

# NSF HSI NATIONAL STEM RESOURCE HUB

## APRIL NEWSLETTER

### **Somos Hacha y Machete** *What Does Diversity Have to Do With Engineering Anyway?*

**Antonio Garcia, Ph.D., Associate Dean Of Academics For The College Of Engineering, New Mexico State University, Las Cruces, New Mexico**

Discussion about diversity, inclusion, and equity has been steadily gaining attention in higher education, and the increasing awareness of its importance, especially in the current state of enrollment declines due to a reduction in the traditional college-age U.S. student population.

When the discussion about diversity turns to STEM fields, the demographics continue to show disparities between students enrolled in these fields vs. the overall population either by state or in the national as a whole. The E part of STEM (engineering) is especially pointed out as needing more diversity and having to respond to calls for more inclusion since the gender disparity is high in many of the subfields of engineering.

Logical arguments abound as to the need to attract all types of students into engineering, but in our current world of constant “information” in the form of statistics, tweets, blogs, etc., aren’t we missing the human side of what diversity means? To me engineering is a humanistic endeavor, and I am not alone in this view (just search these terms for a glimpse of the many thoughtful articles on this subject). So, what does diversity have to do with engineering? This is too big a question to answer in full, so please accept this recollection of

a moment that challenged me and helped define “us” – meaning how the people in the audience and I can relate to each other and close the social distance between “us” a bit.

Recently while presenting to the NMSU Board of Regents and State Legislators on student initiatives in the college of engineering, I rushed through a 5-minute discussion on the work that my colleagues are doing to bolster engineering student success. In trying to express the vision of the college as to how we teach, mentor, and create a student-centric environment to prepare workforce ready graduates, I said that we want the students to be confident and to think of themselves as: “*Somos hacha y machete*”. The specific translation of this old Cuban saying is “We are experts” or “We can get this done”. In my haste I realized that they were not sure how to interpret what I said, and after the initial puzzled looks from the audience, I could see that I needed to explain what this meant. I explained the meaning but then knew that since some thought that the phrasing was odd, I needed to elaborate to give the full meaning of what I was trying to say.

Some background is important here. NMSU is a land-grant school that prides itself on being among one of the first mechanical arts and agriculture colleges in the southwest, and we have a strong and continuing commitment to agricultural sciences and extension outreach throughout the state. I grew up in the greater NYC area and know next to nothing about farming, but was born in rural central Cuba on my grandfather’s farm. So, in the spur of the moment I dug out the only cultural reference point that could possibly work for me in

order to hit as many themes at once in a short period of time.

The phrase “*Somos hacha y machete*” is a well-recognized Cuban saying and comes from the idea that before mechanization, in order to farm in tropical environments, you needed an ax and a machete blade and to know which one to use and when to use it. While the construct of making tools become part of you seems odd, in fact it is a natural way that language use can be compact and poetic as a means of identifying a person and tools as one, in order to convey the idea of being “expert” at something. I was able to quickly explain the agricultural reference, and then realized that many in the audience grasped the idea quite easily.

As I could see that the audience was understanding the relevance of the saying, it struck me by the expressions on their faces that perhaps some were creating a picture in their minds of hacking away at the jungle in order to plant crops. I think that it is also possible that this imagery can help drive home to our stakeholders a message that they probably heard many different times, but may now associate this concept that my colleagues and I feel is important with a new visual image. More concretely, using this imagery could help emphasize that there are many ways to express what it means to be “expert”, and that as a university faculty and staff we are not always thinking along purely academic or “book learning” as a means to generate expertise.

Communicating concepts to an audience in an informal format is not as simple as reading a list and having the audience easily remember all or even some of the items on the list. Our industry partners and recruiters have a series of skills that they want engineering students to have, such as written and oral communication, working under pressure, teaming, leadership, etc. But this is a long and more complex list to absorb in a brief talk with multiple agenda items. More important in this setting may be to stress to a very important group of stakeholders that more resources than simply classroom instruction is needed to meet the needs of industry.

For me, being a 1<sup>st</sup> generation college graduate from a low-income family, and an immigrant is a hidden strength that I really never understood in 30+ years of being an engineering professor and administrator. Sure, I worked with colleagues at multiple universities on student and faculty diversity and still do, but it took me this long to understand and learn that diversity has value by being able to explain abstract concepts in new ways to a broader audience that includes decision-makers. This experience has illustrated to me that we need to draw from all engineering professors and staff that they should use not just their expertise, but also life experiences to drive home important points and communicate these key ideas at a fundamental level to our stakeholders.

