HISPANIC-SERVING INSTITUTIONS in the SOUTH-CENTRAL UNITED STATES 2019

A Research Report for
Los Barrios de Amarillo

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Contents

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This report was prepared for Los Barrios de Amarillo.

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List of Commentaries and Commentators

Foreword

In a panel discussion that coincided with the release of Excelencia's report *From Capacity to Success: HSIs, Title V, and Latino Students* (Santiago, Taylor, & Galdeano, 2016), the organization's Chief Operating Officer and Vice President for Policy, Deborah Santiago, asked how institutions of higher education can move from enrolling Hispanic students to serving them. Similarly, organizational theorist, Gina Garcia, has suggested that Hispanic-Serving Institutions ask themselves: Which merely enroll Latinx students, which help them gain academic credentials, and which go further and enhance their students' cultural experiences (Garcia, 2019)? These are relevant and vital questions, especially as the U.S. Census Bureau notes that the enrollment of Hispanic students at institutions of higher learning more than doubled between 1996 and 2016 (U.S. Census Bureau, 2017). Yet while enrollment increased, Hispanic students are reaching graduation at rates 12 percentage points or more below their White peers (NCES, 2018) and, as a group, are among the lowest in terms of 6-year graduation rates (Chun, Marin, Schwartz, Pham & Castro-Olivo, 2016). It is clear that we have work to do in order to serve Hispanic students better, even at Hispanic-Serving Institutions (HSI).

The significance of this report is twofold. First, it represents a unique collaborative effort to understand and communicate the characteristics of Hispanic-Serving Institutions. Second, it is rooted in an interest to serve the needs and interests of current and future Hispanic students. An inter-institutional collaboration of scholars from across the state of Texas, representing eight institutions and led by Dr. William Kitch from Angelo State University, received support from the National Science Foundation (NSF) to implement a regional conference called *Consejos Colectivos.* The intention was to discuss and discover details about HSIs in the south-central United States. West Texas A&M University (WTAMU) was privileged to be part of the conference planning team and to participate in *Consejos Colectivos.* As part of the project's investigative plan, researchers from WTAMU held and recorded focus group sessions with conference attendees. After the conference, they interviewed select individuals to expand representation in the initial qualitative data set. This data was analyzed and, along with a review of the literature, led to the creation of a survey that the team distributed to faculty, staff, and administrators at HSIs in a seven-state region. Representatives of non-profit organizations that support or advocate for Hispanic students were also included as informants. The findings from that research are presented in this report along with contributions by caring and respected higher education leaders who draw on their knowledge, experience, and expertise to advance continuing efforts in doing the work needed to learn how to serve students effectively at HSIs.

I encourage you to read, reflect on, and act regarding the information in this report. WTAMU and its employees look forward to supporting further collaborative efforts as we participate in the important conversation about serving the students attending HSIs in the state of Texas and beyond.

Sincerely,

Dr. Angela Spaulding
Dean of the Graduate School, Vice President of Research and Compliance
West Texas A&M University

Introductory Material

Authors' Introduction

The material that follows has been compiled with two audiences in mind. The primary audience of this report is the Los Barrios de Amarillo organization and the population of primary and secondary school stakeholders it serves. The second audience is higher education professionals, and, within that group, individuals interested in understanding the nature and characteristics of Hispanic-Serving Institutions. To accommodate a variety of needs and interests in the two audiences, the limitations of the project, a research description, notations of statistical analyses used, markers of statistical significance, and other material an academic audience seeks have been included in this report, but the main body of the text was written for a general audience. This pattern, descriptions of findings in the main body of the text and placing statistical details in tables found in Appendix 3, should fulfill the needs of both practitioners and scholars.

The authors have also attempted to be linguistically and culturally responsive. It seemed contradictory to discuss the cultural understanding of employees at Hispanic-Serving Institutions but to not respect some known preferences in the Hispanic community. This effort was complicated because commonly used descriptive terms like Hispanic and Latino have both advocates and detractors (see Definitions, p. 30). The authors considered use of Spanish terms and phrases like Marrun (2015). They were selected for use in the report as synonyms of a limited number of regularly occurring words and phrases, Hispanics, Hispanic students, Hispanic employees, faculty, family, and advocates, but native speakers of Spanish advised that was not necessary in a report of this type and that some of the patterns proposed were irregular. As this was the case, the team chose to employ several of the more commonly used terms, Hispanic, Latino/a, Latinx, and Latinx/a/os interchangeably, a pattern which is present in the Hispanic/ Latinx/a/os community (Martinez, 2009).

A final means of making the material approachable was placing the majority of tables which list the research outcomes such as counts, percentages, and measures of significance or effect size in an appendix. Some tables and graphs have been included in the text, but only when it was felt they helped communicate the intended ideas.

The investigation described in this report was an initial exploratory undertaking. Very little research has been conducted about the nature and programming of Hispanic-Serving Institutions and the background and opinions of their employees. Like all explorers, it is possible that the research team pursued tracks that will subsequently prove to have little practical value and did not pursue avenues that will be of interest to readers now or in the future. However, an attempt was made, based on information gathered from employees and students at HSIs, to pursue topics of import in understanding HSIs, their employees, their programming, and their orientation toward the Hispanic students they serve. The survey results are descriptive rather than interpretive as the primary question was "What is the case?" rather than "Why is this happening?" It is, however, our hope that readers find this report helpful and that the information it contains will contribute in some small way to improving understanding of, access to, and opportunity within higher education, especially in regard to Hispanic-Serving Institutions and the students they serve.

About the Project and Its Purposes

Bryan DeBusk
Senior Grant Consultant, Hanover Research

The Texas A&M Engineering Experiment Station (TEES), in collaboration with Angelo State University (ASU), El Centro College, West Texas A&M University (WTAMU), Del Mar College, Texas A&M University – Kingsville (TAMUK), Texas Tech University (TTU), Texas Woman's University (TWU), and the Texas Association of Chicanos in Higher Education (TACHE), convened a conference for students, faculty, staff, administrators, advocacy organizations, and representatives of grant making organizations in February of 2018. The purpose was to identify challenges and opportunities for improving science, technology, engineering, and mathematics (STEM) education at HSIs, to focus on improving STEM education for Latinx students, to discuss capacity for research and Latinx student participation in research, and to identify areas for effective institutional change to address barriers to Latinx student success in STEM.

The conference was envisioned as a direct response to the National Science Foundation's (NSF) call for conferences to identify the most critical challenges and opportunities in STEM education at two- and four-year HSIs. Members of the organizing committee represented longstanding and emerging two-year, four-year, and PhD-granting HSIs invested in identifying challenges to Latinx student success and implementing effective solutions. For example, in *Finding Your Workforce: Latinos in STEM* (2015), Santiago, Taylor, and Calderón review 10 areas of evidence-based institutional practices with the potential to improve Hispanic student success in STEM: (1) supporting K-12 policies and programs to improve college readiness, (2) conducting targeted outreach to Latinx students, (3) fostering an environment of institutional commitment to

student success, (4) establishing institutional partnerships that make it easier for Latinx students to advance in the pipeline, (5) improving advising, (6) establishing peer mentoring programs, (7) supporting faculty development, (8) enhancing relevant academic support programs, (9) providing research and fellowship opportunities for students, and (10) securing industry cooperation to ease transitions to the workplace. Unfortunately, for many two- and four-year institutions, knowing which approaches work is not enough to overcome the barriers to adopting those approaches. Thus, the first objective of the conference and associated research was to identify the specific challenges two- and four-year HSIs face in adopting evidence-based institutional changes for improving STEM education and Latinx student success, with a specific focus on areas NSF could potentially address through targeted funding opportunities.

