New Orleans JAZZED about Engineering Education

Paper ID #16825

Native American Mentorships: Industry's Next Step to Assist Native Americans' Transition into STEM Careers?

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I am a Navajo college student that grew up on the northern rim of the Navajo Nation. Besides living on the reservation, I have also lived in Phoenix, Arizona for a portion of my elementary school years and also lived in San Diego, CA for 6 years. I am a "Marine Brat" as my father served 5 years in the United States Marine Corps. I am the oldest of 9 children (6 sisters and 2 brothers) and am the leading example for all of them. I am an outdoors and adventurous person. I also love my sports. Through high school I played 4 years of football and two years of Track&Field. I developed an interest in engineering during my sophomore year in high school and am currently working on my Bachelor's degree in Mechanical Engineering.

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NATIVE AMERICAN MENTORSHIPS:

Industry's Next Step to assist Native Americans transition into STEM Careers?

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INTRODUCTION:

For decades, underrepresented minority (URM) students have struggled to keep up with their non-URM counterparts in many aspects of schooling but specifically in STEM subjects. The underrepresentation of American Indian people in science, technology, engineering, and mathematics (STEM) research and education is an issue that must be addressed in order to safeguard the future of Native American communities and Nations, and to ensure a viable, healthy, national STEM workforce.[i] The key concern this paper will address is how to develop a better pathway to help Native American Indian students ~~to~~ become competitive and excel in Industry. A two-year pilot mentorship program at Utah State University Eastern Blanding indicates that mentoring is an important step for Native students in their pathway to a STEM future.

NATIVE AMERICAN INDIAN DEMOGRAPHICS:

American Indian and Alaskan Native people make up approximately 1.7% of the US population. Their population experienced an increase of approximately 25% between the years 2000 and 2010 and continues in a growth trend. In 2012, the median average of American Indian and Alaskan Native people was 31 years compared to 37 for the overall U.S. population. Suicide is the number one cause of death in the 15-24 year age group. Approximately 30% of American Indian and Alaska Native children live in poverty as compared to an average of 16% nation-wide. There are 324 federally recognized American Indian reservations and 566 federally recognized tribes in the U.S. The Navajo Nation Reservation has the greatest number of American Indians with approximately 170,000 residents.[ii]

NATIVE AMERICAN EDUCATION STATE OF AFFAIRS:

Mr. Cedale Armstrong , co-author and resident on the Navajo reservation, says that, "When I drive through towns in my homeland, there are three things that I see: 1) Underdeveloped housing projects 2) Homeless and out-of-work individuals, and 3) Working class individuals with no higher education training." In these living conditions, it's presumed that kids from tribal reservations are incompetent or incapable of leaving home to pursue a higher education based on their poor socioeconomic status. The constant exposure of this attitude set forth by society has long lasting, and in some cases severe, effects on the mental stability of young Native students. As a result, some students begin to believe that their chances of succeeding in the future are very slim, so they often flunk out of high school and dismiss the idea of attending college altogether. This is a very damaging self-fulfilling prophecy that is very real to these kids.

In 2010, the average graduation rate of American Indian and Alaskan Native students was 67%. This was 26% lower than their white counterparts at 83% and the lowest of any racial/ethnic demographic group in the US.[iii] Bureau of Indian Education (BIE) schools have an even lower graduation rate within the reservations, of 53%, compared to a national average of 80%. [iv] For those that make it into college, the trend continues to be concerning. In 2010, 3.1 million students were enrolled in college. Approximately 1.7 million were non-URM and 1.4 Million were URM students (African Americans, Hispanic, American Indian, Alaskan Native, Asian or Pacific Islander and other ethnicities). Less than 2%, or 29,201, were Native American.[v] Of those Native Americans that start a college degree, 39% first-time full-time students at 4-year institutions graduated, as compared to 60% of White students. [vi]

According to Figueroa, in 2014, many American Indian students faced racism and classism far more than their White peers in the forms of institutional racism, harassment, and/or in memories recorded throughout history. [vii] It is important to educate all people to be supportive of all URM's. But especially, it may be important to provide extended assistance and encouragement to Native Americans so that they have the confidence to overcome these challenges.