A final note is that my approach to a student success program vision is simple, but it also transcends the specific jargon we have been hearing about and writing about as necessary for the engineer of the 21<sup>st</sup> century. In human endeavors, we as engineering faculty and leaders need to understand that we all interpret the world differently. By harking back to 19<sup>th</sup> century modes of expression and values, it reminds us that we have always needed people who ascribe to the idea of “*Somos Hacha y Machete*” because all of us want solutions to problems, and many of us want someone else to worry about the details.

My request to you the reader, who is part of university engineering education, or any field for that matter, see the value of diversity and use unique experiences and backgrounds to help us achieve our goals of building a robust university system.

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*Antonio ("Tony") Garcia was recently appointed as Associate Dean of Academics for the College of Engineering at New Mexico State University and brings more than 34 years of experience in academia and industry. He also holds the position of George W. Lucky Professor in Chemical Engineering due to his expertise in bioprocessing and biomedical devices. As a designer, inventor and researcher, he has developed several diagnostic and drug delivery*

*technologies in conjunction with an international team whose mission is to promote the use of personalized care technology to improve global health. Dr. Garcia is also actively involved in education and human resource projects aimed at improving math, science, and engineering education and to meet the demand for a robust technological workforce as the nation's demographics changes. He was Associate Editor of the Journal of Research in Science Teaching 2003-2005 and was the project director of a National Science Foundation program (LSAMP) project, established in 1992, to enhance opportunities for undergraduate and graduate students in science, math and engineering. After moving to Las Cruces in August 2019, he led a team of NMSU faculty to recently secure a NSF HSI grant (which began in April 2020) on Innovative Partnerships with Industry with the theme of: Enhancing Social Mobility by Combining Adult Learning within an Engineering Curriculum. E-mail: [garcia81@nmsu.edu](mailto:garcia81@nmsu.edu)*

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## **Fostering STEM Research and Application Based Experiences within a Community College**

**Connie Gomez, Ph.D., Department Chair and, Physical Sciences & Faculty, Engineering, San Jacinto College, South Campus**

The educational path to a bachelor's degree will include a community college for half of the current student population in the U.S. This places an increased burden on community colleges to prepare students to be transfer ready without excess credits and to be technically and professionally competitive.

San Jacinto College (SJC) is one of the community colleges adapting to deliver the types of experiences that will make our students competitive. SJC is one of the top 10 community colleges in the nation and an important steppingstone for students looking to enter a STEM field. We are altering students' perceptions of the community college experience to foster the next generation of STEM professionals.

Academically we strive to provide highly rigorous courses while limiting the number of excess credits a student might earn while at SJC using pathways. Students have well defined pathways to follow that will lead them to the major and four-year institution of their choice. However, it is the experiences that go beyond the basic classroom that will distinguish them from others as they enter the workforce. SJC is striving to provide those experiences earlier and more often to our STEM students by using a multi prong approach namely by:

- 1) building the facilities to deliver research and application-based experiences,
- 2) supporting faculty as they build these experiences for students, and
- 3) providing different methods by which to deliver these experiences that fit student needs.

This approach has driven construction of our new LyondellBasell Center for Petrochemical, Energy, & Technology (CPET), our new Engineering and Engineering Technology building, and creating the Undergraduate Research Center (URC). These spaces provide state of the art equipment, flexible areas for faculty to conduct research, include a Makerspace and a Thinkerspace for multidisciplinary collaborations. This approach has also driven the institutionalization of counting research, service learning, and the development of honors courses towards college service, which is a shift from the traditional teaching only in the classroom mindset. Lastly, this approach leverages using Honors courses, service-learning courses, application-based competitions, and research experiences during the semester with limited hours, so that students can balance their academic, work, and family obligations without having to forgo being an active participant. These delivery approaches have allowed SJC to send students to national conferences, to regional presentations and to start actively looking for opportunities well beyond SJC but with a better foundation.

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*Dr. Connie Gomez is the South Campus Department Chair for Physical Sciences and an Engineering Faculty member at San Jacinto College. Her research interests include engineering education and sustainability. She holds a Ph.D. in Mechanical Engineering from Drexel University.*

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## Using a Culturally-Informed Strengths-Based Approach to Thrive in Academia

**Brissa Y. Quiroz, Ph.D., Full-time Engineering Lecturer, California State University, Fresno, Fresno, CA**

I consider myself an engineer who also just happens to be a female Latina living in Fresno, California. I never questioned my social/cultural identity growing up. I was born and raised in the Juarez (Mexico)-El Paso (Texas) region, the largest bi-national metropolitan area in the world. I lived in a community where, in my experience, being bilingual and having an accent was normal, and more importantly, no one questioned my being a female engineer. I observed that in my community an engineer was simply hired based on competency and nothing else.