In some areas, the primary challenges to adopting evidence-based institutional changes are resource limitations. For example, although two- and four-year HSIs play a critical role in the STEM pipeline, many have limited STEM program offerings and limited or no research infrastructure (HACU, 2017). Although NSF and administrators could invest in broadening STEM curriculum and the research enterprise at these institutions, a more efficient approach may be to enhance collaborations with other HSIs and community organizations similar to the way NSF encourages collaborations between institutions through Research Experiences for Undergraduate sites and the Scholarships for Science, Technology, Engineering, and Mathematics Track 3 (Design and Development: Multi-Institutional Consortia) program. In cases where direct investment is more appropriate, some institutions may not be aware of opportunities or may not have the experience needed to successfully pursue funding. Thus, the second objective was to identify challenges and opportunities for two- and four-year HSIs in building capacity for research and expanding STEM instruction and other Latinx student supports through collaborations with other institutions and by pursuing appropriate funding opportunities.

The Psychosociocultural Model (PSC) of College Success for Latinx students (Castellanos & Gloria, 2007) suggests five factors contribute to college persistence among Latinx students: (1) psychological, social, and cultural strengths and supports, (2) degree to which the student struggles with cultural congruence, (3) level of acculturative stress, (4) sense of belonging, and (5) self-efficacy. Although the evidence base is strong for the 10 areas of institutional change described earlier (Santiago, Taylor & Calderon, 2015), only the approaches that address or are adapted to address the factors that influence persistence of Hispanic students, like those in the PSC Model, are likely to succeed. Unfortunately, most approaches are not tailored to Hispanic students, in part because efforts to improve STEM education, build capacity, and implement institutional change are usually dominated by administrators, staff, and faculty, with little input from students and advocates. This limitation was demonstrated by the exclusion of students and other stakeholders from several recent conferences on issues affecting HSIs as well as most of the conferences funded under Dear Colleague Letter NSF 17-092. Including student perspectives is essential if we want them to be participants in the process of identifying and addressing challenges in STEM education rather than being merely recipients or products of the changes other stakeholders implement. Thus, the third objective was to solicit Hispanic STEM student and alumni perspectives on barriers to success in STEM and psycho-sociocultural tailoring of institutional changes to meet student needs and improve STEM education at HSIs.

Finally, conferences are limited as a means of gathering representative feedback because they tend to over-represent administrators and student support staff, and they attract hyper-engaged participants who are already invested in the specific approaches they helped their institutions adopt. The organizing committee elected to address this challenge in two ways. A broader cross-section of stakeholders that included STEM faculty, representatives of HSI and advocacy organizations, and Hispanic students/alumni from STEM programs at two- and four-year institutions were invited to the conference. The expectation was that these stakeholders would challenge common assumptions of administrators and staff who typically attend these conferences, and, in so doing, contribute to identification of barriers and challenges that other stakeholders miss. The second means was a sequential, exploratory, mixed-methods study planned and executed by WTAMU personnel. Information was gathered in focus groups at the conference. Semi-structured interviews were completed following the conference to expand the data set and ensure representation of all stakeholder groups. The data from these activities was analyzed and two follow-on surveys were developed based on the findings. One survey targeted input from faculty, staff, and administrators at HSIs. The other sought to gather information from students attending HSIs. The surveys were distributed to and through stakeholders at HSIs in a seven-state region to capture a broad cross-section of the needs, challenges, and priorities that exist at these institutions. The findings from the survey distributed to faculty, staff, and administrators are presented in this report. These results have many possible applications, but it is hoped that they will contribute to an improved understanding of HSIs and institutional barriers to/opportunities for improving Hispanic student recruitment, retention, and advancement at Hispanic-Serving Institutions.

Hispanic Demographics in the US and in Higher Education

While the body of this report will use a set of terms as synonyms in place of sole reliance on the term Hispanic, discussion in this section will utilize the term Hispanic as it is the word employed by the US Census Bureau in their data gathering and reporting.

In the United States.

The United States Census Bureau (2012) reported that in 2010 there were 50.5 million Hispanics in the United States, who accounted for 16% of the overall population. In August of 2012, the Census Bureau announced that Hispanics had become the "nation's largest ethnic or racial minority" during the 2011 calendar year (US Census Bureau, 2012), reaching 16.7% of the total population. This growth was expected to continue and researchers project that by 2060 Hispanics will make up 30% of the US population, having increased from 55 to 119 million persons (Colby & Ortman, 2015), reaching minority majority status along the way (U.S Census Bureau, 2016). Texas is one of the states with the highest number of Hispanic residents (Flores & Park, 2015). Some reports predict that Hispanics will become a minority-majority group in Texas by 2022 (Valencia, 2017) as they represented 39.6% of the State's population in 2018 (U.S. Census Bureau, Quick Facts, 2018) and 52.4% of the public-school student population in the 2017-2018 academic year (Nagy, Whallun & Kallus, 2018). The expanding number of Hispanics in the population of the United States is resulting in a similar expansion in counts among students in higher education.

In higher education.

a. Enrollment.

The National Center for Education Statistics reported that "from fall 1976 to fall 2015, the percentage of Hispanic students [in college] rose from 4 percent to 17 percent of all U.S. residents enrolled in degree-granting postsecondary institutions" (n.d.). By 2016, the number of undergraduate students was 16.9 million, with Hispanics making up 3.2 million (NCES, n.d.) or 18.9% of enrollees. Many of these students attend HSIs. HACU reported that 66% of all persons identifying as Hispanic who attend institutions of higher education are enrolled in Hispanic-Serving Institutions, a total of 2,066,468 students in 2017-2018.

b. Graduation.

As the number of Hispanic students in higher education has increased, so has their share of all degrees earned. The number of associate degrees "earned by Hispanic students increased by 10 percentage points (from 10 to 20 percent) between 2000–01 and 2015–16" (NCES, n.d.). The count of bachelor's degrees earned has also doubled, increasing "by 6 percentage points (from 6 to 13 percent) between 2000–01 and 2015–16" (NCES, n.d.). However, these increases occurred during periods in which the participation rates of Hispanic students more than doubled which represents a slight regression in graduation rates (NCES, n.d.).

c. STEM degrees.

Citing data from the National Center for Science and Engineering Statistics, Linley and George-Jackson note that in "the STEM fields, three racial and ethnic groups are underrepresented: African Americans, Native Americans, and Latinos" (2013). In 2014 NSF stated, "Blacks, Hispanics, and American Indians/Alaska Natives remain underrepresented in [science and engineering] bachelor's degrees compared to their shares of the population." NSF's 2018 Science and Engineering Labor Force report states "Overall, Hispanics accounted for 6% of employment in S&E [science and engineering] occupations, which is lower than their share of the U.S. population age 21 and older (15%)." This circumstance led Sharkawy (2015) to characterize the limited presence of degreed Hispanics and members of other minority groups in the STEM workforce as "one of the most challenging problems for science education researchers and policymakers."

Importance to Higher Education

Employment opportunities in science, technology, engineering, and mathematics are growing rapidly across the United States (Collins, 2018). Added to that, NSF (2018) noted that the "number of non-STEM jobs requiring STEM skills is now on par with the number of STEM jobs." These factors make attracting students to STEM study and producing workers with STEM skills a national concern (NSF, 2018). As Hispanics make up an increasing percentage of the US population and, therefore, the available workforce, the underrepresentation of Hispanics in STEM studies (Bayer Corporation, 2012; Linley & George-Jackson, 2013) and in STEM

professions (Graf, Fry & Funk, 2018) is a pressing concern. In fact, Arellano, Jaime-Acuna, Graeve, and Madsen (2018) characterized the situation in engineering fields as "dismal." Thus, understanding what is being done for Hispanic students, in general and in respect to STEM study, at the type of institutions they are most likely to attend, Hispanic-Serving Institutions, is important.