MINORITY STUDENTS AND STEM:

Specifically within STEM fields similar findings have been found. A study conducted by Toven-Lindsey, B., Levis-Fitzgerald, M., Barber, P. H., & Hasson, T. (2015) at UCLA[viii] shows that the overall 5-yr degree-completion rate for STEM students at UCLA is 65%. This is much higher than the national average. Nearly 70% of non-URM students completed their STEM degree in 5 years, while the degree-completion rate of URM students in STEM was only 39%. This is significant because it has also been found that URM students entering U.S. colleges are just as likely as their non-URM peers to aspire to complete a STEM major. [ix] Native American STEM students who do attend college face a new barrier. Thompson writes, "FGCS have been demonstrated to have less access to support for success in higher education, fewer financial resources, fewer role models, and lower career aspiration and expectations in comparison to their CGCS peers."[x]

NATIVE AMERICANS AND STEM:
In 2011 and 2012, there were reportedly between 5.4 and 7.2 million STEM occupations and workers between the ages of 25 to 64, accounting for 6% of the workforce. Half of STEM workers were employed in computer occupations. Engineers and engineering technicians were 32% of the STEM workforce.[xi] Native American Indians filled only 2% of the workforce. African American filled 4.6%, Hispanic 5.2%, Asian 18.5%, and whites approximately 70%. [xii]

In the professional track of higher education here are similar findings. Although Native Americans and Native Alaskans make up between 1.5% and 2% percent of the U.S. population, they earned only 0.3 percent of all doctoral degrees in 2012. This is down from 0.5% earned twenty years earlier. Of the 11,764 research doctorates awarded in engineering and scientific fields in 2012, only forty-eight were awarded to Native Americans/Alaskans.[xiii] Only 150 Native Americans received doctoral degrees in 2013 and less than one percent of graduate students were American Indian or Alaskan Native. There are a few initiatives being pursued including a large grant from the Sloan Foundation and NSF RFP's to try to improve recruiting and mentoring.

INTERNSHIPS:
More than half of all seniors graduating from college have participated in a practicum, internship, field experience, co-op or clinical assignment[xiv]. Three-quarters of employers indicate they would like colleges and universities to emphasize more internship or applied learning experiences[xv]. Internships are a well-established practice for the student/employee pipeline and can be effective in landing students future jobs. According to Forbes magazine, 60% of paid interns receive at least one job offer[xvi]. According to CNN, internships create a win/win situation[xvii]. Benefits for the student include:

- Students get a foot in the door of the company they work for.
- Students get an opportunity to build their resume`.
- Students get to "Test drive" a career and be sure it is something they are interested in.
- Many networking opportunities are typically presented.
- Establishing relationships with mentors is a key benefit.
- Students can get college credit for real world experience.
- Students are introduced to the real culture and etiquette of a field.

Benefits for an employer can vary depending on how they use the interns. Benefits include:

- Get to see how a potential employee fits in and performs without making a hiring commitment.
- Can develop a pool of candidates and select the most competitive applicants after getting to know them well.
- Moving a person around within the company to see where the shoe best fits.

STUDENT NEED FOR MENTORSHIPS:
The USU Eastern Blanding campus is just outside the Navajo Nation northern border in the South Eastern corner of Utah. One of the challenges that students face on our campus, especially as a first generation student, is making the transition from high school to college and also from

home to their new surroundings. Curtis Frazier, co-author and grant director on our campus, states, "The students become culture shocked and have difficulty with the change from the life they were accustomed to." Another challenge that they are faced with is preparation. The high schools from which they graduated from did not offer courses that would prepare the students for the college level courses they would be taking, depending on what their declared major was. Academically, many students struggle to complete introductory science and math courses based on insufficient preparation in high school. They also have challenges staying engaged in large lecture-style courses with limited opportunities for interaction with professors.[viii] It has been Dr. Berrett's observation after teaching Native youth for more than 10 years, that "These students are equally as talented as any students I've taught, they just need more opportunity to experience the culture in which they are expected to compete in."

