceptably large attrition during the first year. ECS Scholars experience a smooth transition to college life by maximizing campus resources, opportunities for individual and community development, and on-going interaction with faculty, student affairs professionals, and peers from the College of ECS.

The ECS Scholars LC offers rewarding and unique benefits centered on the following aspects:

- Develop friendships and connections with students and faculty within the College of ECS. Students are block scheduled and placed in a FYS course each semester of their first year (1 unit in the fall and 2 in the spring semester) with an instructor with a PhD in Engineering or Computer Science.
- Receive specialized academic advisement for general education and major coursework under the guidance of CASECS and a graduate-student academic advisor.
- Learn how to study for core math, science, engineering and computer science courses in specialized Freshmen Interest Groups lead by upperclassmen.
- Receive intensive tutoring and academic assistance in core classes on a one-on-one basis
- Opportunities for service-learning experience related to their field of interest; students must complete 20 hours at government or non-profit organizations.
- Receive counseling on transitional issues from a student affairs professional, a co-instructor in both sections of the FYS courses.

The ECS Scholars Program started in 2006 with the following program goals and objectives (the same goals persist each year):

Goal: The first academic year fall-to-fall persistence of 75 first-time-freshman students in the College of Engineering and Computer Science will be 80% as well as 80% of the cohort will maintain adequate academic standing at the end of their first academic year.

Objective 1.1 The 75 students who participate will attend a block of classes in fall 2006 and spring 2007.

Objective 1.2 Participants will attend study groups that cover study techniques and strategies, as well as course content that support the blocked classes.

Objective 1.3 Participants will have access to at least three hours each week of individual tutoring.

Objective 1.4 Participants will be assigned a peer advisor in the College of Engineering and Computer Science.

Objective 1.5 Participants will be required to meet with the CASECS academic counselor at least once each semester.

As mentioned before, the ECS scholars program is supported by CASECS. This center provides a learning environment for all students in ECS regardless of their year in school. Upon

entering the ECS scholars program students are automatically CASECS members. CASECS students receive priority registration for courses, space for student-to-student collaborative learning among all grade levels, and academic counseling; these features aid members of the ECS Scholars program. Another key partner is Freshmen Programs of CSUF. Freshmen programs joined the ECS Scholar support team after the first year of the program (2007 cohort). Freshmen programs facilitates the following for the ECS scholars program: (1) one unit (UNIV 100A) FYS course for ECS Scholar students in the Fall semester, a class that is vital to academic planning, orientation, and transition to Cal State Fullerton, (2) a two unit (UNIV 100B) course in the Spring semester that offers further integration into areas of Engineering and Computer Science via the Service Learning component, (3) maintenance of registration planners that direct students into blocked-scheduled sections linked to their UNIV 100 LC (they work with departments to select appropriate courses, coordinate scheduling for the FYS courses), (4) a graduate-student academic advisor to help ECS Scholars understand the university registration system, coordinate major and general education requirements, and resolve other problems that may prevent successful registration, (5) assistance with implementation of mid semester grade check (early intervention) and connect students academically at-risk with resources to help them succeed in their classes, (6) professional development for instructors and student affairs professionals, and (7) assessment of all professional development programs as well as peer evaluations for all instructional team members.

A third partner in the ECS Scholars program (a partner since the inception of the program) is the ULC. The mission of ULC is to provide all CSUF students with academic support in an inviting and contemporary environment. The staff members of the ULC are carefully selected and trained to assist students with their academic assignments, general study skills, and computer user needs. The ULC provides the ECS Scholars with: Freshmen Interest Groups (provide collaborative learning groups across disciplines) led by trained upperclassmen, one-to-one tutoring, academic workshops, and online writing tutoring. Through the ULC's continual training of Study Group Leaders and a deeper partnership with ECS, a solid foundation of success has been laid for all ECS students served. ULC tutors have a positive impact on the ESC scholars they served in 2006 (n=19) as indicated by the 88.6% overall satisfaction rating indicated in Figure 1.



Figure 1: 88.6% of all ECS Scholars were satisfied with the knowledge they received, courteousness of the tutors, and the tutors ability to create group discussion.

ULC tutors participate in training throughout their employment. Issues of cultural sensitivity, conflict resolution, and cutting edge tutoring techniques are taught through the Peer Tutoring Certification process. These results can be immediately seen in the evaluation responses of the students that receive the ULC's services. As shown in Figure 2, great pride is taken in meeting the needs of CSUF's students in a friendly and courteous manner.

In the collaborative process of tutoring, it is important for ULC group leaders to create a dialogue with students that enable them to actively participate in their individual education. As part of the Peer Tutoring Certification, tutors learn to ask engaging questions that challenge and stimulate independent thinking. Figure 3 shows that 83.3% of ECS scholars surveyed, felt their Study Group Leader successfully facilitated group discussion.

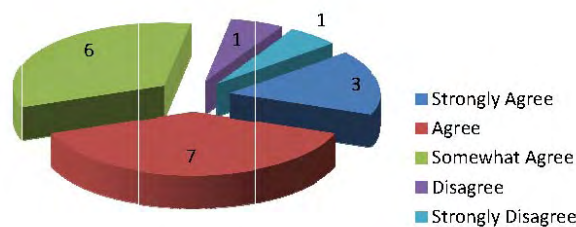


Figure 2: Of the 18 ECS Students surveyed 88.9% agreed their Study Group Leader was helpful and friendly.