In the following commentaries, perspectives of the need for the information in this report are communicated. Each of the topics discussed in the commentaries was included in the survey of the faculty, staff, and administrators at HSIs. Dr. Robledo and Dr. Kitch of Angelo State University introduce the need for institutions of higher education to take a holistic approach to their students that considers the individual and is culturally responsive thereby adapting the institution to fit the needs of students. Audrey Meador of West Texas A&M University discusses the need for increased participation by Hispanics in higher education and briefly notes the potential economic benefit participation can provide. Dr. Claire Sahlin of Texas Woman's University argues for the necessity of inclusive cultural environments in higher education and especially at HSIs. Dr. George Pacheco, Jr. of West Texas A&M University discusses demographic changes in higher education that include increasing numbers of first-generation college students, many of whom are Hispanic. Dr. Pacheco presents a concise argument regarding these students as a critical audience in and important concern for higher education in general and at HSIs. Dr. Elsa Diego-Medrano, also of WTAMU, notes that change must begat change. That is, the increased presence of Hispanics in the student population, especially as reflected at HSIs, should precipitate a change in consciousness among the college and university personnel. When serving a student population with diverse backgrounds and different expectations, it is necessary to adapt old patterns to arrive at appropriate and responsive practices. Dr. Elizabeth Palacios of Baylor University uses her personal history and current research to poignantly note the need for inclusive, responsive and affirming support for Latinas. Dr. Fred Fuentes of Texas A&M University-Commerce discusses the need for and a successful approach to supporting Hispanic males studying at college. Finally, Dr. Lee Clapp of Texas A&M University – Kingsville presents the need for Hispanics and other minorities in the engineering field as a specific example of the broader need for them in the US science, technology, engineering, and mathematics workforce.

Introduction to the commentaries.

Andrea Robledo, PhD
Director of STEM HSI Success Programs, Angelo State University
William Kitch, PhD
Professor, Chair of the Department of Engineering, Angelo State University

The fall term was in full swing and students across campus were meeting with their academic advisors to plan the upcoming spring and summer terms. In addition to the hope and optimism that comes from looking forward to the next semester, students also faced the quickly approaching deadline for dropping classes. Javier and Antonio scheduled their advising appointments back-to-back. They had spent their first semester bonding over engineering projects and late-night study sessions for Calculus. Together they had concluded that engineering was not for them. They found easy success in high school. However, college had not been as trouble free.

This scenario is all too common when it comes to Latinx students in general and for those pursuing STEM degrees. As high school graduation celebrations and college send-off parties fade, they find themselves feeling left out in STEM college classrooms across the country. They can quickly pursue other majors without realizing the tremendous impact this simple decision might have on their futures. According to Georgetown University Center on Education and the Workforce, Latinx individuals have some of the lowest earnings nationwide because fewer of them graduate from college. Considering that by 2020, 65 percent of jobs will require postsecondary education (Carnevale & Fasules, 2017), improving college completion for Latinx students is a pressing concern.

It is widely recognized that attaining a college degree comes with a wealth of advantages. For example, earning a bachelor's degree is associated with substantial general and fiscal benefits. Research shows that individuals with higher levels of education fair better than persons without college degrees in many circumstances (Yakovlev & Leguizamon, 2012), like mental and physical health, increases in adult fluid intelligence, decreased likelihood to engage in crime, and, when controlling for other variables, education also has a strong correlation with overall happiness on measures of subjective well-being (Amin, Flores, Flores-Lagunes, & Parisian, 2016; Clouston et al., 2012; Schafer, Wilkinson, & Ferraro, 2013; Yakovlev & Leguizamon, 2012). According to the US Social Security Administration (2015), men and women who earn a bachelor's degree can expect to make $450,000 more than a high school graduate over the span of a lifetime. In addition, students can pursue majors, such as many in the STEM field (Graf, Fry & Funk, 2018), that will make them high wage earners.

In their report entitled, *Five Rules of the College and Career Game*, the Georgetown University Center on Education and the Workforce emphasizes five important considerations when it comes to education and career success. They point out that while earning a college degree is important, the type of degree students pursue can impact future earning potential. Those pursuing bachelor's degrees in architecture and engineering, on average, make $39,000 more than those pursuing

bachelor's degrees in education. Over the course of one's lifetime that amounts to $3.4 million. Even students who earn an associate degree in STEM earn about $60,000 a year- this is more than others who earn a bachelor's degree in liberal arts. In essence, students have the potential to earn more money with fewer years of college if they spend those years studying STEM majors. The fact is that, "Workers with a bachelor's degree but without advanced degrees who major in architecture and engineering; and computers, statistics, and mathematics earn more at age 25 and continue to earn more than all other majors through age 59" (Carenvale & Cheah, 2018).

What seemed like a simple decision for college freshmen like Javier and Antonio had the potential for significant impact on their future. When they told their academic advisor that they wanted to change their majors, she took the type of action advocated for in the commentaries that follow. She persuaded them to consider the implications. Their advisor asked the two to sit down with other Latinx students who were further along in their degree programs. The students talked about the difficulty of the courses and the constant struggle to study, learn and apply the concepts from math and physics in their engineering courses. They shared study tips and tricks and discussed the importance of time management. At the end of their *charla* (chat), Javier and Antonio collectively concluded that hard work now would pay off in the end. Seeing that other Latinx students were succeeding, they chose to remain in college and in engineering.

We all have a role to play in improving Latinx success.

Family support can encourage students to pursue degrees, to do the hard work of persisting when classes are difficult, and to celebrate all their achievements big and small. But college and university professors must create welcoming classrooms and relevant approaches to learning that engage all the students in their classes as described by Dr. Diego-Medrano. The university must commit to serving all the students that they enroll so that no student is without the resources and support they need to find success in their major. Communities must hold colleges accountable for producing a 21st century workforce that is equipped with the knowledge, skills, and abilities necessary to provide for their families. Ultimately, we all lose if we only tell students to go to college but fail to direct them towards pathways that lead to fulfillment and potential for economic success.

Institutional change will be necessary.

For decades colleges and universities have employed a deficit model approach with Latinx students. This deficit-remediation model focuses on changing students to meet institutional expectations. It has proven to be ineffective in closing gaps of Latinx student success in STEM (Castaneda & Mejia, 2018). To improve success of Latinx students, universities and faculty need to move the focus from changing their Latinx students to changing their institutions. To do this faculty need to invest in a deep understanding of their Latinx students' culture and the variety of skills and knowledge they bring to the STEM classroom (Wilson-Lopez et al., 2016). With this focus, institutions can develop culturally responsive programs that will truly serve the needs of their Latinx students like the programming at Texas A&M University – Commerce Dr. Fuentes describes. Many colleges and universities believe they are being responsive to the needs of all their students; however, data show a significant and persistent gap between the way Latinx

students and their Anglo counterparts evaluate the cultural climate on campuses (Ancis, Sedlacek, & Mohr, 2000). Data recently collected (Preuss et al, 2020) show similar gaps in cultural understanding, even at Hispanic Serving Institutions (HSIs) in New Mexico and Texas.

Javier and Antonio had the support of their families. They had demonstrated academic success in high school. They encountered a caring, well-informed, proactive advisor who helped them consider the short- and long-term impacts of their proposed course of action. Yet, the material in this report demonstrates that there are many gaps and shortcomings at HSIs in the south-central United States. As Dr. Spaulding noted in the foreword, "It is clear that we have work to do in order to better serve Hispanic students, even at Hispanic-Serving Institutions." The commentaries that follow shed light on areas in which this is important and suggest some means of pursuing the goal.

Need to increase Hispanic participation in higher education.

Audrey Meador, M.S.
Instructor of Mathematics, West Texas A&M University

There is a need to increase Hispanic participation in higher education. There is a large number of Hispanic students in the US educational system and this population is one of the fastest growing in the country, especially in rural regions (Lichter & Johnson, 2007). Yet, with the exception of Puerto Rico, the number of Hispanics graduating from institutions of higher education is not proportionate with the number of Hispanic students being educated in primary, middle, or high schools (Fry & Taylor, 2013). For example, 52.4% of the students in the Texas public schools were Hispanic in 2017-2018 (Nagy, Whallun & Kallus, 2018) but 32.5% of the students graduating from four-year institutions of higher education in Texas in 2018 were Hispanic (Paredes, 2019). This is both an educational (Sharkawy, 2015) and economic concern for our society. As Baum and Flores (2011) stated "the sharp rise in demand for skilled labor over the past few decades has made it more urgent than ever to provide postsecondary education for all" (p. 171).