In 2013, Dr. Berrett got together with Mr. Frazier, Director of a Native American-Serving Non-Tribal Institutions (NASNTI) grant on the USUE Blanding Campus, to discuss how they could entice more Native students interested in STEM. Dr. Berrett wanted to create a learning experience what would build students' self-confidence, get them out of their comfort zone, and push them into potential STEM fields for a future career. Dr. Berrett noticed that students in his classes did not have the background to know what STEM careers and fields even existed. Internships were immediately brought into the discussion but Dr. Berrett argued that students were not ready for internships. They needed a more closely monitored and supportive environment. He promoted creating a Mentorship experience with a small group of students to send them to the main Utah State University campus in Logan, Utah, to work side-by-side with experts in STEM laboratory settings. Rather than leaving mentorships to chance or to individual students, he wanted to formalize the process. For American Indians and many minority groups, they do not have the confidence or contacts to make this important connection.

THE MENTORSHIP PROJECT:

To further students' exposure and obtain a real-world experience in a STEM laboratory, Dr. Berrett's and Mr. Frazier's concept was put into play. They sent their best and brightest native students to the Logan campus to work with STEM faculty performing researching the summer. They proposed the basic following structure:

- 16-20 students for four weeks – students working in pairs.
- Rotation through 8-12 laboratories or lab experiences.
- Students stay on campus housing.
- Hire graduate student facilitators from the Logan Campus to coordinate efforts.

Anticipated Outcomes: By allowing participating students to get beyond their introductory level courses and be mentored and trained in a short intensive experience, it was believed that they would find excitement, purpose, and the self-confidence in being able to pursue a career in STEM. In short, having exposure and hands-on experience would give students a vision of their future so they could build the skills need to become successful make it through their studies, and be competitive with other students coming from more fortunate circumstances.

Logan Mentor Expectations: It was determined we were looking for professors and graduate students who would be willing to impart of their time and talents to open the eyes of the native students to the possibilities of careers in STEM fields. This could take place in any technical setting. It was theorized that a good process would be for mentors to put students in a position where they job shadow for a day, then, with prudence, allow them to mimic or "assist" with data gathering, lab work, processes or procedures that occur naturally in the lab. Mentors needed to be friendly yet demanding in a way that gave students a real life taste of what is being done in the Lab. It was felt that through the immersive experience, natural discussions and interaction with these mentors would help students become involved in a meaningful way in STEM careers.

It was not expected that students would be given critical path work that would impact the laboratory's success if something were not done properly. It was also not expected that laboratory workers, assistants, or professors would go out of their way to baby sit or "make work". Mentors could request more than two students at a time to be in the laboratory to minimize the impact on the lab work itself, though students needed to have a hands-on and interpersonal experience rather than just a "field trip." We asked mentors to think of this as a pre-internship where we are preparing students to become highly functional interns and grad students in the future.

USUE Blanding Student Expectations: Students from Blanding lived on the Logan campus (7 hours away) for the four week period of time. Each student reported in a Canvas course a record of what they did and learned each day. A facilitator hired to assist the students met with them daily Monday – Friday to debrief their day and mediate any circumstances and answer questions as students become acclimated to the STEM career. On weekends, some group activities were initiated to help the students acclimate to the region and keep them engaged.

PARTICIPATION AND PROGRAM STRUCTURE:

Year one of the program (2014), only four students were sent into the Mentorship. All four students continued onto higher education at USU Logan or another institution. In 2015, twenty-one students participated. Student's ages ranged from 18 to 35 years old. Students had to have a 3.0 GPA and had to fill out an application for the opportunity. A small stipend was provided to the students plus all housing and travel was covered. Four graduate students acted as facilitator's onsite. Over the course of preparing and coordinating, over 300 emails were sent and over 60 staff and mentors were involved to some degree though some of those were simply to coordinate a field trip, housing, or to meet for instance with an admissions counselor for a 30 minute orientation. The core groups were the mentors in the labs and facilitators.