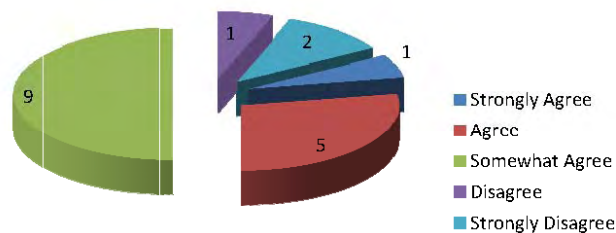


Figure 3: 83.3% of ECS students surveyed somewhat agreed, agreed, strongly agreed that their study group leader successfully facilitated group discussion.

The ULC's Study Group Leaders are very knowledgeable about the subjects tutored. Only students that demonstrate excellent writing skills and have an exemplary academic track record are hired as learning assistants. Tutors are also personable and able to explain complex concepts in simple terms. This results in 94.4% of the students served reporting an increase in knowledge of the subject area they studied, as shown in Figure 4.

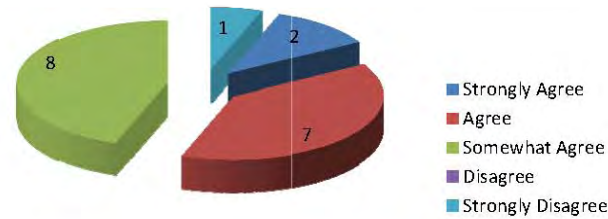


Figure 4: 94.4% of students surveyed somewhat agreed, agreed or strongly agreed that their study group leader aided in personal increase of knowledge in the subject area.

Attendance and Perceived Preparedness for Study Groups

The ULC hopes to strengthen collaboration with ECS to increase student participation in study groups. The results displayed above clearly indicate that the ULC provides an invaluable resource that supports academic participation and success. As Figure 5 illustrates, 55.5% of students surveyed did not regularly attend study groups. In order to make the most of this resource, future goals to improve regular attendance to study groups have been established. As the partnership between ECS and the ULC progresses, greater regular participation in study groups will result in a richer academic experience for ECS students.

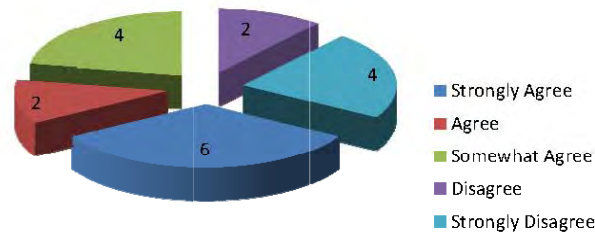


Figure 5: Fifty-five percent (55.5%) of students stated that they had not attended study groups regularly when asked if they attended study groups.

Future efforts will focus on encouraging proper study skills. Figure 6 indicates that only 50% of students come prepared for study group. To rectify this, Study Group Leaders will not only give an overview of the subject area, but will help students learn what types of questions to ask as they are reading and engaging the study material. This approach will encourage individual participation in study outside of the classroom and study group atmosphere.

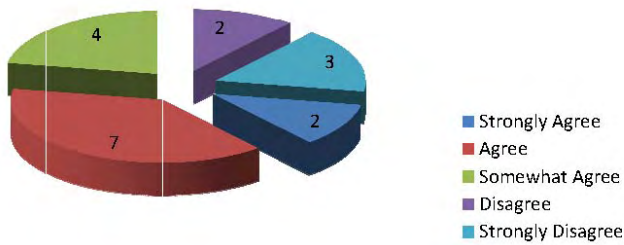


Figure 6: Fifty (50%) of students admitted that they did not come to study group prepared on a regular basis when asked if they prepared for the study groups.

The distribution of ECS students in the fall semesters of 2006 and 2007 are given in Table 1. This table shows the different categories of the overall student population as well as those who were part of the ECS scholars program. Note that the overall enrollment in the college as well as participation in the ECS Scholars program increased from 2006 to 2007.

Table 1: Student categories in Fall 2006 and Fall 2007

<u>ECS Fall 2006 FTF</u>								
	Native American	Asian	African American	Hispanic	White	Nonresident	Unknown	Total
Men	3	77	35	131	87	17	21	371
Women	0	28	8	25	26	1	5	93
Total	3	105	43	156	113	18	26	464

<u>Fall 2006 ECS LC</u>								
	Native American	Asian	African American	Hispanic	White	Nonresident	Unknown	Total
Men	0	0	1	12	0	3	0	16
Women	0	1	0	2	0	0	0	3
Total	0	1	1	14	0	3	0	19

<u>ECS Fall 2007 FTF</u>								
	Native American	Asian	African American	Hispanic	White	Nonresident	Unknown	Total
Men	4	82	28	142	82	33	21	392
Women	1	17	9	26	27	3	4	87
Total	5	99	37	168	109	36	25	479

Fall 2007 ECS LC

	Native American	Asian	African American	Hispanic	White	Nonresident	Unknown	Total
Men	1	8	2	16	5	2	4	38
Women	0	1	1	2	4	0	0	8
Total	1	9	3	18	9	2	4	46

Note: "Nonresident" implies non-citizen

Academic Impact of ECS Scholars Program

The pass rate in various freshmen courses for ECS Scholars is significantly higher than the general pass rate for ECS students. Table 2 demonstrates the passing rates of ECS relevant courses taken by the 2006 LC in Fall 2006 and Spring 2007. Pass rates are compared with pass rates of all FTF in 2006. Table 3 demonstrates the passing rates of ECS relevant courses taken by the 2007 LC in Fall 2007 and Spring 2008. Pass rates of those the 2007 cohort were compared between those that attended the study groups and those that did not attend the study group.