Efforts to increase Hispanic student participation can focus on academic or non-academic supports that contribute to students' recruitment and their persistence towards a degree. Research regarding academic support for the recruitment of Hispanic students to higher education has explored various systems such as access to early-entry programs like Upward Bound (Cowan-Pitre & Pitre, 2009), scholarship opportunities (Baum & Flores, 2011), learning to navigate the post-secondary educational landscape (Garcia, 2010), and academic preparation in regards to subject matter (Baum & Flores, 2011). Non-academic support structures specific to Hispanic students can draw on cultural values inherent within the theoretical framework of collectivism. For example, Nora and Crisp (2012) advocate for consideration of patterns within Hispanic families and "factors specific to Latinas." While much of the research touts the benefits of various initiatives and the impact of certain factors (Castellanos & Gloria, 2007; Santiago, Taylor, & Calderón, 2015), much more research is warranted to pinpoint the exact enterprises which will result in the greatest success.

Increasing Hispanic students' access to higher education should be the goal of any institution of higher education. The opportunities resulting from a young adult obtaining a bachelor's degree increase ability to achieve economic stability and self-sufficiency (Danziger & Ratner, 2010). Given familism in Hispanic culture, increasing the economic power of the individual has the potential to increase that of a broader family unit as well. For these reasons and many others, it is necessary that extensive, empirical research be conducted to increase effectiveness of practices and programs for the growing number of Hispanics participating in post-secondary education. Understanding the characteristics, staffing, and programming at HSIs is a significant contribution toward this goal.

Developing Cultures of Inclusion and Belonging at HSIs.

Claire L. Sahlin, PhD

Associate Dean of the College of Arts and Sciences and Professor of Multicultural, Women's, and Gender Studies at Texas Woman's University

HSIs contribute greatly to the educational attainment of Latinx postsecondary students in the U.S. Approximately 40% of Latinx students graduating with baccalaureate degrees are from HSIs, and 54% of those graduates receive degrees in STEM fields (Núñez, 2017). Furthermore, as of 2016, over 60% of Latinx students were enrolled in HSIs (Garcia, 2018). Yet, as indicated by the research described in this report, many Latinx faculty, staff, and administrators do not believe that institutions of higher education adequately understand Latinx cultures, experiences, and values.

HSIs, like other colleges and universities, appear to have operated too frequently with a "deficit-remediation" model of higher education. Rather than building on the strengths and cultural values of diverse students, postsecondary classroom pedagogies, curricula, and educational programming may too often emphasize skills that students lack and blame the students for academic difficulties. In addition, instead of giving prominence to cultural diversity on campus and understanding it as a valuable resource for students' empowerment, colleges and universities, including HSIs, may communicate implicit messages about the need for underrepresented minority students to forgo their experiences and conform to dominant cultural values. As Garcia and Okhidoi (2015) observed, "despite demographic changes in the student population, the organizational structures of these institutions [HSIs] are largely unchanged, making it difficult to truly 'serve' Latina/o students who have distinct needs based on a history of discrimination in the educational system."

One of the implications of the survey findings discussed in this report is that faculty, staff, and administrators at HSIs need to ask serious questions about what it truly means to 'serve' Latinx students, as both Garcia and Nunez have urged (Garcia, 2017; Núñez, 2017). Retention rates, graduation rates, enrollment in post-baccalaureate degrees, and post-graduation employment of Latinx students—while significant—should not be the only criteria for measuring how well an institution serves its Latinx students (Garcia, 2017; Garcia, 2018). Instead, service to Latinx students at HSIs should also be measured by how well the needs of Latinx students are addressed

as well as by "social factors like a positive racial campus climate, community engagement, and support programs to help students succeed" (Núñez, 2017).

Inclusive institutional climates that serve Latinx students are those where Latinx students feel connected with faculty and staff who may speak Spanish and who work with students to foster the development of a positive racial/ethnic identity. Supportive institutional cultures also embrace culturally relevant pedagogies and curricula throughout the university, including STEM fields, while promoting student participation in ethnic studies and other similar programs (Pappamihiel & Moreno, 2011; Garcia, 2017; Garcia & Okhidoi, 2015). "Decolonized HSIs," according to Garcia (2018), "should work toward the advancement of knowledge [in all fields] related to understanding the racial and cultural history, values, languages, epistemologies, and methodologies of people with indigenous roots in the colonized Americas." Furthermore, university environments that serve Latinx students also seek to remove obstacles to students' success and educational attainment while providing culturally relevant student support services and specialized mentoring and tutoring programs (Garcia, 2017).

In order to foster inclusive campus climates at HSIs, faculty, staff, and administrators require meaningful training programs to improve their knowledge and understanding of the cultural backgrounds of Latinx students. Such cultural competency training should recognize that Latinx people, who originate from Puerto Rican, Cuban, Mexican, Central or South American, and/or other Spanish cultural backgrounds, do not form a monolithic group, and thus, that it is not possible to generalize about the cultural backgrounds, values, and histories of all Latinx people. As Garcia and Okhidoi (2015) observe, Latinx people "are a heterogeneous group, varying by country of origin, socioeconomic background, generational status, language preference, immigration status, and academic preparation." Cultural competency training is needed and should proceed from a place of cultural humility while seeking to advance understanding of the effects of colonization and discrimination on Latinx people as well as the histories of their exclusion from educational systems in the U.S.

HSIs need to enact transformative cultures of inclusion and belonging for Latinx students that affirm their positive presence on college campuses, draw upon their deep traditions and values, and respond in supportive ways to their unique challenges as members of historically underrepresented minority groups in the U.S. (Pappamihiel & Moreno, 2011). Universities that truly serve Latinx students must intentionally create antiracist environments that affirm their dignity and empower them. Creating campus cultures of inclusion not only contributes positively to student persistence and graduation rates, it but is the morally right course of action (Garcia & Ramirez, 2018).

First-generation college students.

George Pacheco Jr., PhD
Director of Experiential Learning and C2C, West Texas A&M University

The face of higher education in the United States is changing. Many of today's students are graduating high school with multiple hours of college credit, Associate degrees, working full-time jobs and some even have families. The cultural identity of students entering higher education is also changing.

> According to U.S. Census Bureau, we are now a nation with increased multicultural complexities and nuances—of the nation's approximately 307 million people, 65% are Whites/non-Hispanics, 16% are Latinos/Hispanics, 13% are African Americans, 1% reported as American Indians/Alaskan Natives, and 0.2% identified themselves as Native Hawaiians and Pacific Islanders. Note that 1.7% of the population chose to identify themselves as two or more races (Ting-Toomey & Chung, 2012, p. 7).

Along with these demographic shifts, the number of first-generation college students is rising. First-generation college students (FGS) are students whose parents did not complete a degree from a college or university. The FGS population has shown steady growth for over two decades. University administrators must recognize the complexities of this new student body. Today's students come from a variety of ages, cultural, ethnic, locale, and socioeconomic backgrounds. The diverse nature of this 'new student' is pushing universities to be proactive in the ways in which they engage students. These students come into higher education settings with not only a different set of goals and perspectives, but often have different family responsibilities that can impact their pursuit of education. The result is "first-generation college students enter academic settings with less knowledge about what to expect and are often confronted by assumptions that are at odds with familial expectations" (Lowery-Hart & Pacheco, 2011, p. 56).

In 2016, the Hispanic population of the United States reached fifty-eight million, growing from 13% to 18%, making them one of the fastest growing populations in the country (Flores, 2017) and many college students in this population are FGS. Demographic projections indicate that by 2060 Hispanics will make up 31% of the U.S. population while Whites will compromise 43% (Lopez, 2009). As the Hispanic population has continued to expand, research indicates that they have made progress in some areas of education. For instance, the enrollment of Hispanics in K-12 has grown from 19% to 24% (Santiago, Calderon, & Taylor, 2015). High school completion rates have increased from 57% to 65% while the high school dropout rate has been cut in half to 13% (Santiago, Taylor, & Calderon, 2015). "While we have experienced an increase in educational attainment, the growth in higher education completion rates has not kept up with the growth of the Hispanic population, which can have a negative effect on the future of the community as well as the future of our nation" (Garza, Pacheco, Gallardo, Castillo, & Henderson, 2019, p. 2). Educational attainment is vital to the success of any community as well as the success of the United States; furthermore, an educated Latino community equates to greater economic opportunities for them and the greater society (Nora & Crisp, 2009).