I now live in central California, a region blessed with many talented young people; however, it cannot compare with Hollywood or Silicon Valley. The region ranks as one of the poorest areas in the state and has some of the worst air quality in the nation. As such, I am learning to navigate my new environment as part of an alliance.

I am the Co-Principal Investigator of a multi-institutional collaboration between California Polytechnic State University, San Luis Obispo; California State Polytechnic University, Pomona; California State University, Fresno, and California State University, Dominguez Hills, which is one of several Alliances for Graduate Education and the Professoriate (AGEP). The objective of this

alliance's culturally informed strengths-based program is to support newly hired science, technology, engineering, and mathematics (STEM) faculty from historically underrepresented minority groups by providing training that enables them to authentically leverage their natural talents and strengths of their intersecting social and cultural identities to successfully navigate their institutional contexts. As part of the AGEP Alliance, I have learned how faculty and students perceive me, different from how I see myself.

According to Gallup's CliftonStrengths assessment, my top five strengths are:

1. Learner
2. Achiever
3. Arranger
4. Input
5. Individualization

This confirms to me that I belong in a STEM career; however, I failed to predict the intersection of gender and race, that this would become a double whammy in how people would question my credentials, without consideration of my qualifications.

Recently, I have been sharing my own personal experiences in dealing with situations like *cultural taxation*, *microaggression*, and *implicit bias*, phrases that I, as an engineer, did not even know existed until recently. The fact that these situations now have labels, unfortunately, attests to how common they have become. Through the AGEP Alliance, we are addressing these issues, and are preparing early-career faculty to learn about their own strengths, so that they can emphasize their potential value in higher education and avoid being assessed through a *deficit lens*. For more information about this project, please visit <https://www2.calstate.edu/impact-of-the-csu/research/csu-agep-alliance-for-diversity-and-strengths-of-stem-faculty/Pages/default.aspx> or connect with me at [byquiroz@mail.fresnostate.edu](mailto:byquiroz@mail.fresnostate.edu)

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*Brissa Quiroz, Ph.D. is a full-time Engineering Lecturer and serves as the Valley Industry Partnership for Cooperative Education (VIP) Program Director in the Lyles College of Engineering at Fresno State. Dr. Quiroz' professional career is centered on serving as a bridge between her passion for STEM (science, technology, engineering and mathematics) and community outreach and education. Her ultimate goal is to empower every student to succeed in college, and especially, help increase recruitment and retention rates of students in higher education – including low-income and minority groups. Dr. Quiroz serves as the President for the Society of Women Engineers (SWE) San Joaquin Valley Section and Board of Directors for the American Society for Engineering Education (ASEE) Corporate Industry Partnership Division (CIPD). Dr. Quiroz writes this column as the Co-Principal Investigator of a collaborative research of a National Science Foundation (NSF) grant-funded project under the Alliances for Graduate Education and the Professoriate (AGEP) Program titled: "The AGEP California State University Underrepresented Minority STEM Faculty Alliance Model: A Culturally-Informed Strengths-Based Approach to Advance Early-Career Faculty Success" Grant Numbers: 1916056, 1916046, 1916050 and 1916054.*

## ¿Puedo hablarte en español?

**Nicolas Mendez, New Mexico State University, Las Cruces, NM**

*“Si hablas a un hombre en un idioma que comprenda, eso llega a su cabeza. Si hablas con él en su idioma, eso llega a su corazón.”,*

Antes de la pandemia, la tendencia de registrarse en universidades en Estados Unidos por parte de estudiantes hispano hablantes estaba incrementando año a año<sup>1</sup>, sin embargo, con el cierre de fronteras y el golpe económico generado por el COVID-19, se redujo el índice de inscripción en el segundo semestre de 2020 cerca del 6%. Deborah Santiago, directora del grupo Excelencia, menciona que, a pesar de todos los problemas generados en el último año, la minoría hispana quiere seguir inscribiéndose a programas en educación avanzada dentro de EE. UU.

¿Qué podemos hacer nosotros como profesores, alumnos, y administradores en nuestras

instituciones para promover la matriculación de estos estudiantes en los programas universitarios? Pienso que, si brindamos una asesoría y una atención a los estudiantes de manera en que el cambio de idioma y cultura no sea tan drástico, ellos se sentirán mas a gusto y con mas animo de seguir adelante. Un ejemplo de esta situación fue utilizado en el distrito universitario Ana G. Mendez, donde en el programa acelerado AHORA, fue homologado en Estados Unidos continental, específicamente en Florida, el cual busca que estudiantes tanto hispano hablantes como angloparlantes, se sientan igual de cómodos en un aula de clase al recibir clases en ambos idiomas y poder entregar trabajos en el idioma que prefieran<sup>2</sup>.