ECS Scholar's Retention in the College of ECS

The 2006 Fall LC of the ECS Scholars program had a one year retention rate of 79% as opposed to 49% for the overall ECS FTF the same year. The Fall 2007 LC had higher one-year

Table 2: Pass rate of the 2006 ECS Scholars LC in important courses

Fall 2006		
Course Name	% Passed in LC	% Passed of FTF
Math 125 Pre Calculus	90.00 (n=10)	48.65 (n=37)
Math 150A Calculus I	90.00 (n=10)	50.00 (n=8)
Math 150B Calculus 2	100.00 (n=0)	0.00 (n=3)
Math 270A Mathematical Structures I	100.00 (n=1)	100.00(n=2)
<i>Fall 2006-All Mathematics Combined</i>	<i>90.48</i>	<i>48.00</i>
Spring 2007		
Math 125 Pre Calculus	50.00 (n=2)	52.17 (n=23)
Math 150A Calculus I	75.00 (n=8)	56.25 (n=16)
Math 150B Calculus 2	33.30 (n=6)	83.33 (n=6)
Math 270A Mathematical Structures I	100.00 (n=1)	75.00 (n=4)
Math 270B Mathematical Structures II	100.00 (n=1)	100.00 (n=1)
<i>Spring 2007-All Mathematics combined</i>	<i>61.00</i>	<i>60.00</i>

retention rate of 80% (slightly higher than the first cohort) whereas the overall Fall 2007 FTF had a one-year retention rate of only 53% the same year. The fall 2006 LC had a two-year retention rate of 42%, whereas the overall fall 2006 ECS FTF had a two-year retention rate of

only 31%. The 2007 LC has not reached their second year in ECS and one-year retention data of the 2008 LC will be assessed at the end of the Spring 2009 semester. The term “Retention” is defined as in “ECS retention”, including only those who still major in ECS and excluding those who moved to other programs at CSUF.

Table 3: Pass rate of the 2006 ECS Scholars LC in important courses

Fall 2007		
Course Name	% Passed that attended study groups	% Passed that did not attend study groups
Math 125 Pre Calculus	65.38 (n=26)	28.57 (n=14)
Math 150A Calculus I	100.00 (n=13)	50.00 (n=2)
EGCE Engineering Surveying	75.00 (n=8)	50.00 (n=8)
EGME 102 Graphical Communications	100.00 (n=4)	66.67 (n=3)
Spring 2008		
Math 150A Calculus I	100.00 (n=9)	80.00 (n=5)
Math 270A Mathematical Structures I	75.00 (n=4)	80.00 (n=5)
CPSC 120 Intro. to Programming	100.00 (n=2)	00.00 (n=0)
CPSC 121 Programming Concepts	77.78 (n=9)	33.33 (n=3)
EGCE 206 Computer Aided Drafting	100.00 (n=4)	100.00 (n=9)
EGEE 245 Com. Logic and Architecture	100.00 (n=2)	00.00 (n=0)
EGME 245 Laboratory	100.00 (n=2)	00.00 (n=0)

Conclusion

The ECS Scholars program contains the integral parts of a structured LC: 1) block scheduling, 2) incorporation of Freshmen Seminar Groups, 3) Service Learning Component and 4) collaboration between faculty and student affairs professionals.⁸ The program allows students to take advantage of interpersonal interactions that usually take place in upper level courses or may otherwise not occur without such a program. ECS Scholars participate in shared knowledge and the FYS course covers a wide range of topics that spark the interest of students in different areas of Engineering and Computer Science.⁹ The program fulfills the Triesman’s model: the merging of student’s academic and social lives (as facilitated by Freshmen Interest Groups and CASECS).^{8,10} By the end of the first semester students form formal friendships and depend on one another for academic support (shared responsibility) and thereby fortify the student-to-student relationship that enhances the educational experience of engineering students.^{8,12}

The ECS Scholars Program also caters to the needs of Computer Science students.⁶ The FYS courses’ curriculum emphasizes the interdisciplinary application of Computer Science with career presentations by career specialist and alumni of the college. The service learning component allows the application of computer science skills to community issues. Students are given a three dimensional perspective on multiple careers in computer science via exposure to computer science oriented student clubs, access to computer science faculty, and invitation to

multiple career fairs. In addition, the one-on-one advisement sessions with the student affairs professional enhances the self confidence of the student.