There is ample data in this report to suggest that Latino and FGS educational attainment merits further study. While the changes educational institutions are enacting may be slow, they are significant and the need for them has been consistent over the last two decades. As colleges and universities face pressure to expand enrollments and provide access to diverse students, they find it difficult to recruit and retain FGS (Crissman-Ishler, 2005). First-generation college students are also significantly less likely to graduate due to lack of family support, financial strains, poor academic preparation, and other barriers (Brooks-Terry, 1988; Orbe, 2004, 2008; Engle, Bermeo, & O'Brien, 2006, Lowery-Hart & Pacheco, 2011).

Many institutions use support programs to improve FGS academic success. Unfortunately, these programs often isolate FGS, creating a protective group that does not fully integrate into campus culture. Programs aiding FGS are often unpublicized or viewed as inaccessible by students.

Many students also argue that it is difficult to "fit in" because the programs create a separation between FGS and non-FGS (Wilson, 2000). The ostensible failure to "fit in" results in some students developing an incapacity for positive relationships with the college and for peer friendships. For FGS, the give-and-take nature of their relationship struggles emerges from their desire to maintain cultural identity while navigating the college experience. These students can feel torn by who they want to become and who their familial connections expect them to be. This duality is an imposed reality many students face, yet institutions often do not recognize this. "Institutions of higher education face an important challenge. They must admit that their relationships with FGS are troubled, and then they must honestly and heartily attempt to develop and maintain such relationships. It will not be an easy process, but it is a necessary one" (Lowery-Hart & Pacheco, 2011, p. 66). The findings described in this report can help colleges develop more effective relationships with FGS and Hispanic students, many of whom will be FGS. The data should guide the ways in which faculty and staff seek to engage and understand this population of students, not because the students are "different", but because they come to us with a different set of lived experiences that shape the way they interact with us. If we choose not to meet them where they are, then we are choosing not to help them acclimate to our institutions, and, as a result, limiting their access to a valuable resource.

Need for faculty engagement with minority students.

Elsa Diego-Medrano, PhD
Assistant Professor of Education, West Texas A&M University

There are many students from diverse backgrounds attending two-year and four-year institutions of higher education and as a result, institutions should seek to meet the needs of a broad range of students. Institutions and the faculty have to undergo a paradigm shift and learn how to engage diverse students if we are going to ensure their success. As a Latina first-generation student myself, I found navigating the intricacies of the culture of higher education very confusing. I did not have a family member, a friend, or even a mentor that I could turn to for advice. That is what many students are seeking - someone to turn to for advice, guidance, and/or mentoring – and is

something of particular importance for first-generation students. It can be accomplished by focusing on building relationships between faculty and students.

The students I teach find themselves in the same circumstances that I was in when I first attended college. Many of them are first generation and nontraditional students or traditional students that are pursuing a new path in their life. That path may be quite unfamiliar to them, but they all have the same goal in mind, education as the key to success and a better life. Assistance from others is essential for success in an environment that is unfamiliar and that has its own culture. As a faculty member, I have encountered many students seeking someone they can relate to who can mentor them and/or provide them guidance when they experience cultural dissonance in college or uncertainty regarding decision making or processes.

The students I have in my courses may be the first in their family to attend a university or they may not have been in school for a number of years. As a result, many of my students tend to feel lost. A sense of confusion and isolation can weigh heavily on them and this, eventually, might be the deciding factor in whether they will drop out or stay enrolled. One factor that impacts student retention, according to research, is forming relationships. Relationships make students feel connected and when students feel connected, they are more likely to succeed and not drop out. Faculty are uniquely positioned to meet this student need for relationships.

The traditional role of faculty has been to deliver content for students to ingest. This has been the accepted practice, but it was very limited in respect to relationship building. Although this pattern was the norm in the past, it is not working for the new generation of students who are entering institutions of higher education. This new generation of students are seeking guidance and a feeling of connectedness. If we do not meet the needs of this new generation of students by building connections through relationships, then we will not be able to provide them an education as we are unlikely to retain them in college.

As a faculty member, I understand the importance of building relationships with my students. I know that once that relationship is established, my students will be more receptive to the lessons I teach, become more active participants in class, and be more likely to attend class and related activities. This list of effects is a recipe for student success. It is not uncommon for my students to stay after class just to talk, ask for advice, or at times seek me out due to a crisis they are dealing with which they feel I can help resolve. I see these interactions as opportunities to provide students with the tools they need to become successful especially when they do not know who on campus to turn to for help in their situation. For example, I have had students who had academic accommodations in place in high school but did not know those accommodations would be accepted and applied at the university. In our after-class chats, I was able to unearth why the student was having trouble and provide direction to the Office of Student Disabilities which arranges academic accommodations. Another relevant example is students who were not aware of the resources put in place to ensure their success such as tutoring labs, student success centers, and student success coaches. Because I have established relationships with my students, many feel comfortable enough to come to me when they experience a ‘bump’ in their education.

This usually involves conversation and results in me providing information for the student about a resource they did not know existed on campus or, my simply giving life advice.

At institutions of higher education, we cannot continue to do business as usual. Our thoughts about and methods for engaging with students have to change. If we want students to become successful, then we must be cognizant of our actions and understand that the students we now serve are different. Building relationships can be the key to ensuring the success of our increasingly diverse student population.

Supporting Latina Students in Higher Education.

Elizabeth Palacios, PhD

Dean for Student Development and Special Assistant to the President on Diversity, Baylor University

Looking back on my undergraduate days, I have come to realize my journey was very different than many of my White classmates. I attended a Predominantly White Institution (PWI) where I was the "other" that some of my professors and classmates couldn't quite wrap their heads around. Some of their questions and comments showed how little they understood about me. I was asked "Which fields did you pick cotton from?" and told "You speak really good English for being Mexican." There were many stereotypes that I encountered at college that had not been part of my experience growing up in San Antonio, Texas. There, Latino/as were represented in all fields and at all levels of power and influence. I didn't know that I was different until I was no longer the majority. I became a minority on my college campus, and I was also a first-generation college student.

I have now been a part of higher education for over 38 years, specifically at a PWI that is now an emerging Hispanic-Serving Institution. The excitement, and dread, has risen now that my colleagues and I are focusing on the needs of our Latinx students. We recently conducted surveys, listening sessions, and programs to hear from our Latinx students-- their hopes, dreams, and challenges. I was dumbfounded. Many of the same concerns and challenges that I had experienced years ago, were still evident in the experiences of our students today. This was disheartening.

We learned that our Latinas are most vulnerable, especially those coming from traditional homes. Hispanic culture teaches us to respect authority, be humble, put others first, to not argue or cause conflict, and so much more that we value in engaging with our elders and families (Calzada, Fernandez, & Cortes, 2010; Calzada, Tamis-LeMonda, & Yoshikawa, 2013; Ramirez-Esparza, Gosling, & Pennebaker, 2008). However, these characteristics do not work when navigating higher education, especially in systems made for a different population and gender than Latinas (Sharkawy, 2015). In my own journey to becoming a professor and dean, I have had to relearn how I engage with others while keeping true to my own cultural values and traditions. I constantly work with our Latina leaders instilling the concept of having the best of both worlds, especially when they have chosen male-dominated majors such as STEM (Baird, 2018). This

may include speaking up or speaking out. Using their voice, experiences, and expertise with others, regardless of their age, gender, ethnicity, or position. Family expectations, especially for Latinas, can often be at odds with academic goals, student involvement, research, and/or pursuing graduate school. I have many students whose parents expect them to return home and get married, work at their family business, or simply take care of younger siblings. For Latinas, the pull between family expectations and their educational goals can become stressful, painful, and isolating particularly when their family thinks of higher education as a luxury rather than a necessity.