Laboratory experiences were available to students in Bioengineering, Biology, Wild Land Resources, Assistive Technology, Plant Soils and Climate, Watershed Science, Civil and Environmental Engineering, Veterinarian Medicine Genome Lab, Mechanical and Aerospace Engineering, Teacher Education and Leadership, Nutrition Dietetics and Food Nutrition, Audiology, Biochemistry, Psychology, Natural Resources, Mathematics, and Inorganic

Chemistry. Not all professors and Labs were available for the entire four weeks. Some could only take students on for one week. Several labs took more than two students.

Laboratory experiences ranged from lab to lab. In each lab however it was expected that students would be overseen and supported in their efforts. In one of the Mechanical Engineering labs for instance, students built columns of concrete and tested them in a structural test. They documented the specified variables in the make-up of the mixes and noted the results. Initially the students were supervised, and then after a couple of days the mentees were given the code to the laboratory and they were free to come and go as they needed. In one of the wildlife range laboratory's mentees went into the field (nearby mountains) for days with researchers and collected data on Moose. From modifying DNA to using microscopes to study plant life, students were exposed to real world STEM laboratory experiences. When the mentors felt the students were comfortable, they would leave them to conduct the needed work, but it was a more closely monitored situation than a typical internship experience.

OUTCOMES:

In a debriefing with the lead facilitators and a survey of all the mentors, the overall experience was overwhelmingly "positive" for both students and mentors. Students loved exposure to different fields, loved to get to know the campus, and loved the real lab experiences. They liked pushing boundaries and liked the freedom to explore. They felt it definitely helped students open up options and career paths. The four facilitators hired (graduate students) worked 30-40 hours a week with these mentored students form Blanding for the four weeks they were onsite.

Some of the areas that the mentors and facilitators identified for improvement included:

- Mentors want more information on students ahead of time. Bio/picture/etc. More time ahead … questionnaires, transcripts, etc.
- More time going over lab procedures, lab safety, etc.
- Need a mentor workshop. Educate the mentors that they are not high school students, but they are not grad students. (Very malleable! This is why they are here!)
- Improve Mentor communication: More time in advance….clear standards…if you miss weekly meeting…More social events, more small group talks, more info about dorms, stipends, when coming, more touch base with mentors ahead of time…
- Use the companion course as a big stick… (Extrinsic motivation) for kids to perform while they are up there. Written explanations, experience, etc.

According to the weekly journals and summative reflections from the Canvas course, the participating Native American students, said:

Student 1: "I was apprehensive and had shaky confidence in my skill set to participate in this program." "Within these four short weeks I feel that I have grown much more than the person I was when we first started the program."

Student 4: “I do feel that I gained more confidence to compete in a global economy.” “The fact that they *(mentors & facilitators)* have confidence that we can make it, it’s all I need to know to show how hard work I will give to achieve what I want.” “No more half-assing and thinking by average work, you can succeed at the university’s level.”

Student 6: “My perspectives on my career didn’t change. It got me more motivated to continue my education higher in my department.” “I feel that nothing is impossible and from what the STEM program has taught me is there is always a solution for a problem. There isn’t a problem to big or small for the world. I feel that I can’t wait to start teaching children about the STEM program.”

Student 8: “I would just like to say that everything of the STEM Mentorship program was amazing and will definitely guide me through life.” “In order to be successful in my future, having true courage, confidence, consistency, and hard work will take me a long way. Life won’t toss me money when I’m struggling for help. It’s all up to me to strive for where I want to be. I believe that success is built on a foundation by taking chances and overcoming adversity.”

Student 9: “This experience over the past four weeks was eye opening for me because of the different experiences I was exposed to that were outside of my field. I feel like I’ve gained invaluable experience and knowledge of STEM careers that I can apply to my future career, and it allowed me to get out of my comfort zone and dabble in something new.” “I never really had much confidence in math and science fields; however, my experience here, especially the past week, has rewarded with confidence in this area”

Student 12: “Being at Logan, I have learned that college life on a big campus is not as daunting as it originally seemed.” “From a career perspective, the program has really opened my mind to the different options that the campus provides in education.” “When it comes to my future and what I feel like I want to do, this program has helped me feel a lot more sure about going into Computer Science.”