De la misma forma según lo explica el Departamento de Educación de EE. UU.<sup>3</sup>, brindándoles a los estudiantes la oportunidad de expresarse en ambos idiomas, tendrán una manera más fácil de encontrarse con ellos mismos y poder acercarse a sus metas profesionales.

Algunos de los beneficios que tienen recibir clases en ambos idiomas a corto y larga plazo son<sup>4</sup>:

- Mejores habilidades cognitivas
- Desarrolladas habilidades de comunicación
- Aprender nuevos idiomas en el futuro más fácilmente
- Habilidades de investigación en más fuentes
- Mas oportunidades de futuros trabajos
- Mejores trabajos dentro de organizaciones multinacionales.

<sup>1</sup> [Douglas, D., Natanson, H., & Harden, J. \(2021, January 31\). Washington Post. Retrieved from A steady stream of Latino students was arriving on college campuses. Then the pandemic hit.](#)

<sup>2</sup> [Eipstein, J. \(2010\). Inside Higher Ed. Retrieved from Bilingual \(Higher\) Ed](#)

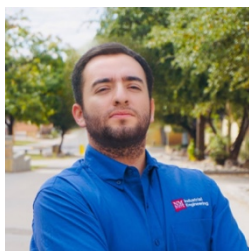
<sup>3</sup> [DOE. \(2016\). DOE. Retrieved from The Importance of Bilingual Education](#)

<sup>4</sup> [School of Education. \(2020, May 19\). School of Education Online Programs. Retrieved from The Benefits of Bilingual Education and Its Impact on Student Learning and Growth](#)



A manera personal, siendo la primera vez viviendo, estudiando y trabajando fuera de un país hispano hablante, he sentido más cercanía dentro de mis clases y el trabajo con profesores y administradores que son hispano hablantes. Siento que al tener un vínculo similar, en este caso el idioma, la comunicación se hace de manera mucho más efectiva y directa.

Esto significa que si desde que inician la universidad se permite un ambiente bilingüe dentro del salón de clases a estudiantes de las minorías (en este caso Hispanas), la confianza en ellos mismos y la calidad de trabajos que presenten se podría incrementar, teniendo retroalimentación en su idioma natal y teniendo una mejora continua en su búsqueda del camino a la excelencia académica y profesional.



*Nicolas Mendez is a Master's student in Industrial Engineering. He is from Bogota, Colombia, and completed his Bachelor's degree at La Salle University in 2018. During his professional career, he has worked in the pharmaceutical industry performing quality control, process analysis, and cost evaluations. He is a member of the Recruitment Team*

*for the Department of Industrial Engineering at New Mexico State University, working with middle and high school students to pursue a career in engineering.*



## HSI STEM HUB NEWS

### Process Oriented Guided Inquiry Learning (POGIL) Workshop, April 15, 7 PM EST

**This one-hour introductory e-series workshop is a general overview that will include discussion and activities. We will cover:**

- The roles used in POGIL classrooms
- The learning cycle and how it applies to POGIL activities
- The process skills students develop in a POGIL classroom

**SEATING IS LIMITED!!!**

### REGISTRATION SITE:

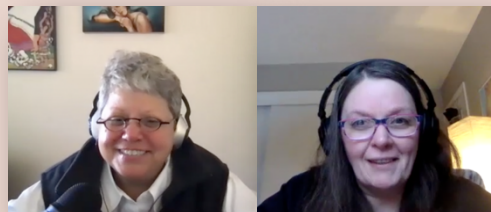
<https://events.pogil.org/event-4184586>

**USE REGISTRATION CODE:  
HSI-STEMHUB-2021**



**STEMiversity the Podcast**  
Hosted by  
President Monica Torres

**New Podcast coming April 20, 2021**  
**Diversity Programming in STEM with**  
**Guest Panelist: Dr. Bernadette Connors**  
[Click here for more information](#)



## Grantsmanship Trainings Now Available

### Preflight Grant Writer's Certification Series

Join experienced grant writers as you learn to navigate the grant world. This training is recommended for first-time grant writers at any stage in their career (postdocs welcome) as you begin formulating ideas and planning for writing your first grant.

