



Bridging the Research Gap: Community College to University

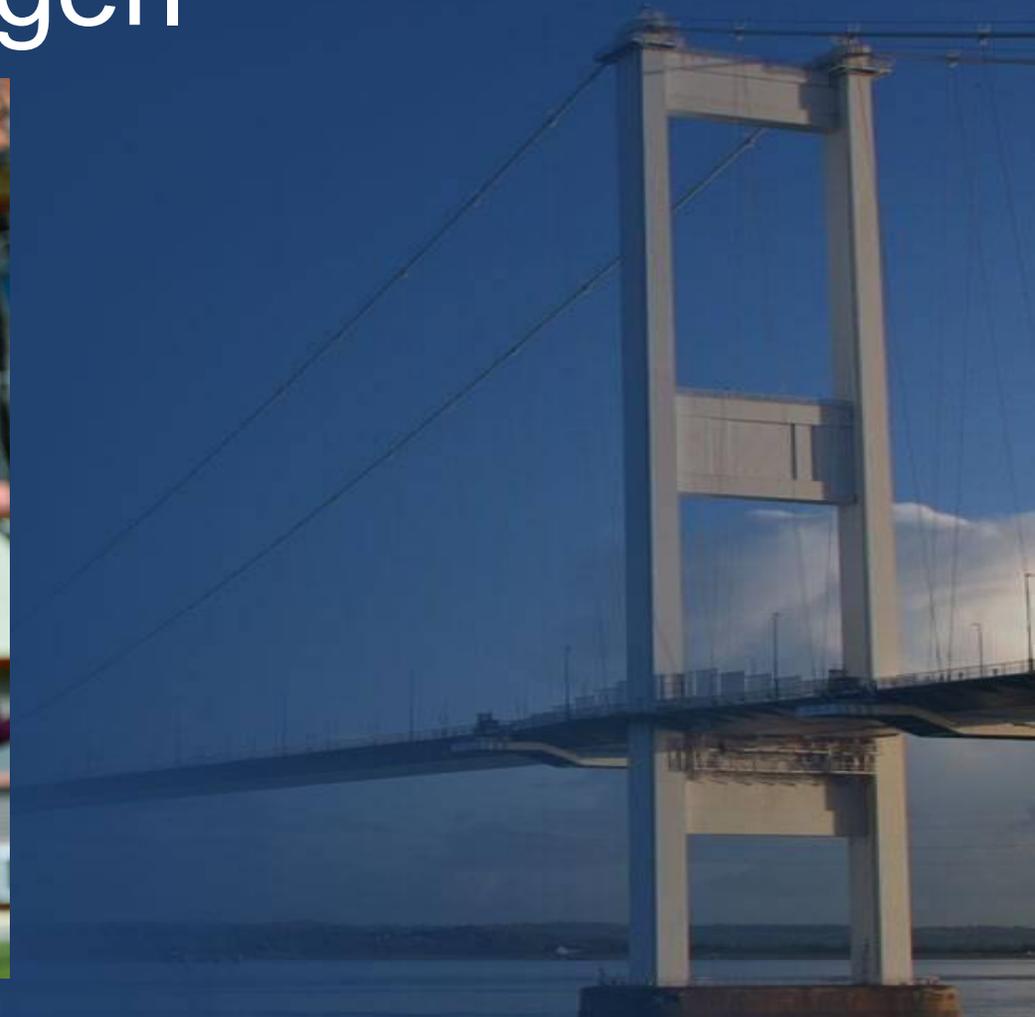
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Bridging the Research Gap

A large suspension bridge with two tall towers and numerous cables, spanning across a body of water. The scene is captured during sunset or sunrise, with a warm, golden light reflecting on the water and the sky. The bridge's structure is silhouetted against the bright sky.

- ❖ Who: CC students ready to matriculate to university
- ❖ When: Usually just prior to Associates Degree – a bit of a problem
- ❖ What: Research Experience --- Missing in most cases
- ❖ Why: A vital component to the success of the STEM student
- ❖ How: That is the story we are going to tell

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New Mexico Alliance for Minority Participation (NM AMP) and the Summer Community College Opportunity for Research Experience (SCSCORE) Program

- New Mexico Alliance for Minority Participation (NM AMP), funded by National Science Foundation (NSF), began in 1993. We were recently awarded our 6th Phase of Award (25 years now), which is referred to as the New Mexico AMP “STEM Pathways and Research Alliances.”
- Since 1993, NM AMP has increased the retention, development, and graduation of underrepresented minority (URM) students in STEM (Hispanic, African American, Native American, Alaskan Native, or Pacific Islander).
- Over the lifetime of NM AMP, the number of STEM B.S. degrees awarded to URMS in NM has more than tripled (from 253 in 1992-93 to 858 in 2015-16). This is an increase of 24 to 48 percent (see fig. 1 below). This is due to NM AMP and programs in NM with similar goals.

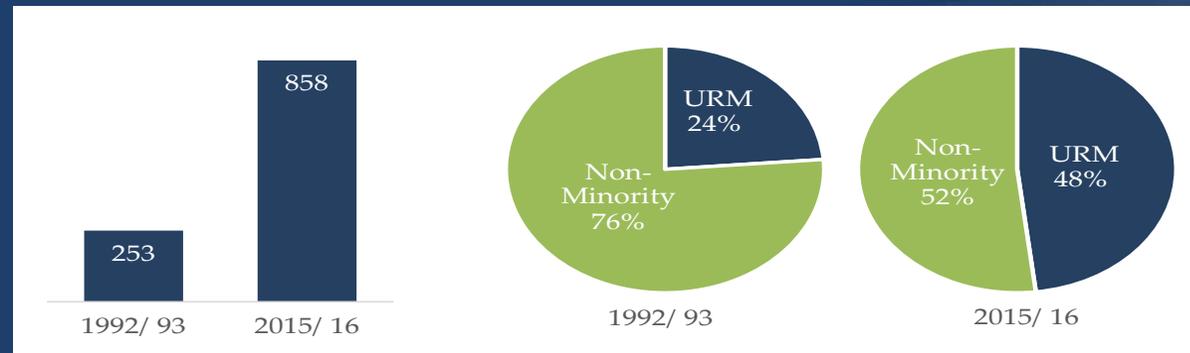


Fig 1 Number and percentage of STEM degrees awarded to URM students in NM

THE NM AMP PATHWAY

1. The NM AMP Pathway (Fig 2) supports URS students at partnering 2- and 4-year institutions and provides them with multiple opportunities to explore STEM programs and careers, engage in undergraduate research, and participate in addition programs and opportunities that support early career exploration, STEM identity and self-efficacy, and self-direction.