Above all, the first two cohorts of the ECS Scholars program have closely achieved the projected a one year retention rate of 80% (79% for the 2006 cohort and 80% for the 2007 cohort). Participation in study groups needs to improve, but students who attend are benefiting both academically and socially. In addition to the Freshmen Interest groups, the students also had access to over three hours of one-on-one tutoring. Participants met regularly with a CASECS academic counselor and the graduate-student academic advisor provided by Freshmen Programs. Overall, students in the LC had better passing rates compared to those that were not in the LC. Although no statistically significant inferences can be made, the effectiveness of Freshmen Seminar Sessions is seen when comparing pass rates of LC students who consistently attended the sessions versus those that did not. The 2006 and 2007 cohorts had access to peer mentors in the FYS courses and the 2008 cohort had access to them outside of class. The ULC continually provides the leaders of the Freshmen Interest Groups with training and supplemental instruction will be incorporated to increase efficiency and attendance. Students are taught how to efficiently prepare for study group sessions in the FYS courses and by the Freshmen Interest Group Leaders. The services rendered by the student affairs professional were also critical in helping students deal with transitional issues.

Overall, the ECS Scholars program has been an unqualified success in retaining student in the College of Engineering and Computer Science. The Title V grant that funds this successful initiative is ending in the middle of CY 2009. While it is hoped that the funding will continue, some aspects of the program such as block scheduling will continue regardless of funding.

Acknowledgments

This paper is dedicated to the memory of Dr. Donald Castro for his enlightened vision on the educational mission of the university and his unwavering support to the issues of retention of underrepresented students. His untimely passing has created a void for all those who knew him. The authors would also like to thank Dr. Hye Sun Moon, Senior Research Analyst at the Institutional Research and Analytical Studies Department, Fran Zareh-Smith, Director, University Learning Center and Dr. Nancy Page-Fernandez, Director, Freshmen Programs (all at CSUF) for their contributions and support.

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Biographical Information

Raman Menon Unnikrishnan is the Dean of the College of Engineering and Computer Science at California State University, Fullerton. He is active in teaching and research in the areas of Control Systems, Power Electronics and Signal Processing. He has been a consultant to several industries and governmental agencies, and has been involved in technical and professional education for industries. He is active nationally and internationally in the field of engineering education and engineering accreditation.

Prior to joining CSUF in 2001, Dr. Unnikrishnan was on the faculty of the Rochester Institute of Technology in Rochester, NY where he also served as Associate Dean for Graduate Studies and Research from 1989 to 1991 and as the Head of the Electrical Engineering Department from 1991 to 2001. He received his BSEE degree from the University of Kerala in India, MSEE degree from South Dakota State University and the Ph.D. degree in electrical engineering from the University of Missouri-Columbia. He is the recipient of the *Eisenhart Award for Excellence in Teaching* at RIT, a special professionalism award from the Xerox Corporation and an IEBE Region 1 *Award for Leadership* on advancing the continuing education needs of the engineering community. In 2000, he received the IEEE *Third Millennium Award* for Outstanding Achievements and Contributions. In 2006 he received the *Missouri Honor Award* for being an outstanding alumnus. Since 2008 he has been a Commissioner of the Engineering Accreditation Commission of ABET. Dr. Unnikrishnan is a Fellow of IEEE.

Ricardo V. Lopez is the Retention Coordinator for the College of Engineering and Computer Science at CSUF. He helps coordinate the collaborative management of the ECS scholars program as well as directs several retention efforts aimed at helping ECS first-time freshmen. He has worked in the field of education for over 5 years with various non-profit organizations and several Southern California school districts. He is also actively involved in the field of Public Health research and advocacy. In 2006 he was accepted into the Minority Training Program in Cancer Control Research (MTPCCR) at UCLA where he conducted research at the Jonson Comprehensive Cancer Center. He earned his undergraduate degree at UCLA in Molecular, Cell and Developmental Biology and his Master of Public Health at CSUF. He is the lead author of published manuscripts on the knowledge and perception of Human Papilloma virus and Cervical Cancer among college-age students.

From: Leti Clark [lclark@delmar.edu]
Sent: Tuesday, March 24, 2009 9:27 AM
To: Hispanic Serving Institutions Stakeholder Input
Cc: Mark Escamilla; Marjorie Villani; Susie Kaspar
Subject: NSF-HSI
Attachments: STEM_Comments_for_Congressman_Ortiz.docx

On behalf of Del Mar College, we are submitting comments on the STEM Programs as requested by Congressman Solomon P. Ortiz for your review and consideration. If you need additional information, please contact Dr. Mark Escamilla, College President, (361) 698-1203 and/or Ms. Marjorie Villani, Interim Vice President of Instruction, (361) 698-1205.