Although some of our traditions and cultural values may appear to impede Latina progress in both education and academic careers, there are many strengths that Latinas bring. Hispanic cultural values and enculturation enhance Latinas' abilities to collaborate, network, build communities, teams, and systems (Aguilar, 2019; Campos & Kim, 2017; Ruiz, Sbarra, & Steffen, 2018). The intrinsic value of bringing people together to build something bigger, stronger, and more inclusive has been an asset to companies for many years. Now, higher education is learning the value of investing in and supporting Latina leaders, scholars, and administrators who do this. Unfortunately, this concept is not the norm but the exception (Preuss & Sosa, 2018). While many institutions, especially HSIs are trying to figure out what to do with the influx of Latinx students, many Latinas are already building their own support systems, e.g. social media for Latinas in Doctoral Programs; groups for Latina undergraduate students; and other grassroots efforts.

Having reviewed the data about our Latina students not faring as well as their male and White counterparts in terms of intentional support, recognition, mentoring, and academic research opportunities, it is imperative that we rectify this by investing in our Latina students who can fill many roles, doctors, lawyers, professors, administrators, CEOs, and much more (Ortega-Liston & Rodriguez Soto, 2014; Torres-Capeles, 2012). We should encourage their cultural assets, give them tools to navigate higher education, and affirm who they are and what they can become. This will require addressing circumstances that make their pursuit of STEM majors, as well as working in the STEM careers after graduation, more challenging as there is research that indicates that even when Latinas graduate with STEM degrees many do not pursue or stay long in STEM careers (Graf, Fry & Funk, 2018). We must begin adjusting programming at HSI colleges and universities to produce strong, affirmed, educated, confident Latina leaders equipped to pursue careers in whatever field interests them.

Supporting Hispanic Males in Higher Education.

Fred Fuentes, PhD

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During the 2016 university academic year, there were more than 470 Hispanic Serving Institutions in the United States, representing 14% of Higher Education Institutions around the nation. While representing less than 15% of the total count of colleges and universities, these 472

institutions educated the majority of Latino undergraduates, enrolling 64% of all Latina/os pursuing associate and bachelor's degrees. That most Latino college students attend HSIs represents an opportunity and a challenge. They are heavily concentrated in HSIs presenting undiffused opportunity to address their interests and needs by facilitating appropriate programming at and through these institutions. To accomplish this, there will also be the challenge of facilitating appropriate and applicable institutional change to meet the needs of this large and expanding group of students.

The Pew Research Center noted that in 2014 eight states had Latino populations of at least one million, Arizona, California, Colorado, Florida, Illinois, New Jersey, New York, and Texas. The Hispanic Association of Colleges and Universities indicated that the growth of the Hispanic population from 2000 to 2010 has been more rapid in the South and Midwest than elsewhere in the United States. The state of Texas, which is part of a region in which Latinos have lived for centuries, is on the forefront of this population growth. In 2015, 39% of the residents of Texas were Latino (US Census Bureau, American Community Survey, 2011-2015). During the same period, the K-12 population in the state reached 49% Hispanic, just on the cusp of becoming a minority-majority school system. By 2018, that threshold had been crossed permanently shifting the balance in the K-12 student population, and the future pool of college students, toward Hispanics (Nagy, Whallun & Kallus, 2018).

There are, though, multiple challenges for higher education associated with this shift in demographics not the least of which is the retention and graduation rates of minority males. The 2018 Project Males report states, "A large gap exists among gender groups of Hispanics in both enrollment and graduation from Texas' colleges and universities" (Sáenz, Ryu, & Burmicky, 2018). The report notes the tremendous gap in outcomes for minority males and the immediate need to increase services that strategically empower men of color in higher educational settings. The 2019 Excelencia in Education Latino College Completion Report on Texas stated that in order to reach the degree attainment goals set by the state, there must be significant progress in closing the equity gap in college completion as well as "scaling up" programs and initiatives that work for Latino students.

Texas A&M University-Commerce (TAMUC) is a part of the Texas A&M University System (TAMUS) and an emerging Hispanic-Serving Institution. It is already a regional leader in diversity initiatives. The minority student population at Commerce has grown 311% over the past 15 years. Despite the growth, our institution recognized that Latino students continued to experience lower levels of university completion than their peers. TAMUC is not unique in this regard (Lynch & Engle, 2010) but has taken some innovative approaches to address the concern. The Male Minorities Matter (M3) program was founded to address retention challenges for African-American and Hispanic males (TAMUC, n.d.). It is a learning community that focuses on relational support and leadership development by offering workshops and extensive peer and staff mentoring. Participants are either early career mentees or 'big brother' mentors (juniors and seniors). As they progress at the university, mentees have the opportunity to become mentors for first time freshmen as well as high school students. The program has two cohorts, one for African-Americans and one for Hispanics. The latter is called the Latino-American Mentorship

Program (LAMP). LAMP boasts the highest retention and graduation rates of all programs at our university, 92% of participants retained and 91% graduate. Students in the general population are retained at a rate of 64% and 49% of them graduate (TAMUC, 2017).

This model aids in creating a "pipeline" of mentors and direct, egalitarian access to undergraduate leaders who assist first time, first-generation male students succeed by empowering these young men of color to feel welcome in higher education and worthy of

seeking advanced degrees. As stated in the Project Males mission description, the model promotes "a college going culture from high school through college completion and encourages post graduate success." This is not, though, the case at all HSIs.

In this report, you will learn that approximately 33% of respondents from HSIs report their institution provides support for STEM students, yet around 15% reported providing "specific support" to Hispanic students studying STEM, with less than half of those providing support directly targeting Latinas in the STEM fields. These figures are far too low when one out of every two students that will be applying to Texas colleges in the near future will be Hispanic. There are many other indications in the data gathered for this report of gaps that exist at HSIs in respect to cultural competence, understanding the background of Hispanic students, and even representative staffing. These concerns direct attention to appropriate institutional change.

We all know that we are better servant leaders when we are informed about changes in demographics, in student success rates, and we keep staff and faculty well-informed. Yet as indicated in this report, only 31% of the HSI employees stated their institution used published research or institutional data when preparing programming for Hispanic students, less than 18% of the personnel responded that their HSI had STEM programs that would target students who are Latino, and very few HSIs are actively disseminating information about Hispanics students and Hispanic culture to their employees. Change is necessary if HSIs and their sister institutions are to facilitate success for Latinos and Latinas. HSIs receive each year, from all federal funding sources, 69 cents per student for every dollar going to other colleges and universities (HACU, 2017). This makes maximizing fiscal and staff resources critical to ensure student and program success. In TAMUC's case, it meant creative leveraging of resources and innovative patterns of implementation to create a sustainable and collaborative effort. Yet more can and should be done. The *Los Barrios* report reflects the importance of "scaling up" efforts in many ways at the local level including representative staffing. That will be particularly challenging, as the US Bureau of Labor Statistics 2016 report entitled "Labor Force Characteristics by Race and Ethnicity" indicated that less than 2% of university faculty are Latino males. With Texas and other parts of the United States reaching minority-majority status in the coming years, it is imperative that Hispanic student success in higher education increase, not only for the sake of equity but to maintain an educated workforce. Without dramatic improvements in success rates for Hispanic males, they will remain underrepresented among college-educated citizens and in many fields and industries, including among college faculty and staff, representing a substantial under-educated and under-utilized segment of US population.

The Need to Increase Hispanic Representation in Engineering.

Lee Clapp, PhD

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It is widely recognized that engineers are critical for U.S. technology development, innovation, manufacturing, and services, and are thus essential for U.S. economic strength (Congressional Research Service, 2017). Leading economists, however, have expressed concern about the ability of the U.S. to maintain its international competitiveness due to the country's weak efforts to develop a sustainable pipeline for science and engineering (S&E) human capital (Porter et al., 2016).

There were 6.9 million scientists and engineers employed in the U.S. in 2016, accounting for 4.9% of the total U.S. workforce (Congressional Research Service, 2017). Despite perceptions of a weak pipeline for a skilled S&E workforce, four engineering disciplines grew by 10% or more in the U.S. from 2010 to 2014: petroleum engineers (30%), mining and geological engineers (12%), biomedical engineers (10%), and industrial engineers (10%). While every engineering discipline added jobs, the most – in absolute numbers – were for mechanical engineers (21,500 new jobs). Overall, engineering jobs increased by 7% from 2010 to 2014 (Wright, 2014).