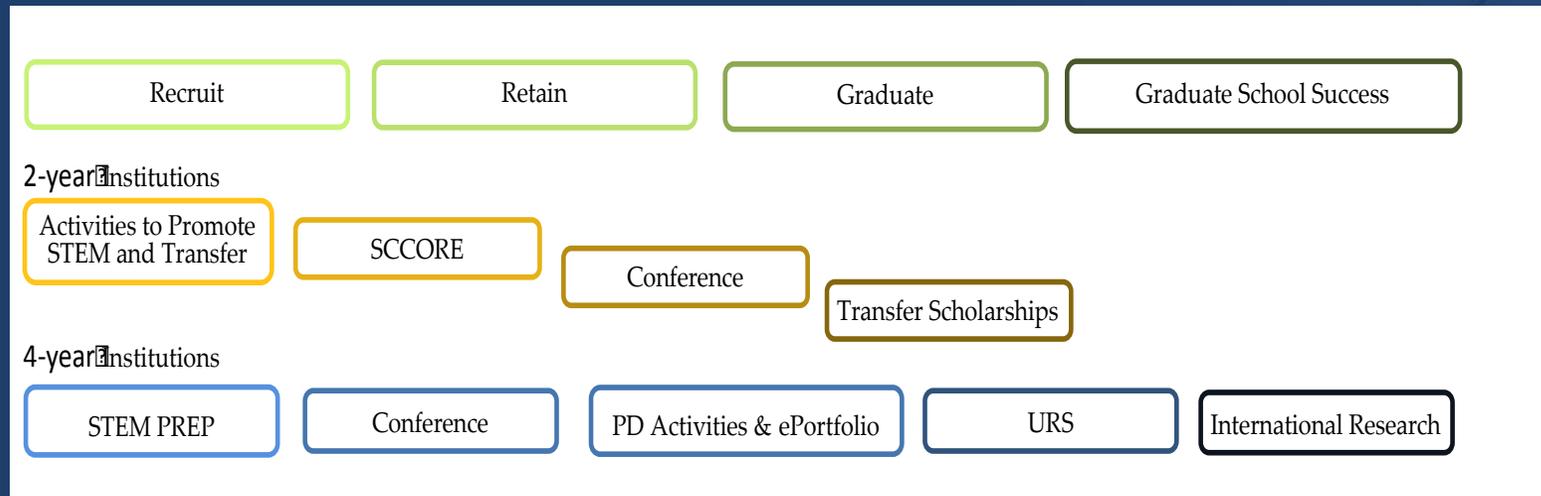


Fig. 2 The NM AMP Pathway

2. The NM AMP Pathway rejects deficit-based thinking that assumes students lack either qualities or abilities for achievement and, instead, embraces a strengths-based approach that recognizes the unique contributions and interests of individual students and provides them with guidance and experiences that enable each student to achieve his or her full potential.
3. With 15 alliance partners throughout the state of NM, NM AMP provides funding for programs, activities, and events that nurture and enhance professional development and research-based focus.

NM AMP GOALS FOR ALL ITS PROGRAMS

1. Increase capacity of Alliance institutions' and others to successfully service URM students by a) Increasing availability of contexts and opportunities for experiences promoting the development of a positive academic and scientific identity, and b) broad dissemination of learning from a rigorous, mixed methods social science research project and translation into practices for NM AMP and broadly disseminate research findings to encourage change in STEM education.
2. Increase graduation for URM students in STEM by
 - a) increasing successful transfer of URM students from 2-year to 4-year institutions in STEM programs
 - b) increasing retention rates of URM students in STEM
3. Increase the number of URM students who transition and complete STEM graduate programs.

BACKGROUND AND HISTORY OF SCCORE

- Because of its commitment to retention in STEM and Transfer, in 2005, NM AMP started the Summer Community College Opportunity for Research Experience (SCCORE) program, evolving from another New Mexico AMP bridge program, the Minority Engineering Transfer and Articulation (META) program, that took place between 2001 and 2004. This program was targeted to civil engineers at New Mexico State University and two partner community colleges.
- Because of the impressive outcomes, we took the successful components of META and redesigned the program, allowing it to become a sustainable and successful program on its own merits.
- Distinguishing SCCORE from META and according to NSF preferences established for our funding, the program targets URM students in all STEM disciplines at all partner community colleges.
- SCCORE provides research opportunities, fosters student success, and assists students in transfer, with the following components: 1) a Summer Bridge Program in which non-local students are housed on campus for four to six weeks and attend a credit-bearing seminar (local students who commute are funded, also); 2) Research Assistantships; and 3) Year-Round Advising Support.
- The program was housed at NMSU from 2005-2014, at which time, we opened up the hosting of the program to all of our university partners. Once only hosted at the lead institution, NMSU, now all universities have the opportunity to host the SCCORE program. Students choose to attend SCCORE at the university to which they want to transfer one day.