DEL MAR COLLEGE
RESPONSE TO CONGRESSMAN SOLOMON P. ORTIZ' REQUEST
FOR COMMENTS ON STEM PROGRAMS
MARCH 23, 2009

1. Offer a NSF S-STEM, NSF ATE and NSF CCLI competitions that either 1) only HSIs are eligible to apply or 2) where HSIs receive bonus points. Several of the other agencies offer competitions that specify HSIs or Minority Serving Institutions as the only eligible applicants.
2. Offer a new funding opportunity exclusively designed for Community College HSIs to attract talented students (not just low income) to the STEM fields with a plan for entering through the Community College and matriculating to a four-year institution and graduating in a STEM field.
3. Offer funding opportunities for HSI programs to interest Middle School and High School students in the STEM fields. These programs should be designed to introduce students to the pathways necessary to prepare and move through the system towards a final goal of completion and employment. There should be a required component to include parents or guardians in the decision-making process.
4. Offer funding for Community College HSIs to increase the number of community college students participating in undergraduate research. This will provide community college students the opportunity to engage in research as freshmen and sophomores and be better prepared for rigorous upper division STEM courses when they transfer to a four-year institution of higher education. The funding should be used to:
 - (1) train faculty to do research
 - (2) purchase instrumentation for research activities
 - (3) remodel buildings to accommodate research space
 - (4) procure supplies for research activities
 - (5) collaborate with research institutionsIn this case funds will be needed for:
 - a. student housing
 - b. travel
 - c. tuition
 - d. supplies
 - e. faculty mentors
 - f. student stipends

From: Adam Chavarria [addamm2020@aol.com]
Sent: Thursday, March 26, 2009 12:36 PM
To: Hispanic Serving Institutions Stakeholder Input
Subject: NSF-HSI
Attachments: Summary - Hispanic STEM Initiative.docx

First, please permit to begin by sharing an excerpt from a communication I received recently from Michael Milken, Chairman of the Milken Institute, in connection with its forthcoming Global Conference.

“While people worldwide have recently suffered some \$60 trillion in losses on financial instruments and real estate, that figure is actually dwarfed by the value of the world’s human capital, worth substantially more than \$1,000 trillion. With a value like that on our collective potential, a cancer cure would be worth more than \$50 trillion in the U.S. and well over \$100 trillion globally. This suggests that investments in medical research may have more value than building new bridges or highways. And it underscores what we already know about education: in the long run, it’s the single best investment in stimulating the world’s economy.”

As the former Executive Director of the White House Initiative on Educational Excellence for Hispanic Americans, I had the privilege of witnessing a multitude of determined efforts by a variety of organizations to address the education needs of Hispanic students throughout the country. Many are encountering significant success in producing positive education outcomes for the children, youth, and families they serve. However, many of these same achievements are occurring in disparate, isolated cases.

In the absence of a national coordinating vehicle, it has become very clear that a concerted effort is needed to maximize the positive education outcomes and the exponential benefits that can be derived from combining all these efforts in a collaborative initiative. Such an effort will be undertaken under the auspices of the National Association for Hispanic Education and will focus on implementing an initiative designed to substantially improve education outcomes in the core areas of science, technology, engineering, and mathematics (STEM). A summary of that effort is attached for your information.

I recommend that NSF consider doing the same and encourage more HSIs to collaborate and form partnerships to accelerate positive education outcomes in the STEM fields.

Thank you, in advance, for considering this request. Please contact me if you have any questions or desire more information.

Adam Chavarria

703-909-1315

National Association for Hispanic Education*
Hispanic STEM Initiative

SUMMARY

Up until the progress of the past few years, the state of Hispanic education had not changed substantially for decades. Yet, despite being the fastest growing segment of the U.S. population and the youngest in median age, Hispanic Americans continue to lag behind in almost every measure of educational attainment. At a time when America is losing ground to other countries in terms of academic achievement and in economic competitiveness, there is no better time than the present to mobilize the human assets that Hispanic Americans represent in order to restore and maintain the nation's prosperity.

This initiative will implement an aggressive five-year plan that mobilizes the nation's full and wide range of human and institutional assets for the expressed purpose of improving the education attainment of Hispanic students all along the educational pipeline, particularly in science, technology, engineering, and mathematics (STEM). The objectives of this initiative will be achieved through a collaborative network of public and private organizations highly committed to increasing:

1. The number of qualified math and science teachers in our classrooms;
2. The number of informed Hispanic parents, families, and communities involved in their children's education;
3. The number of Hispanic students graduating from high school academically prepared to undertake the rigors of a college education, and;
4. The number of Hispanic college graduates ready to pursue careers in the STEM fields.

The objectives of this initiative will be accomplished by building a national framework and infrastructure that comprises:

- a network of all stakeholder groups including: education associations and organizations; Hispanic-serving schools and school districts; institutions of higher education, particularly Hispanic-serving institutions; Hispanic STEM associations and organizations; corporate and Hispanic business sectors; community and faith-based organizations; early childhood development programs and services; parent and family involvement groups; teacher/educator associations and organizations, and; federal, state, and local governments
- an information sharing and communications network
- an assets bank and inventory of organizational capacities
- a public awareness campaign
- a knowledge base of Hispanic educational research, best-practices, and strategies for scaling up effective programs
- an advisory group that supports the implementation of the five-year plan

This initiative will not seek to duplicate existing programs or services. Instead, it will harness and channel existing stakeholder group assets and efforts toward increasing and expanding positive education outcomes for Hispanic Americans throughout the education pipeline – from pre-kindergarten to postsecondary education. Indeed, there has long-existed a wealth of assets in the form of human ingenuity, talent, expertise, and experience among the range of stakeholder groups operating throughout the country. The time has come to mobilize these assets in order to close the academic achievement gap for Hispanic students, once and for all. In the process, this comprehensive effort will help form a significant part of the solution that restores America’s economic competitiveness by fulfilling the nation’s need for talent in the STEM fields, now and for years to come.