Student 14: “Joining this mentor-ship is one of the best things that any student at Blanding could do if they were interested in any S.T.E.M field.” “After experiencing everything, I feel more confident in transitioning into this lifestyle and earning a degree, thus making me feel more confident to compete in the global economy. I am very confident in my skills or potential to do what these students do.” “My eyes have been opened and exposed to many new careers that have made me reevaluate my decisions and plans for the future. I have realized that there are too many fields of engineering that excite me and plan to go into. Sadly, I cannot do them all. My interests are all in the STEM fields, which now I have realized that it is time to narrow it down into a particular field.”

Student 15: “The Mentorship program has been one of the most rewarding experiences as a student of the STEM field. At the start of the program I had my mind set on a certain school and a specific engineering field to pursue. I got super excited about all sorts of fields I never even

considered. This of course perplexed me and made me more confused about what I want to invest my future in, but I soon realized how lucky and fortunate I was be caught in a situation where all my options were pretty fantastic and unlimited." "I feel confident in my future haven gone through this mentorship. It was an eye opening experience for me and I hope that all of the Blanding students apply themselves to this opportunity."

Student 17: "I got a more diverse experience being here and learning/working in the STEM fields than I ever would have considering I am an English major. It's nice to learn new things and be able to understand what I am doing especially when the sciences/math subjects are my weakest point. So with that being said I am more confident than before I came." "To hear everyone's different stories was fascinating. To be successful it takes patience and hard work of getting to where you want to be in life. It was very motivational especially when they came from backgrounds different than yours and you see that they made something out of themselves. Seeing that made me want the same thing."

Student 19: "My experience here was awesome." "Living here for a month taught me how to budget my money, think ahead, and learn to fix my own problems. Therefore I believe that this experience has prepared me for that global economy. When I first came to Logan I was dazed and confused. While in Logan I saw that I had adapted easily. I was more confident rather than shy. Being at a university, I seen all the opportunities they offer. I discovered that I am starting to notice other programs and have an interest in going in to that field."

Student 20: "I have never lived on a campus and I have enjoyed the company of like-minded individuals, the mentors are an invaluable resource. Throughout our stay every one of our mentors in differing labs provided direction, insight, as well as, letting their passion for the subject matter shine through their work."

Personal Vignette: Mr. Armstrong not only is a co-author, but was a participant in the program. The following is a personal summary of his thoughts about the experience:

> Approaching the end of my freshmen year and college, I was given an opportunity to attend a STEM summer program at our main campus in Logan. Throughout the four weeks I would be learning about the different schools of Utah State University and would be working close under three different professors. Each week I gained significant first-hand knowledge of what mathematicians, structural engineers, and Material Scientist do.
>
> The first Professor I worked with specialized in the structural design of levy's and dams. In his lab we conducted experiments with various sediments and pressurized water cells. The object of the experiment was to test the permeability of the soil as constant water current traveled through it. In order to differentiate the less permeable sediments, we would increase the water pressure by increasing its rate of flow into the sediment until it could no longer hold its form and implode. With the given results, this led us to the second part of our experiment. I had to make concrete cylinder sample that would be wrapped in a plastic membrane and placed in a vacuum cell. Next, water would be pumped into the cell at a certain pressure to test the integrity of the concrete sample.

Calibrated sensors measured the water pressure and permeability of the sample until it finally gave way allowing us to determine if the mixture we used would be adequate for underwater structures.

The second workshop, I worked with two professors in the math department. A few other schoolmates and I learned how the rule of probability could allow us to determine the ratio of land to water on planet earth. Through using two different methods to calculate the land-to-water ratio our results were very similar in which 60% of earth was land and 40% was land. We were also introduced to a sophisticated coding program that could solve nearly any mathematical function if it was given the right variables. For example, we were able to calculate how much of the program we would become familiar with by the end of the week, the concept of the Golden Ratio, and what the Fibonacci sequence was.