OUTCOMES OF THE SCCORE PROGRAM STATEWIDE CON'T:

Race/Ethnicity Profile 2005-2018

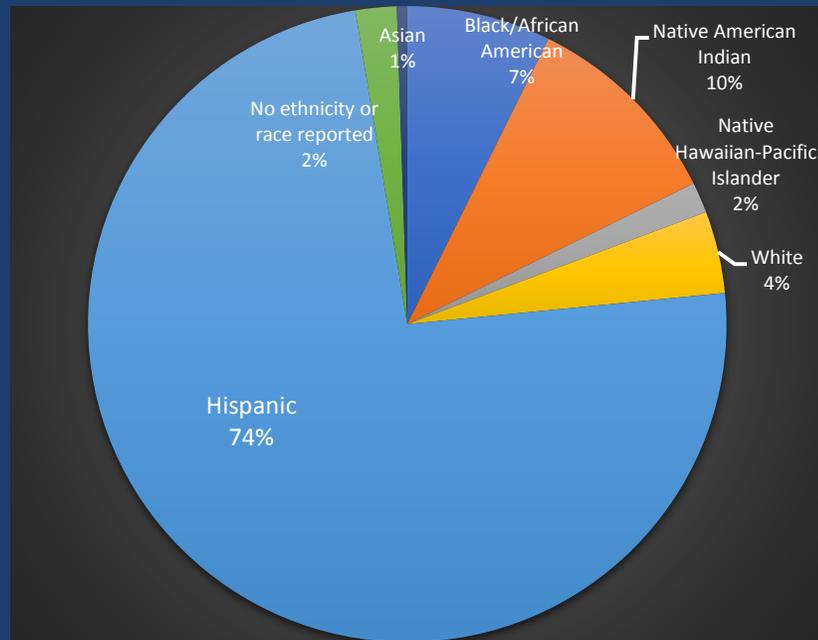


Figure 5: Ethnicity Profile 2005-2018

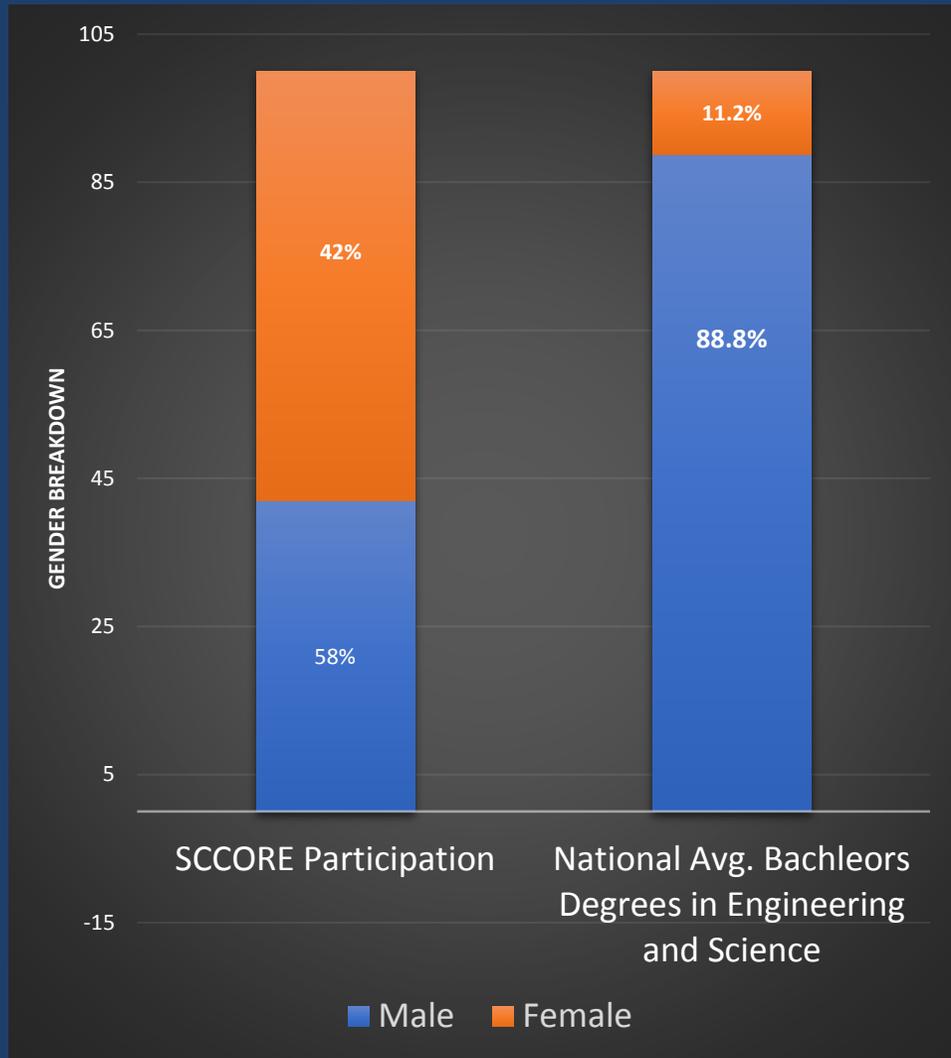
- Significance of the demographics of SCCORE: 76% Hispanic, given that less than 2 percent of the STEM workforce is Hispanic, and 20 percent of the country's youth population is Hispanic

Source: Overview of Hispanics in Science, Math, Engineering, and Technology (STEM): K-16 Representation, Preparation and Participation, July 2012 (<https://www2.ed.gov/about/inits/list/hispanic-initiative/stem-factsheet.pdf>)

- Over half (53%) of all Hispanic Serving Institutions (HSIs) are community colleges, due to the large concentration of Hispanic students (Benitez & DeAro, 2004).

Source: https://www.hacu.net/images/hacu/OPAI/H3ERC/2012_papers/Crisp%20nora%20%20hispanics%20in%20stem%20-%20updated%202012.pdf

OUTCOMES OF THE SCCORE PROGRAM STATEWIDE: Gender Breakdown



“In 2012, [only] 11.2% of bachelor’s degrees in science and engineering, 8.2% of master’s degrees in science and engineering, and 4.1% of doctorate degrees in science and engineering were awarded to minority women.”

Source: NSF, *Women, Minorities, and People with Disabilities in Science and Engineering, 2015* -- <https://ngcproject.org/statistics>

OUTCOMES OF THE SCORE PROGRAM STATEWIDE:

192 students have participated since 2005; 67% (N= 129) have transferred, & of these, 19% (N=25) have graduated so far with a bachelor's degree. 10 students have completed or are pursuing a master's degree & 4 students have completed or are pursuing a Ph.D.