Presently, we and the rest of the world are facing a severe economic downturn. The United States is now poised to make a heavy investment in its physical and financial infrastructures to stimulate a badly needed economic recovery. However, equal attention and investment must be devoted to cultivating the nation’s human infrastructure. After all, a highly skilled and educated work force including engineers, mathematicians, and scientists will be needed to implement the investments going into building the nation’s physical and financial infrastructures. This initiative will forge this network by implementing a five-year action plan that mobilizes the nation’s vast reservoir of human and institutional assets to accelerate the production of that talent in the Hispanic community.

Background

In 2002, a strong bi-partisan effort in Congress led to the passage of the No Child Left Behind Act that introduced education reform in our nation’s public schools. Since then, several elements of education reform have begun to take root in classrooms across the country. The disaggregation of the academic performance of students by subgroup, for example, has served to unmask the persistent academic failure of low-income children, English Language Learners, minority students, and children with disabilities. Other elements of education reform such as early reading, parent and family involvement, and the call for more qualified teachers in the classroom set in motion renewed efforts to improve our public education system. Academic preparation—particularly in the core subjects of mathematics and science—emerged as an important outgrowth of education reform.

The emphasis on academic preparation in math and science was strengthened by the announcement of the American Competitiveness Initiative (ACI) in 2006, a comprehensive strategy designed to increase federal investment in critical research, ensure that the United States continued to lead the world in opportunity and innovation, and provide American children with a strong foundation in math and science. Subsequent legislation passed by Congress in 2007, as the *America COMPETES Act*¹, was designed to improve America’s competitiveness in science, technology, engineering and mathematics through the academic components it authorized. The *College Cost Reduction and Access Act* (CCRAA), in particular, provided Minority Serving Institutions \$510 million in new funding in fiscal years 2008-09 to spur the growth of minority students pursuing STEM fields. Of that amount, Hispanic Serving Institutions (HSIs)² were

¹ The *America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education and Science Act* (or the *America COMPETES Act*) was passed by Congress and signed by the president in August, 2007.

² A Hispanic-Serving Institution (HSI), as defined by the *Higher Education Act of 1965*, as amended, is an institution of higher education that has at least 25 percent Hispanic full-time equivalent (FTE) undergraduate student enrollment and provides assurances that not less than 50 percent of the institution’s Hispanic students are low-income individuals.

allocated \$100,000,000 in each of those two years to increase the number of Hispanic and other low-income students attaining degrees in STEM and to develop model transfer and articulation agreements between 2-year Hispanic Serving Institutions and 4-year institutions in these fields.

The important role that Hispanic Serving Institutions can perform in developing Hispanic talent in the STEM fields became the subject of a comprehensive conference convened in April 2007 at the University of Texas at El Paso (UTEP). This conference was enhanced by the participation of other long-standing Hispanic STEM associations, Hispanic-serving schools and school districts, federal agencies, high-tech corporations, the College Board, and the National Math-Science Initiative, among others. The purpose of the conference was to raise awareness about the key components of the American Competitiveness Initiative and to create a framework within which recommendations and strategies could be developed to respond to the challenges and opportunities that the ACI presented.

Speakers and panelists provided substantive and informative presentations about the nation's need for talent and innovative research in the STEM fields and the role that HSIs could play in meeting that need. The conference sessions addressed topics ranging from academic preparation, retention and graduation of more Hispanic students in the STEM fields to technology commercialization and the research needs of the private sector. Other sessions addressed an important ACI goal: the preparation of 100,000 additional teachers qualified to teach AP and IB mathematics, science and critical foreign languages by 2015, by providing professional development opportunities for current teachers and attracting new teachers to the classroom. Still other sessions emphasized the critical need for highly qualified teachers at every grade level, effective teacher-development programs, and effective schools of education.

Many attendees also emphasized that HSIs should establish or strengthen partnerships with K–12 schools, the business community, Hispanic science and technology associations, and even other institutions of higher education to help develop the capacity and infrastructure needed to meet the challenges and opportunities inherent in ACI. Many others contended that there was an urgency to work across sectors, from Pre-K through postsecondary institutions, to fully address the nation's critical need for talent and research.

Emergence of the Hispanic STEM Initiative

An important outcome of the conference was the emergence of a diverse working group of stakeholders, which included representatives from the corporate sector, HSIs, K–12 schools, Hispanic STEM associations, and nonprofit organizations that expressed the need to further engage in constructive dialogue to build on the momentum generated by the conference. This same working group convened again at the Competitive Crisis Council’s (CCC)³ summit “California Is at Great Risk: Securing Our Competitiveness in a Global Market,” held at California State Polytechnic University (Cal Poly Pomona) in September 2007. Conference sessions and speakers addressed the critical issues affecting the STEM community and the importance of producing scalable and measurable results that lead to positive education outcomes. A variety of workshops, aimed at elementary, middle and high school principals and teachers, addressed the need to increase parental involvement and to focus on STEM programs.