The last Professor I worked with was by far my favorite. He specialized in material science and thermodynamics. Here we worked with a few of his grad students to study the conductivity and integrity of carbon nanotubes/fibers. I had to conduct three tests using samples called “dog bones” out of an epoxy resin, epoxy with aligned carbon nanofibers, and chopped carbon nanofibers which would go through a tensile test. As the stress built up and broke the samples, we were able to see how many pounds of pulling force it took to break each sample. As we looked over the data we confirmed that the sample with the aligned fibers provided more strength than the other two samples. Lastly, we were taken to a test lab were automated, self-sustaining electric vehicles were being tried through experiments. The goal of their research was to electrically charge vehicles as they drove over conductive panels that were intergraded in the road.

Throughout my stay on this campus, I had begun to develop myself and gain new understandings of what I wanted to study and practice after I was done with school. I learned what life would be like living on the main campus, the skills I needed to possess and develop in order to succeed at the next academic level, and how to interact with people that I have never met before. Above all these experiences the most important thing this summer mentorship program did for me was developing my confidence. I believed this was greater than learning how dams are built or what courses I should take towards my degree. Without my confidence none of these opportunities would have been available to me.

CONCLUSIONS:

Minority students throughout the nation continue to be under represented in industry and higher education. The success of this small mentorship initiative at USUE Blanding Campus shows significant growth and improved readiness in the American Indian students that participated. Four specific conclusions can be made from qualitative analysis of the participants.

1. Native American Students who participated where clearly nervous and lacked self-confidence. By giving the students an opportunity in an open, structured and supportive program, their self-confidence was significantly built and they were successful.

2. Native American Students can compete in STEM careers and higher education. According to the mentors and facilitators, the students found success in completing difficult tasks asked of them in the laboratories and in the field.
3. The lack of self confidence we believe can be attributed to the lack of preparation in their schooling, lack of guidance or modeling from home, and sheer lack of experience. Many of these students come from homes without running water and electricity. These socio-economic barriers when faced in a new environment like a large city are overwhelming to them. Though the students may be capable of doing the tasks in STEM careers, just knowing how to take a bus and negotiating the mass transit system can be overwhelming. This is an example of Maslow's famous theory of hierarchy of needs.
4. Programs such as this mentorship must be considered to increase the flow of URMS and specifically Native American Indians into the pipeline of STEM professions and higher education opportunities. It cannot be left to chance.

RECOMMENDATIONS:

The presentation of this work has been an action study of our efforts to improve American Indian access to pathways which will bring them to STEM. We acknowledge our lack of structure and validation of measurements. In analyzing our own pilot program, we believe we have found something of value. We hope that in the future we and others may be able to secure funding and improve data gathering and analysis methods.

SUMMARY:

We can make a difference. Not only has this mentorship program at Utah State University made a difference, but others across the nation are having an impact. For instance, the University of Chicago Pritzker School of Medicine implemented courses designed specifically for potential URM students that would identify racial/ethnic stereotypes, real-world workplaces, and health care disadvantages. After two years of implementing the program their URM enrollment rate doubled from 11% to 22% The University of Toledo College of Medicine partnered with SNMA and within one year saw a 50% gain in URM enrollment. Duke University also put a similar program in place which created a comfortable learning atmosphere for URM students and a summer program. They experienced an 80% success rate of students continuing into graduate or medical school.[vii] These examples in academia need to be extended into the workplace.

Industry needs more Native American Indian and URM students. A favorite quote that is often attributed to Einstein goes something like this: "Insanity is doing the same thing over and over and expecting different results." The big question we must address is "How long are we going to allow these numbers for the American Indians persevere?" It is clear that the Native American Indians we helped get a foot in the door through Mentorships overcame many barriers and have a good chance of being successful. What can industry and higher education do to take the next steps?