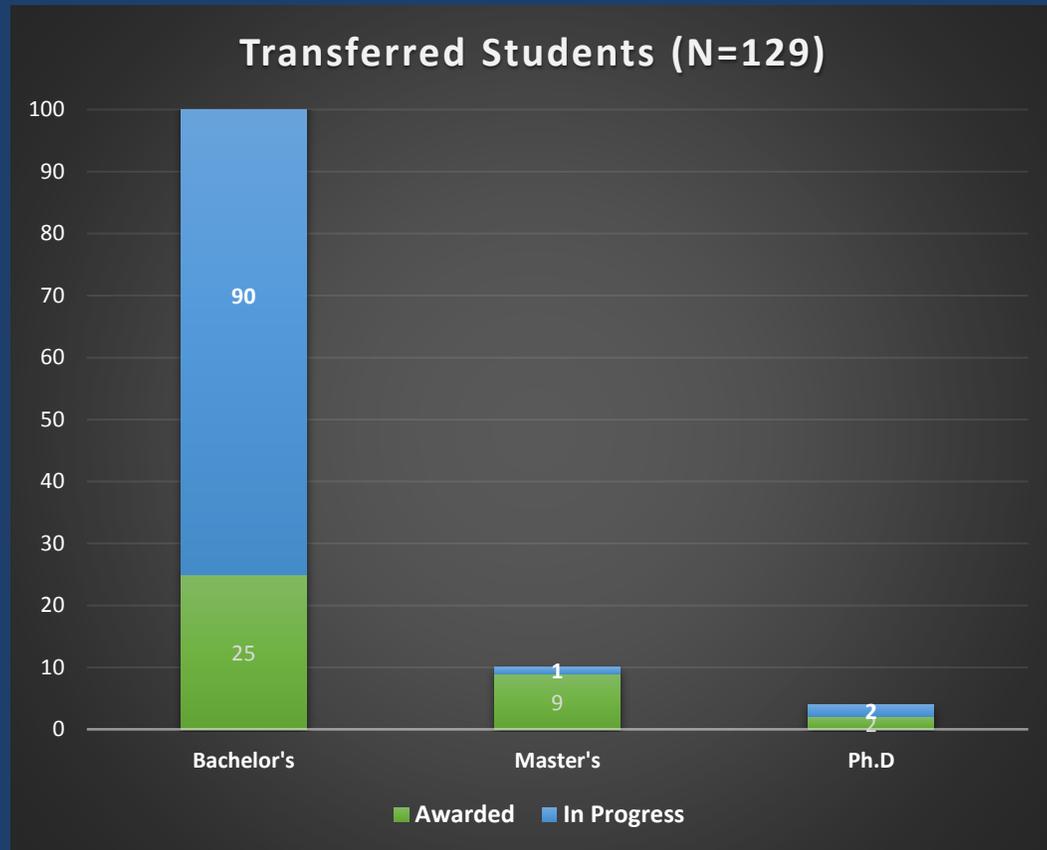


Figure 3: Cumulative SCCORE Participation (2005-2018)

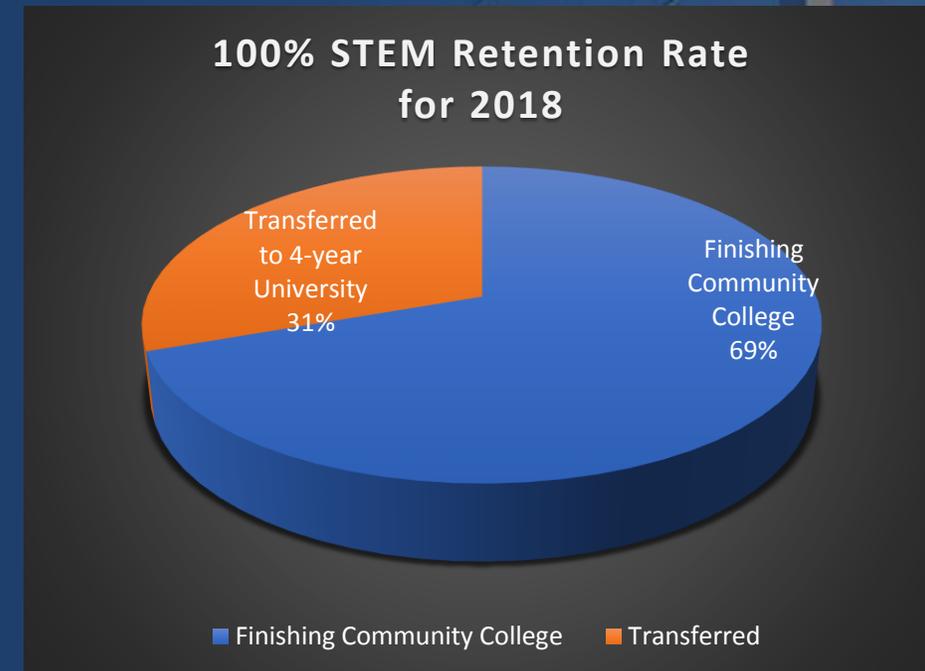
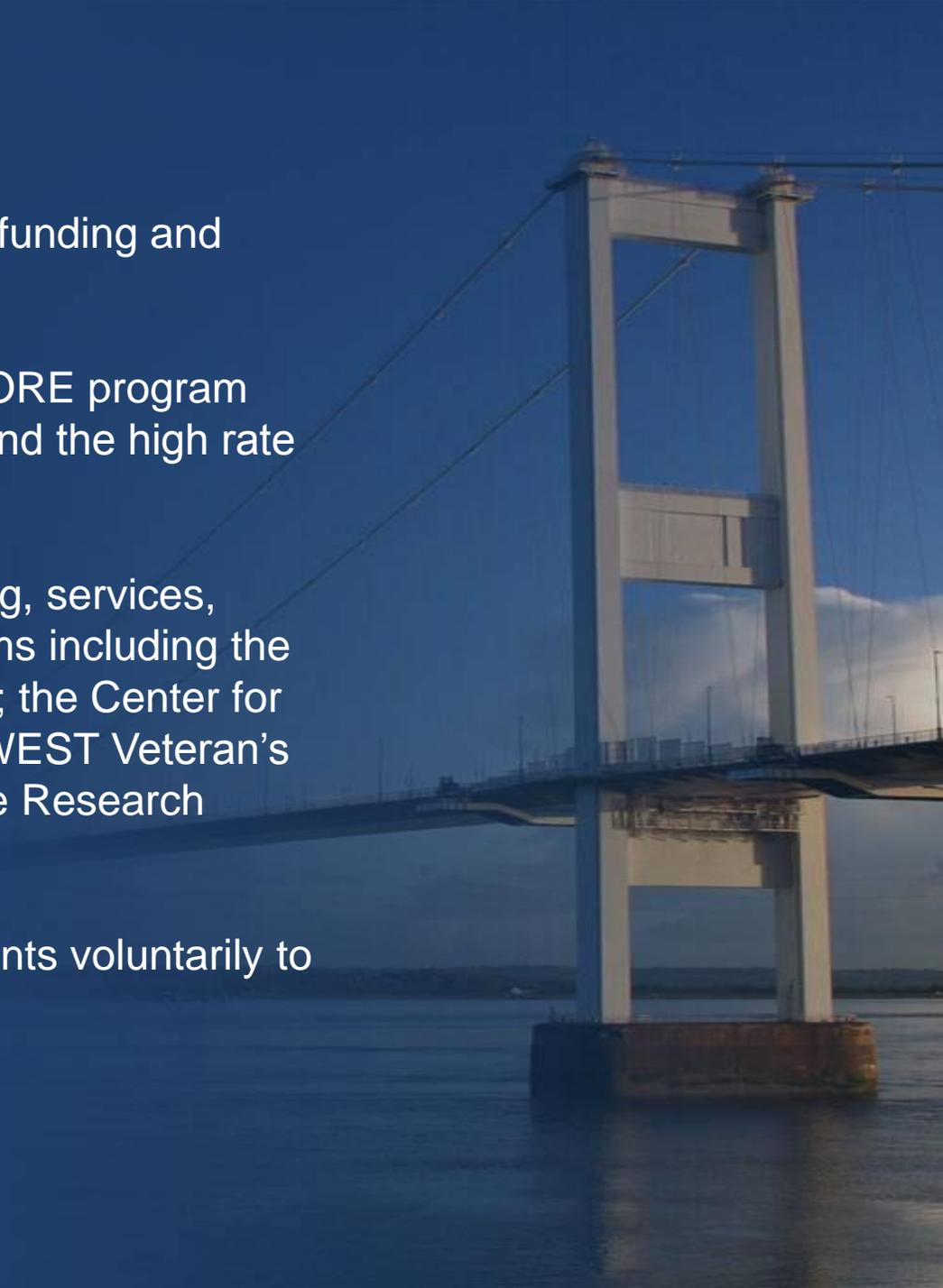