The working group convened three more times in 2008 to continue the dialogue about ways to work together along shared goals. The group expanded to include representatives from the Hispanic business sector, parental involvement groups, and grassroots science organizations. The group also explored ways to strengthen relationships with K–12 public schools and institutions of higher education to create seamless transitions for Hispanic students seeking to pursue STEM disciplines. At its most recent meeting in Washington, DC, the working group agreed that it was critical to have a vehicle that would continue to work toward improving Hispanic STEM education and focus on delivering actions.

This, then, was the precursor to the formation of the Hispanic STEM Initiative. The advisory group that will help support the initiative’s effort to implement the five-year action plan will be drawn from the members of the working group. Organizations that presently comprise the working group are listed below:

Arizona State University
**California State Polytechnic University,
Pomona**
**California State University System, Office
of the Chancellor**
Education Development Center, Inc.
Exxon Mobil Corporation
Florida International University
HENAAC
Hidalgo Independent School District
Hispanic Heritage Foundation
Manual Arts High School
New Mexico Tech

**Parent Institute for Quality Education
(PIQE)**
SACNAS-SHPE-MAES Consortium
Self Reliance Foundation
**Society of Hispanic Professional
Engineers, Inc. (SHPE)**
**Society for the Advancement of Chicanos
and Native Americans in Science
(SACNAS)**
**Texas Higher Education Coordinating
Board**
The Boeing Company
The College Board

³ The Competitive Crisis Council (CCC) is a coalition of corporations, educators and Hispanic engineering organizations dedicated to building a pipeline of qualified technical talent in the U.S.

Society of Mexican American Engineers & Scientists (MAES)

**The University of Texas at El Paso
U.S. Department of Energy
US-Mexico Foundation for Science (FUMEC)
X1 Technologies
U.S. Hispanic Chamber of Commerce**

About the National Association for Hispanic Education (NAHE)

The mission of NAHE is to promote and ensure the success of Hispanic students at all educational levels—from early childhood and elementary schooling through collegiate and professional education—across all 50 states and the Commonwealth of Puerto Rico. In fulfilling its mission, NAHE will forge a national network of stakeholder groups and organizations in a collaborative effort to transform the future of Hispanic education--beginning with the implementation of a five-year action plan that maximizes Hispanic educational achievement in the science, technology, engineering, and mathematics (STEM) fields. This is the purpose of the NAHE's Hispanic STEM Initiative.

Mobilizing Resources and Assets in the U.S.

These resources represent just some of the human and institutional assets—stakeholder groups and organizations with the experience, commitment and vested interest to improve education outcomes for Hispanic children and youths. They comprise early childhood development programs, the Hispanic faith-based community, Hispanic serving institutions of higher education, K-12 public schools, Hispanic STEM associations, the private sector, and the enduring values and strengths inherent in the Hispanic family. They all form the reservoir of important assets from which the Hispanic STEM Initiative will draw to improve Hispanic academic achievement. And, because no one entity can do it alone, many of these stakeholder groups understand that they must collaborate to accelerate the production of Hispanic talent in the STEM fields.