The Bureau of Labor Statistics (BLS) (2018) projects that employment of engineers will grow by 8.3% between 2016 and 2026, an addition of 139,300 new jobs. Accounting for labor force exits and transfers, BLS projects that 1.265 million new engineers will be needed. These projections note that several engineering specialties will grow even faster: petroleum engineers (15.1%), marine engineers (12.2%), civil engineers (10.6%), and industrial engineers (9.7%).

An important phenomenon driving the need for more engineers in the U.S. is the aging S&E workforce. The percentage of the S&E workforce over 51 years old increased from about 20% in 1993 to 33.4% in 2015 (National Science Board, 2018).

Hispanics in engineering.

The underrepresentation of minorities in S&E fields in the professional workforce remains one of the most challenging problems facing policymakers interested in the development of diverse human capital to maintain U.S. competitiveness in the global economy (Shakawy, 2015). In 2015, Hispanics and Latinos accounted for 6.0% of the U.S. S&E workforce, despite making up 14.9% of the U.S. residential population aged 21 or older (National Science Foundation, 2018). A slightly more recent study found that Hispanics and Latinos accounted for 7% of the United States' S&E workforce, despite representing 16% of the total U.S. workforce (Pew Research Center, 2019). The statistics are even worse for females: in 2015, Hispanic and Latina women made up 1.8% of the US S&E workforce, despite representing 7.5% of the US residential population aged 21 or older (National Science Foundation, 2018).

Participation of US Hispanics and Latinos in S&E higher education is only slightly greater than their participation in the S&E workforce. The 2016 census data showed that Hispanics and Latinos received only 9.8% of engineering baccalaureate degrees and just 4.9% of engineering doctoral degrees, despite representing 17.8% of the total U.S. population. Even more troubling, Hispanics and Latinos hold only about 3.6% of the faculty positions in engineering (Arellano et al., 2018). Although the percentage of engineering degrees earned by Hispanics and Latinos increased from 5.8% in 1995 to 9.6% in 2014 (National Science Foundation, 2017), this was still significantly lower than the corresponding percentage of the total population. Finally, Hispanic-Serving Institutions play an essential role in educating Hispanic engineers, granting about a third of all engineering bachelor's degrees earned by Hispanic students (Anderson et al., 2018).

Although the number of engineering degrees conferred on Hispanics annually has increased over the last decade, it has not closed the gap with the percentage of college-aged Hispanics within the US population, and it is not keeping pace with the projected need for S&E employees. Whereas educational policy experts once viewed this primarily as an equity and social justice issue, they now also see it as an issue of economic vitality and national security. If the US is to produce enough engineering graduates to meet the needs of an expanding S&E workforce, the number of Hispanic engineering graduates must increase (Anderson et al., 2018).

Definitions

Hispanic/Latinx/Mexican-American/Chicano

Given the aims of this report, the authors feel it essential to briefly discuss terminology. As the words and phrases one uses directly relate to and can even communicate a level of cultural competence, we believe we can show respect for the person groups referred to in this document by making careful choices about the words we employ. Many outside the Hispanic/ Latinx/ Mexican-American/ Chicano population do not know that various parties have preferences for or distaste in respect to each of the conventional labels just listed. Yet, "The diversity and historical/social context of Latinos in the United States greatly impacts how an individual Latino student may see himself or herself in the college environment...[and] nuances among cultures, historical issues within cultures, and conditions... may impact individual Latino students" (Torres, Howard-Hamilton, & Cooper, 2003, as cited in Batista et al., 2018, p.71). This adds complexity to the intention to be culturally responsive when communicating the research findings in this manuscript.

Martinez (2009) wrote about the struggle to define "Hispanic" or "Latinx," and noted the challenge extends to "Mexican-American," "Chicano," and "Tejano" (pp. 289-294). The first usage of the term "Hispanic" as an official label was in 1970 by the U.S. Census Bureau to refer to all peoples with Spanish-speaking or Latin-American heritage. Martinez states that some people accepted this term as a banner of commonality for all Spanish-speaking people to rally behind – a sign of unity and recognition. Others said that the U.S. government had overstepped, and they saw the term in light of the European conquest of the Americas. Some people took it as a prompt to develop their own unifying term – "Latino/a" – while others promoted the creation of terms that distinguish subcultures – "Chicano" and "Tejano." Martinez (2009) noted that there is still disagreement in the use of various terms on the basis of politics or ancestry, but there are also those who use the various terms interchangeably. A few scholars, like Marrun (2015),

introduce and use words and phrases in Spanish, like *mi gente* (my people) and *nuestra gente* (our people) in their work. The authors considered all these patterns and decided to employ several terms as synonyms. In the remainder of this document, Hispanic, Latino/a, Latinx, Latinx/a/os will be used interchangeably.

Higher Education and Hispanic-Serving Institutions

The U.S. Department of Education (US ED; ED) has a general definition for an institution of higher education (2005). It is an educational institution, in any State, that is legally authorized to offer a post-secondary education program and admit students with a certificate of graduation from a secondary school or its equivalent (there are also other provisions which are not relevant to this report). Nearly every college and university with which the public is familiar fits this definition. Within this broader group, there is the designation Hispanic-Serving Institution. The US ED description of these entities states that the organization must fit within the definition of an institution of higher education and that it have "an enrollment of undergraduate full-time equivalent students that is at least 25 percent Hispanic students" (U.S. Department of Education, n.d.).

The Hispanic Association of Colleges & Universities (HACU) maintains, on its website, a list of institutions of higher education that US ED has identified as Hispanic-Serving Institutions. The most recent listing (HACU, 2019), which is for the 2017-2018 school year, reports a total of 523 HSIs in the United States and its territories. At the time of this report California (n = 170), Texas (n = 93), Puerto Rico (63), New York (n = 34), Florida (n = 25), Illinois (n = 25), and New Mexico (n = 23) had the most HSIs (HACU, 2019) but twenty-five states remained without an HSI. While prevalent in some regions of the country, HSIs are only a small percentage of US colleges and universities, 12.2% of the total count of 4,298 institutions (Moody, 2019**)**.

Deficit Model and LatCrit Orientations

Much of the research completed regarding Hispanic students in higher education has focused on identifying what the students lack in preparation, cultural understanding, or social support. The intention in these efforts has been establishing means of improving the potential for Latinx/a/os success in higher education. This has involved a strong emphasis on student characteristics and patterns, commonalities in their backgrounds, or even misunderstandings they might hold about college with the assumption that there are a group of generalizable factors hindering Hispanic student success.

The notion of one or more deficits that cause minorities to need more assistance or to underperform in comparison to their White peers has existed in one form or another for decades (Bruton & Robles-Pina, 2009; Kirk & Goon, 1975). For example, a lack of appropriate cultural capital and support systems is an explanation offered for minorities having less than representative numbers in grade school gifted programs (Ford & Grantham, 2003) while simultaneously experiencing higher proportions of students in special education programs (Harry & Klingner, 2007). The same pattern of thought, when applied to Hispanics in higher education, postulates there are various characteristics Hispanics must develop and mechanisms they must

master in order to be successful (Hernandez & Lopez, 2004). Positioning the cause for student challenges with the individual has come to be known as the deficit-remediation model or just the deficit model. Researchers question whether this approach has produced substantial changes in success for Hispanic students (Castaneda & Mejia, 2018).