Figure 4: Retention Rate for 2018

SUCCESSFUL LEVERAGING OF SCORE

- One reason for our success for so many years is the leveraged funding and support we have received
- The State of New Mexico has been very supportive of the SCORE program since it includes the entire state's community college students and the high rate of transfer
- Other programs have collaborated with SCORE to offer funding, services, support, faculty and graduate student mentoring. These programs including the Reinventing the Nation's Urban Water Infrastructure (ReNUWIt); the Center for Bio-Mediated and Bio-Inspired Geotechnics (CBBG); the ReinWEST Veteran's Program; and the Established Program to Stimulate Competitive Research (EPSCoR).
- Faculty offer their research mentorship and their graduate students voluntarily to meet the requirements of some of their grants/proposals.



SERVING AS AN INSTITUTIONAL COORDINATOR OFTEN LEADS TO LEADERSHIP DEVELOPMENT

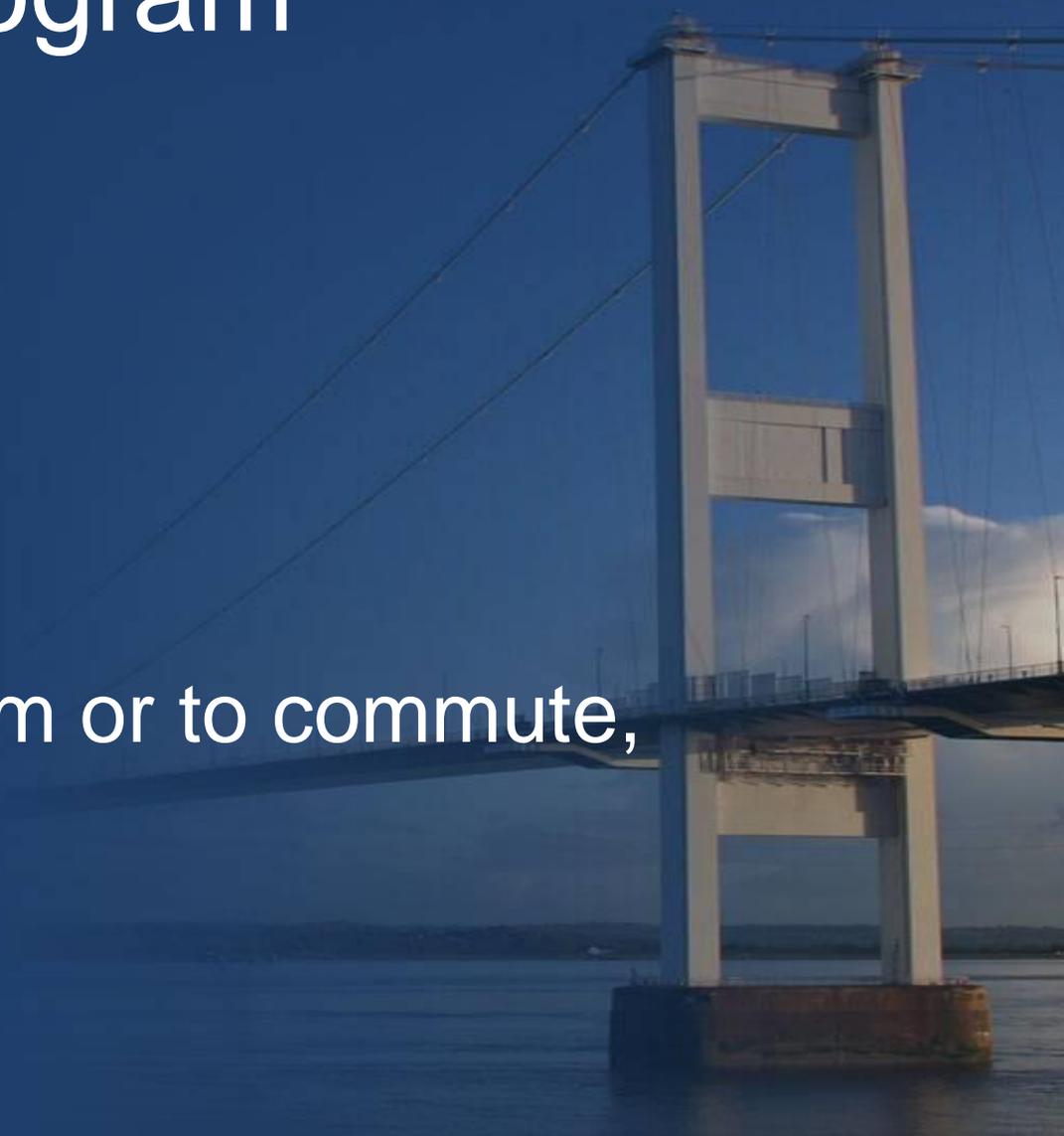
- Several of our Institutional Coordinators (IC) through the years have risen to leadership positions in their respective institutions
- The IC at one of our universities, who had held a position for several years as an Instructor, was named the Research Coordinator for the College of A&S, a real achievement at an institution not as recognized for its STEM contributions, but more for its focus on Education.
- Another community college IC was recognized as an outstanding leader and named one of the Vice Presidents at NMSU.
- Our IC at one of the larger universities in our partnership served as the Associate Dean of Research. She and her husband have been recognized in *Science* for an article describing their work to redefine the Grand Canyon's rock layers and to initiate and install the Trail of Time Geology Exhibition at the Grand Canyon.
- Our former Director was named Dean of Engineering at NMSU and went on to serve as Dean at Chico State College; our current Director serves as the Associate Chair of his STEM department.
- Another of our community college IC's was named the STEM Director at an institution that is considered the largest higher education institution in NM.