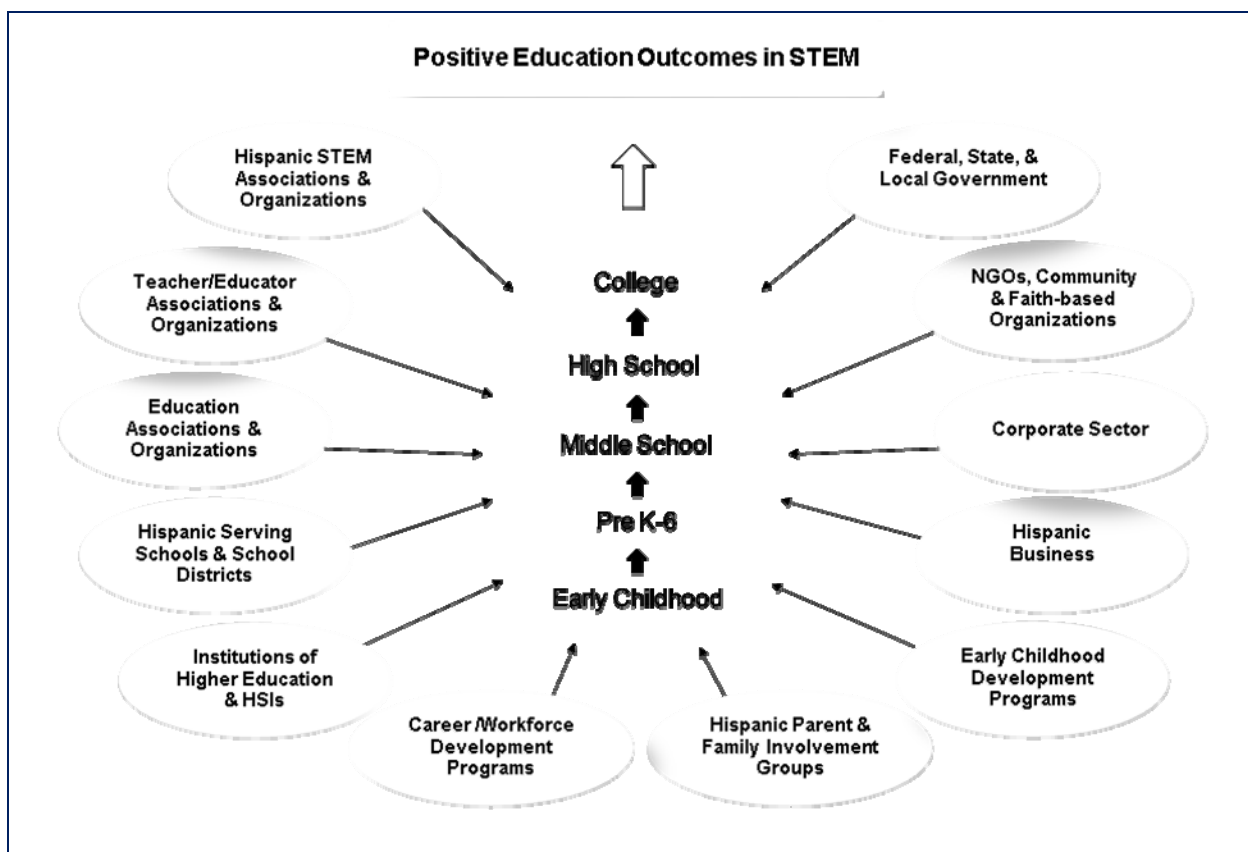


Figure 1 - Stakeholders and Positive Education Outcomes

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One important issue I see with our students today is that they have grown up with a resonance of passive education. (see “I can’t imagine” or “The Perfect Storm” on my website.) To deal with this, I have set up a 3-course series that brings in a lot of different approaches to increase the students’ ability to bring their imagination to science. I call them Discovery and Innovation classes. They could be developed anywhere. I would love to see NSF fund a group of people from HSI’s to develop more classes like this – they help our students gain the confidence they need in science, give them a way to deal with their feeling of inadequacy, and allow them (especially minority boys) engage in the process of science. Since these are not core classes, NSF could help by providing funds to hire PhDs/post docs so we can teach them to teach these classes with senior faculty.

I run the NIH- IMSD program at UNM. These sorts of programs are exactly what the students need to help them gain focus, know their hearts, and embrace who they are so that when they are part of the group, diversity really means something and they bring everything they have to the table. I have had people at several major institutions tell me that they look for my students because they are so different – so ready to get down to business.

One thing we need at UNM, and probably elsewhere, is support to develop early intervention/Discovery and Innovation courses and labs. Our students are not ready for critical thinking because they don’t know how to bring their imaginations to the table. However, it is possible to change that with concentrated effort. Many times, if we don’t develop a relationship with students early on, they don’t think about graduate school until they graduate! There are lots of different approaches that can do this – but bringing their imaginations into thinking about science precedes their ability to do critical thinking.

Developing strong ties with a couple of major institutions helps. Our students feel as if they have a clear path but can choose whatever school they want. We have a lot of faculty from Harvard and U Washington coming through and students going there. I set it up so that it is not a one-way relationship – so that UNM can build something from this relationship, too.

All state and small schools are suffering right now. We could hire minority faculty if we had some way to get set up funds for 3 years. NIH has the KO1 program and that would really REALLY help right now. Helping new faculty get going at HSI's should be a priority.

I think there are some great minority faculty around the country and just having a workshop where we could talk about best practices would be wonderful. I can imagine a series of workshops for faculty at minority institutions that would help them with their development. I know I am close to being burnt out and this could help us all keep going until there are people in our schools who can take over from us.

I know everyone could use more equipment, etc., but this is just more of the same, as far as I am concerned. I think we need to think of something that can travel like a wave. We teach some faculty, they teach students, the students become teachers, etc. I'll add something that I wrote to my students awhile ago:

Dear students, this is going to be short. I wanted to remind you all of the three IMSD suggestions (and a fourth that I don't usually tell you until you are close to finishing).

1. Know your heart. Don't be smug about this, it isn't easy – and it is a lifelong pursuit. However, if you follow your heart, you will do amazing things and you will look back on a life that is full of love and fun and was interesting and valuable, no matter what you do or when your time is up.
2. See everything as a blessing or an opportunity. By this, I do mean EVERYTHING. If you can look at the positive aspects of even the most dire situations, you will have the strength to help move forward – whether it is yourself, your family, your town, or the world. I don't mean that you shouldn't grieve, but, in the grieving, look for more and more positive things – and you will be stronger faster and be more effective.
3. Embrace who you are. We don't want diversity simply because it looks good. We take time to think of who we are, where we come from, and what we bring to the table so that our voices can be strong and valuable parts of the discussion. Programs like IMSD won't last forever, so we are counting on you to understand why diversity is a good thing, what you can do to make diversity work – including seeing who is around you who doesn't have their voice yet, and to represent the different experiences that you bring from your family and all that you have learned growing up.

Finally, the last thing I tell students is that science is like gymnastics, everyone remembers the landing. So, finishing well is very important. You get one chance to make a first impression and one chance to wrap things up. The impression that everyone is left with when you are gone is very important. Be stars. Be leaders. Follow your dreams.

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