#### **Preflight Panelists are:**

**Paul Gutierrez, Ph.D.**, Over 30 years of experience with Extension, at three Land Grant Universities—including 12 years Extension Administration and 18 years Extension Faculty/Specialist. Dr. Gutierrez served as Vice Provost for NMSU University Outreach and Engagement, and Associate Dean and Associate Director of NMSU Cooperative Extension.

**Melissa A Harrington, Ph.D.**, Director of the NIH-funded Delaware Center for Neuroscience Research, an NIH-funded, virtual center linking neuroscientists at DSU and the UDel. Her research program in neurophysiology has been continuously funded by grants from the National Science Foundation, the National Institutes of Health, and the Department of Defense since 1998.

**Jon Juarez**, HSI STEM Hub Co-PI, NMSU Regents Professor and Chair of the Computer Information and Technology Department at DACC. He has authored eight database application textbooks published by McGraw-Hill. He serves as co-chair of the New Mexico Collegiate Business Articulation Consortium, board member of the New Mexico Association for Career and Technical Education.

**Margie Vela, Ph.D.** Her contributions to broadening participation of underrepresented groups in STEM include serving DSU as Assistant Director for the SMILE Program; performing analysis on broader impacts as a NSF Summer Scholar; and serving Child, Youth, and School Services for Fort Lee, Virginia as the Project Director for the HIRED! Program.

**\*\*You should complete this series at least 6 months before your submissions deadline.**

[Click Here for More Information](#)

## The NSF HSI National STEM Resource Hub will host the Jumpstart Grantsmanship Webinar 2021 Spring Series:

**Friday, May 7, 3 PM EST** (Community College Flash Presentations and Q & A):

**Small Steps to Connecting Community College Students to Campus**, Dr. Becky Mercer, Associate Dean for STEM and Allied Health, Palm Beach State College (PBSC)

**Our Impression of the Challenges Community Colleges Face**, Dr. Nora Garza, Vice President for Resource Development & External Affairs, Laredo College

**Workforce Equity: Skills Gaps and Opportunity Gaps in Southern New Mexico**, Dr. Mary Ulrich, Director, Workforce Development and Career Readiness at Doña Ana Community College

Friday, June 4, 3 PM EST, TBA

Friday, July 9, 3 PM EST, TBA

#### **Register on Zoom:**

[https://us02web.zoom.us/webinar/register/WN\\_1\\_XuQnX2QnOJ0wgePzpu0Q](https://us02web.zoom.us/webinar/register/WN_1_XuQnX2QnOJ0wgePzpu0Q)

**The HSI STEM Researchers, Educators, Professionals and Scholars Network-** You can join the network, free of charge, with your .edu, .gov, or .org email address. Membership offers a variety of opportunities including:

- Monthly
- Hub announcements
- Community Board
- Member directory with over 700 network members working in STEM in higher education
- Access to potential collaborators across the country
- Access to on-demand training
- Access to resources and materials

The Network is a community of practice providing a unique space for HSI STEM educators to connect and engage in networking, training, resource sharing, collaborative research in a supportive academic environment. This community of practice is central to the Hub's mission. We need your participation to create a supportive community that works together for successfully training the generation of scientists, technologists, engineers, and mathematicians at HSIs.

HSI Network Membership:  
<https://hsistemhub.org/join/>

## **Newsletter Editor** **MARGIE VELA**



*Margie Vela is a researcher, educator and public servant devoted to diversity, equity and inclusion (DEI) in higher education and STEM. She earned her Ph.D. in Water Science and Management from New Mexico State University (NMSU) in 2019 and served the State of New Mexico in public service as a Regent for the*

*NMSU System from 2017-2019. She served as an intern at the National Science Foundation in 2015 and as a Farmer-to-Farmer USAID volunteer in 2018. Her career in DEI began at Fort Lee Garrison, where she served as Director for the HIRED! Program to prepare dependents of military personnel to enter college or the workforce. Her career in higher education began at a Historically Black University, in 2010, where she implemented a multi-million-dollar program focused on diversifying the STEM enterprise. Currently, Dr. Vela serves as Senior Project Manager for the NSF HSI National STEM Resource Hub working to implement a project aimed to bolster STEM at 539 Hispanic Serving Institutions in grantsmanship, multicultural awareness, institutional capacity building and STEM pedagogy; and facilitating partnerships across institutions and disciplines. Dr. Vela serves the NMSU Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) Chapter as founding co-advisor and has served as a national panelist for SACNAS in DEI training as an alumnus of SACNAS Postdoctoral Leadership Institute. She recently earned a Certificate in DEI from Cornell University.*