BIBLIOGRAPHY

[i] National Science Foundation (NSF) award Abstract #1348410. Indigenous Program for Stem Research and a Regional Native Network of Graduate Education: A National Research and Educational Model. http://www.nsf.gov/awardsearch/showAward?AWD_ID=1348410

[ii] National Indian Education Association (NIEA). Statistics on Native Students. http://www.niea.org/research/statistics.aspx.

[iii] Mendoza, W. (2014) Indian Students in Public Schools- Cultivating the Next Generation: Hearing on Indian Education Before the S. Comm. on Indian Affairs, 113th Cong. (Testimony of William Mendoza, Exec. Dir., White House Initiative on Am. Indian and Alaska Native Education.)

[iv] Stetser, M. & Stillwell, R. (2014). U.S. Department of Education, National Center for Educational Statistics. Public High School Four Year On Time Graduation Rates and Even Dropout Rates: School Years 2010-2011. http://nces.ed.gov/pubs2014/2014391.pdf.

[v] Jen-Mei, C., Chuhee, K., Stevens, L., & Buonora, P. (2016). Strategies to Recruit and Retain Students in Physical Sciences and Mathematics on a Divers College Campus. Journal Of College Science Teaching, 45(3), 14-22. http://web.b.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=3&sid=24110fc5-cffe-40ad-b46b-171d9193748c%40sessionmgr110&hid=128

[vi] Knapp, L., Reid, J., & Ginder, S. (2012) Enrollment in Postsecondary Institutions, Fall 2011; Financial Statistics, Fiscal year, and Graduation Rates Selected Cohorts, 2003-2008.

[vii] Figueroa, O. (2014). The significance of recruiting underrepresented minorities in medicine: an examination of the need for effective approaches used in admissions by higher education institutions. Medical Education Online, 19, 10.3402/meo.v19.24891. http://doi.org/10.3402/meo.v19.24891.

[viii] Toven-Lindsey, B., Levis-Fitzgerald, M., Barber, P. H., & Hasson, T. (2015). Increasing Persistence in Undergraduate Science Majors: A Model for Institutional Support of Underrepresented Students. CBE Life Sciences Education, 14(2), ar12. http://doi.org/10.1187/cbe.14-05-0082.

[ix] Hurtado S, Eagan K, Chang M (2010). Degrees of Success: Bachelor's Degree Completion Rates among Initial STEM Majors, Los Angeles, CA: Higher Education Research Institute at UCLA.

[x] Thompson, M. N. (2013). Career Barriers and Coping Efficacy Among Native American Students. Journal of Career Assessment, 21(2), 311-325. http://jca.sagepub.com/content/22/4/595.full.pdf+html

[xi] Landivar, C. (2013) Disparities in STEM Employment by Sex, Race, and Hispanic Origin. United States Censu Bureau. http://www.census.gov/library/publications/2013/acs/acs-24.html

[xii] National Science Board. Revisiting the STEM Workforce: A Companion to Science and Engineering Indicators 2014 (NSB-2015-10)

[xiii] Staff, 2014. Universities Partner to Boost Native Americans in STEM Fields. Philanthropy News Digest. http://philanthropynewsdigest.org/news/universities-partner-to-boost-native-americans-in-stem-fields/

[xiv] Staff, 2015. New Research on Internships and Experiential Learning Programs. Association of American Colleges and Universities. https://www.aacu.org/publications-research/periodicals/new-research-internships-and-experiential-learning-programs

[xv] Hart Research Associates, (2010) Raising the Bar: Employers' Views On College Learning in the Wake of the Economic Downturn, AAC&U

[xvi] Adams, S., July 25, 2012. Odds Are Your Internship Will Get You a Job. Forbes, Magazine http://www.forbes.com/sites/susanadams/2012/07/25/odds-are-your-internship-will-get-you-a-job/#7350c07b453f

[xvii] Hering, B. (April 10, 2010). Why Are Interships so Important? CNN.com. http://www.cnn.com/2010/LIVING/worklife/04/14/cb.why.internships.important/