Making research Magic happen

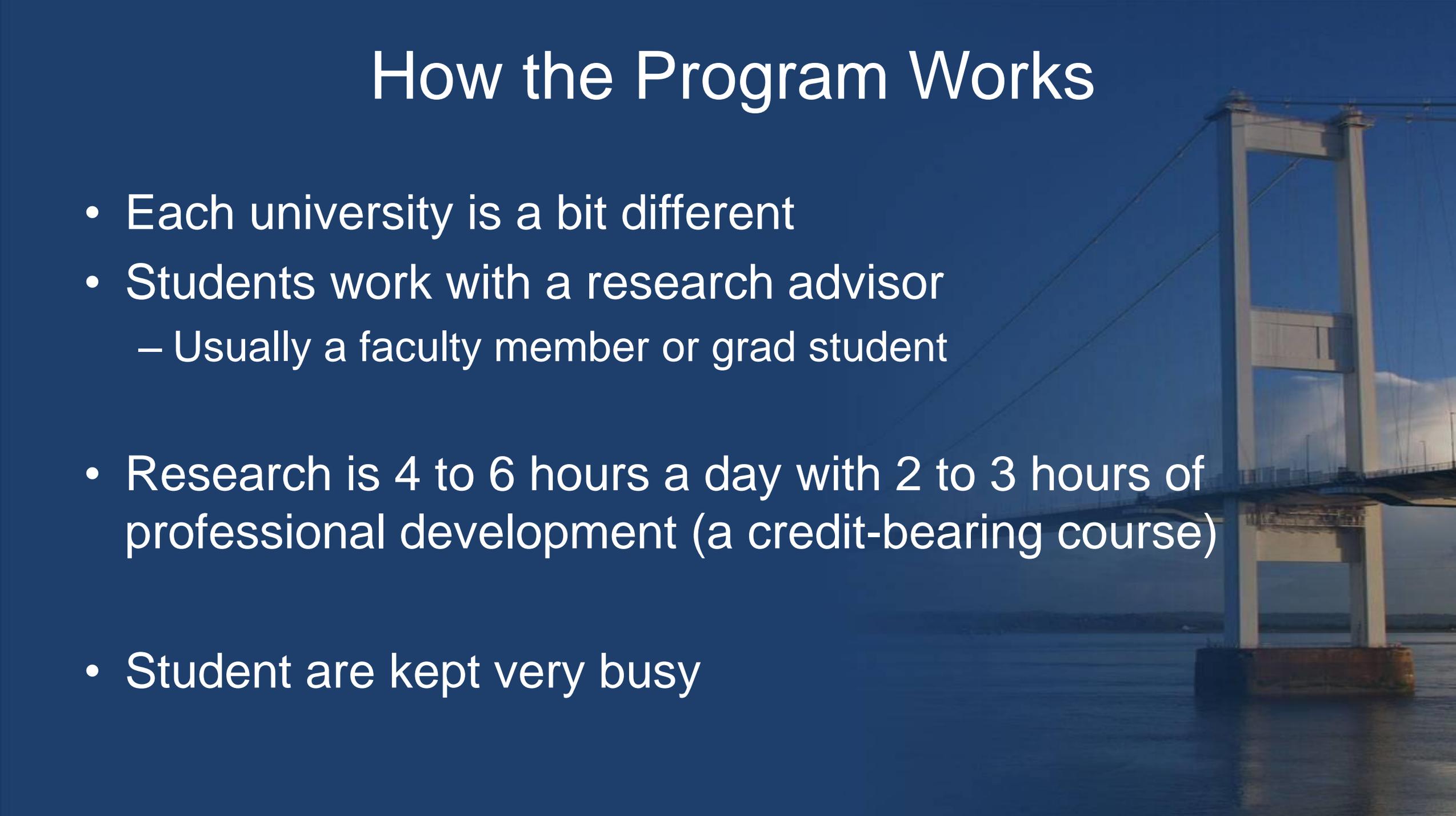


SCCORE Program

- Must be a minority student
- GPA of 2.7 or higher
- Majoring in a STEM field
- Have interest in graduate school
- Wiling to live in residential program or to commute, if local.
- Must be ready to work hard



How the Program Works

A photograph of a suspension bridge tower, likely the Bixby Creek Bridge, set against a blue sky at dusk. The tower is a large, white, rectangular structure with a central opening. It is supported by a concrete pier in the water. The bridge deck and cables are visible, extending from the tower. The water is calm, and the overall scene is serene and atmospheric.

- Each university is a bit different
- Students work with a research advisor
 - Usually a faculty member or grad student
- Research is 4 to 6 hours a day with 2 to 3 hours of professional development (a credit-bearing course)
- Student are kept very busy

Hands on research



Collaboration events



Professional Development



- How to Use the Library
- Lab safety and Hazardous Materials
- Research Paper Citation Management
- Resume/CV Workshop
- Financial Aid Workshop
- Transfer Credit Workshop
- Poster Creation Workshop
- Interviewing Skills

Lab Tours and Activities of SCCORE

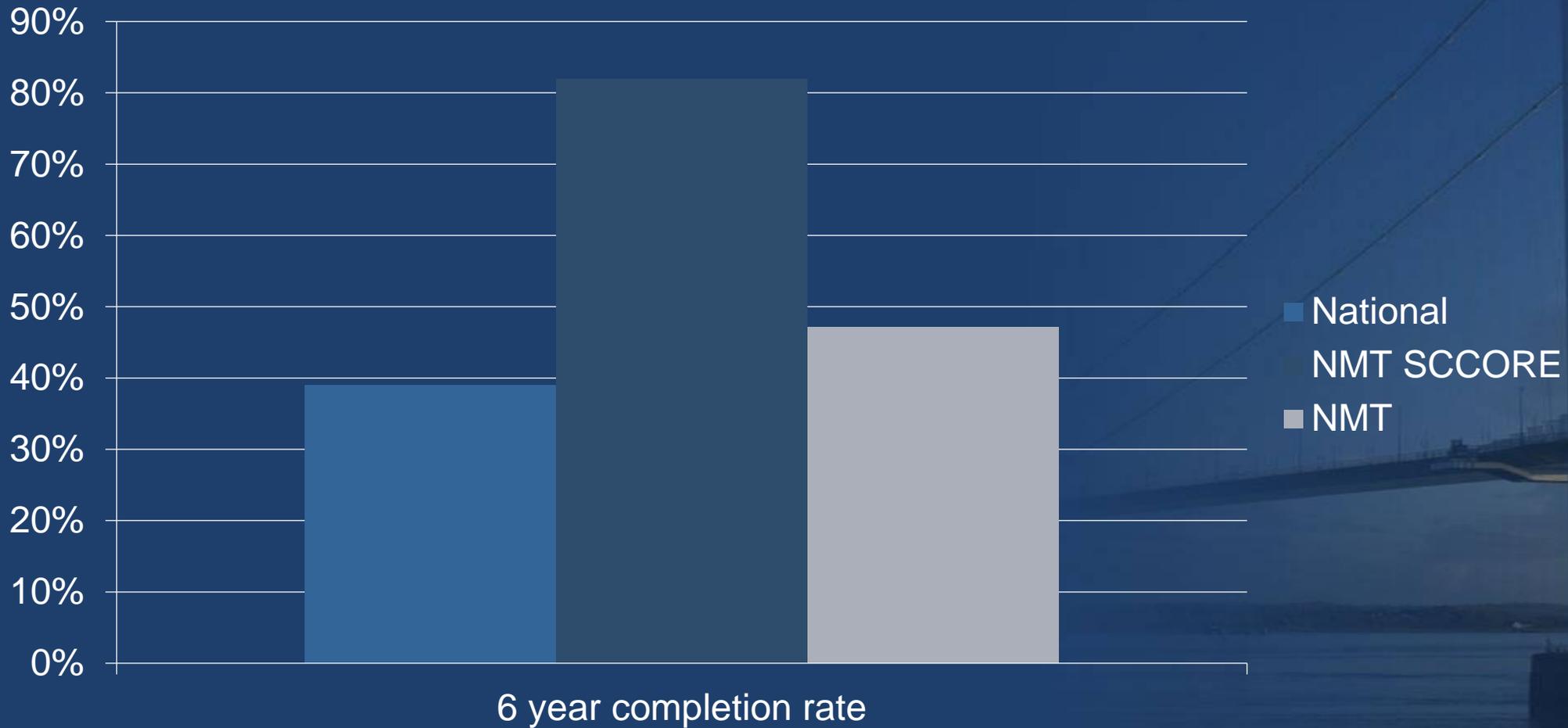
- Langmuir Lightning Lab
- Magdalena Ridge Observatory
- Intel
- Magdalena Ridge Interferometer
- Materials Science Lab
- Energetic Materials Research and Testing Center
- Petroleum Recovery and Research Center
- IRIS/PASCAL
- STEM labs and field trips at the host universities
- Transfer and graduate panels and speakers



Student So Far at New Mexico Tech

- Since 2014 17 students
- 14 are still enrolled at a university or CC
- 11 have matriculated to the host university
- 1 has joined the ARMY
- 1 has taken a job in the oil field (makes \$\$\$)
- 1 I have lost contact with
- 2 will graduate this fall (both have job offers)

Degree Completion for Students in New Mexico Tech SCCORE



Students who thought I was a pain in the “Neck”

Students

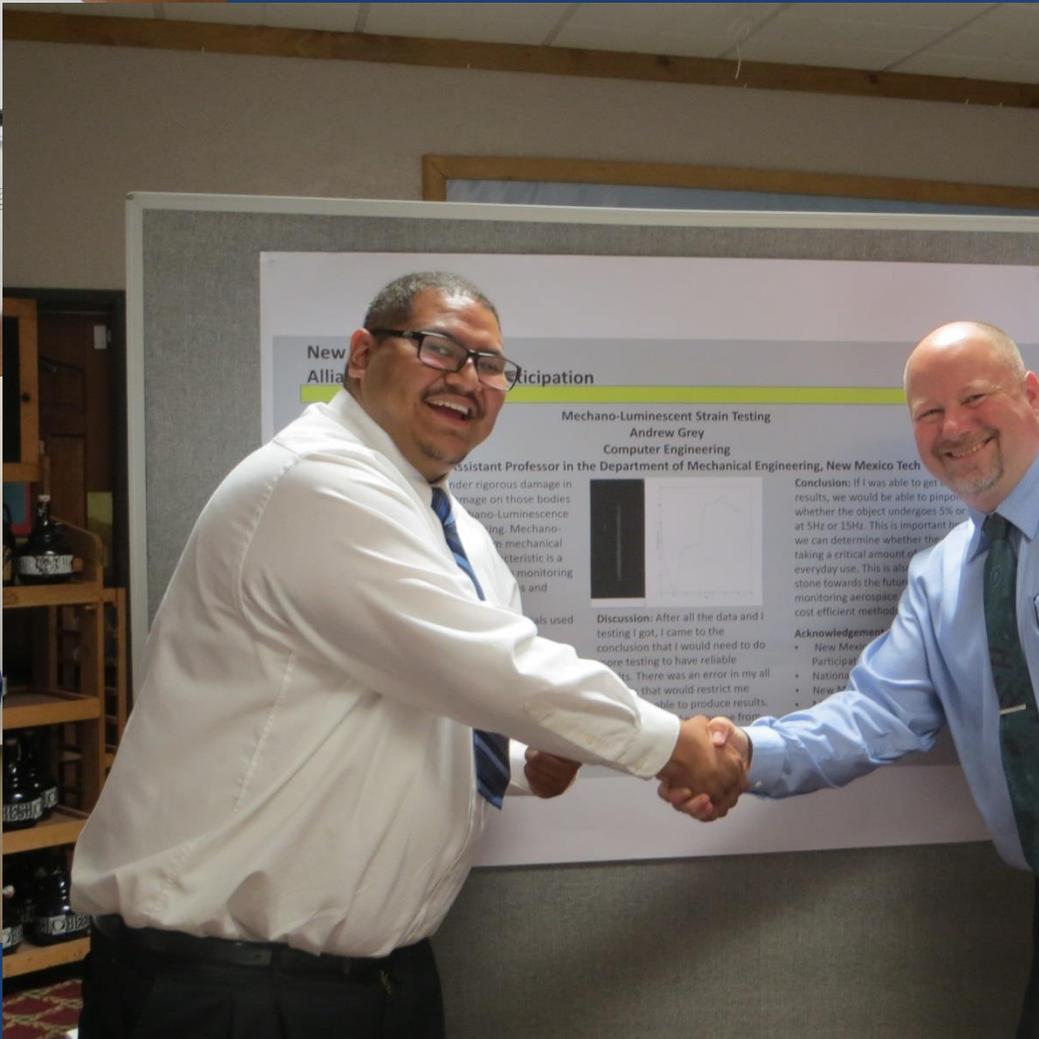


■ YES

■ Also YES but in a different
Color



Group Participation Time



Introduction

- I was born in Cd. Juarez, Chihuahua
- Moved to the United States in January 2001
- Graduated high school in December 2007
- Got married in 2011 and had a daughter in 2012
- Decided to invest in mine and my family's future by getting a better education
- Graduated with an A.S in engineering in 2013
- Transferred to New Mexico Tech
- Expected graduation date: May 2019



Program Benefits



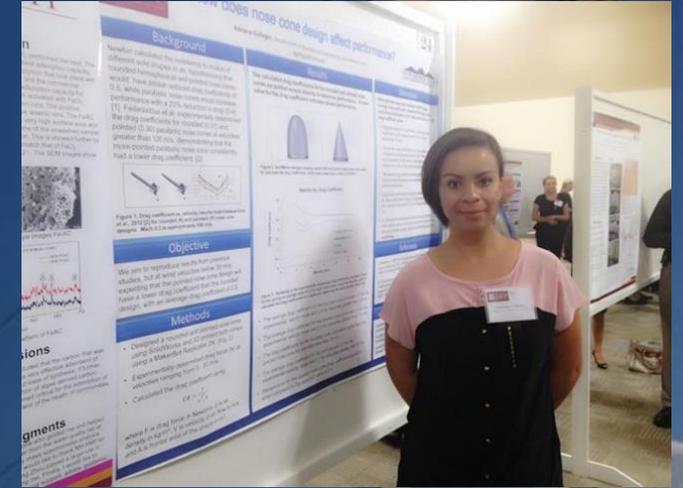
- Exposure to a real life research environment
- Experience in professional poster presentations
- Professional resume
- Transfer Scholarship
- Motivation for future research/internship experiences

Alliance for Minority Participation (AMP)

My first research experience

Summer Community college Opportunity for Research Experience (SCCORE):

- A month long research experience at New Mexico Tech
- From June 1-26, 2015
- Designed two different rocket nose cones using SolidWorks and 3D printed them
- Tested drag effects and air flow using New Mexico Tech's wind tunnel
- The results proved that the rounded nose cone experienced less drag forced compared to the pointed nose cone
- Presented results in poster presentation at the yearly AMP conference in Las Cruces, NM.



Following AMP

Competitive Research (NM EPSCoR)

- Two month long research experience at the University of New Mexico
- From June 3 - July 29, 2016
- Researched and implemented current solar cell techniques
- Researched energy materials
- Synthesized solar molecules
- Synthesized quantum dots (QD)
- Presented research in end of the summer EPSCoR conference



Open doors for Internships

National Radio Astronomy Observatory (NRAO) and The Very Large Array (VLA)

- Mechanical Engineering Aid
- May 2018 – Present
- Assist Mechanical Engineer with 3D designs, CAD assemblies and CAD drawings
- ThermXL software that outputs thermal analysis of the cryogenic receivers



Poster Presentations and Awards