In spite of the longstanding nature of the deficit model, there is a push in higher education to shift from focusing on deficits to what has been labeled "dynamic thinking" (Ford & Grantham 2003). Latino Critical Theory, often shortened to LatCrit, takes this basic orientation. Latino Critical Theory is a sociological framework proposed to improve understanding of Hispanics and their interactions with and within American institutions. LatCrit seeks to shed light on how Latinos/as interact with and within numerous social structures including but not limited to higher education (Schwartz, Donovan, & Guido-DiBrito 2009; Villalpando, 2004) and government agencies (Gonzalez & Portillos, 2007; Iglesias, 1996). LatCrit goes beyond demographic categorization and considers background and traits like language, class, gender, nationality, ethnicity, and culture (Villalpando, 2004; Irizarry, & Raible, 2014; Solorzano & Bernal, 2001; Gonzalez & Morrison, 2016; Kiehne, 2016) and how these relate to each other in forming a person's identity. This has resulted in discussion of "Latinas/Latinos' multidimensional identities" (Bernal, 2002), how those identities are understood within the social structures in which the individuals operate, and the resulting psychosociocultural (Campos & Gloria, 2007) and relational impacts. The LatCrit literature contains considerations of the psychosociocultural dynamics for Hispanics in different educational contexts including grade school structures and programming (Zamora, Curtis & Lancaster 2017), the processes and patterns in high school (Giraldo-Garcia, Galletta & Bagaka, 2018; Irizarry & Raible, 2014; Stein, Wright, Gil, Miness & Ginanto 2018) and those in college environments (Batista, Collado, & Perez II, 2018; Macias, 2017; Reeder 2017; Shelton, 2018). The work in higher education even extends to consideration of the experiences of DACA students (Macias, 2017).

These brief descriptions were deemed necessary because the authors recognize that, at colleges and universities, there is often a "disconnection between [the] institutional diversity mission and the lived experiences of students on campus" (Chun & Evans, 2016, p. 9). The research described herein was undertaken to identify a broad spectrum of characteristics of Hispanic-Serving Institutions as a means to an end, facilitating improved service to their students. As Chun and Evans note, this requires reaching an understanding "within the context of an institution's educational mission, historical legacy, and other contextually driven environmental factors" (2016, p. 21) like "structural or compositional diversity of faculty, staff…psychological climate of attitudes and perceptions between and among racial/ethnic groups…[and] the structures, policies, and processes that pertain to diversity" (p. 63). Which meant that institutional patterns, commitments, and staffing as well as "curriculum, cocurricular activities, campus climate,…experiences within the academic department, and opportunities for…interactions among faculty and students" (p. 28) had to be addressed. The authors attempted to accomplish this without including a deficit-remediation model orientation and, while unearthing fodder for understanding the HSIs and their psychsociocultural context, maintaining a descriptive rather than analytical purpose.

Science, Technology, Engineering, and Mathematics (STEM)

The US Department of Education includes the following science and engineering fields in the category STEM: “astronomy, chemistry, physics, atmospheric sciences, earth sciences, ocean sciences, mathematics and statistics, computer sciences, agricultural sciences, biological sciences, psychology, social sciences, and engineering. At the doctoral level, the medical and health sciences are included under science and engineering because these…correspond to the doctor’s-research/scholarship degree level which are research-focused degrees” (National Science Board, 2018).

Definitions of Statistical Analyses Employed

The following means of statistical analysis were used with the survey data. Brief definitions of each are provided for readers who may not regularly interact with statistics.

Bonferroni correction.

The Bonferroni correction “adjusts probability (p) values because of the increased risk of a type I error, [rejection of a null hypothesis that is in fact true,] when making multiple statistical tests” (Armstrong, 2014). When completing multiple tests of hypotheses, the probability of having a false positive finding, a type one error, rises. The Bonferroni correction adjusts for this by testing each comparison while taking the number of comparisons made into account.

Chi-Square ($\chi 2$).

Chi-Square analysis is used to test relationships between variables that have no numeric meaning, like male and female, ethnicity, and professional area of responsibility. It assesses the extent to which observed values match the values expected theoretically. The assumption is there is no meaningful difference between the two categories of responses, for example between those from men and women. The Chi-Square test is used to assess whether this is, in fact, the case.

Effect size (see Phi Coefficient and Cramer’s V below).

An effect size is a measure of the magnitude of a phenomenon. “A small effect size is one in which there is a real effect -- i.e., something is really happening in the world -- but which you can only see through careful study. A 'large' effect size is an effect which is big enough, and/or consistent enough, that you may be able to see it 'with the naked eye'” (Statistics for Psychology, n.d.). A good example of the latter is observing that the average man is taller than the average woman. A weak effect size is usually considered to be anything up to 0.2, a moderate to moderately strong effect size is 0.2-0.3, and a strong to very strong effect size is up to 0.4, 0.4-0.5 is an “extremely good relationship or the two variables are measuring the same concept” (Laerd Statistics, 2017). Reporting this number is important as it is possible for there to be significant relationship between two variables but for the action being considered to have very little actual effect. A classic example is a medical study that looked at information from 22,000 patients and found that taking aspirin was significantly associated with a reduced number of

heart attacks however, the effect size calculation revealed that the actual impact of taking aspirin was “very small” (Sullivan & Feinn, 2012).

Fischer’s exact test.

Fisher's exact test “is a statistical test used to determine if there are nonrandom associations between two categorical variables” (Wolfram Math World, 2019). It is most frequently employed with two-by-two comparisons like comparing the yes and no responses from two categories of respondents.

Kruskal-Wallis *H* test.

A Kruskal Wallis test is used to check for relationships between two or more sets of ordered responses and measures variance between the groups. The assumption is that the sets of responses have sufficiently similar distributions for there to be no meaningful difference between them. The scores are represented as p values (p = .05 means the response pattern is likely to occur at random only 5% of the time). The lower the p value, the less likely the result is random. Kruskal Wallis tests do not, though, show causation, only the degree to which the difference in the distributions are likely to occur by chance.

Mann-Whitney *U* (MWU).

The Mann Whitney U test compares two response sets from groups using the median, for distributions that are similar, or the shape of the distribution, for instances where the patterns of the distributions are different. The test measures whether the two samples are equal by determining whether randomly selected values from one sample are likely to be different than

randomly selected values from the other sample. Differences in the sample are represented as p values (see definition below) which depict the likelihood that any difference between the samples occurred at random.

Mean Rank.

Mean ranks will be provided when comparisons are made between groups of values that were gathered using Likert scales. This method can determine if there is a difference between the average values in two sets of data points. Mean ranks represent the “average” value in the group when all the data points gathered for both groups have been combined, ordered from lowest to highest, assigned a numeric rank within that ordering, had the ranks separated back into the two groupings, and then had a numeric average (mean) calculated for each set of rankings.

p value.

A p value is a number between zero and one which indicates the probability of the calculated statistic being obtained assuming there is no relationship between two or more sets of values (e.g., survey responses). A Mann Whitney U with a p value of 0.02 indicates that the observed difference would occur 2% of the time if there is no true difference in the populations.

Pearson correlation coefficient (Pearson's r).

Pearson correlation coefficient, also known as Pearson's r, "is a measure of the strength of a linear association between two variables" (Laerd Statistics, 2017). Values range from -1 to 1 with the value 0 indicating no association between the two sets of variables.

Phi coefficient.

This statistic will be referred to as phi or a phi value in the report. Phi coefficients represent the level of correspondence between sets of binary variables like "Yes" and "No" or "Present" and "Not Present." They are used with Chi-Square analysis to demonstrate the effect size which is the magnitude of the difference between items being compared. In this report, the phi coefficient was used exclusively in the case of two-by-two comparisons. For example, the responses of men and women to a "Yes" or "No" question.

Cramer's V.

Like a phi value, Cramer's V calculates the strength of the association between variables, the effect size, but it is used when there are more than two things being considered (larger than a two-by-two matrix). An example from the data set used for this report is questions in which two or more types of respondents, males and females or faculty, staff, and administrators, could answer "Yes," "No," or "I don't know." Cramer's V is restricted to values between zero and one with figures further from zero indicating a stronger relationship.

Z score.

Z scores represent the relationship of a value to the numeric average score. It is expressed in standard deviations. A value of zero is exactly at the numeric average (mean) and the higher the score the more spread out the numbers in the set are and that diversity represents variance in the data.

Abbreviations and Demarcation

Some abbreviations are introduced in the text, like the use of US ED and ED for the United States Department of Education and NSF for the National Science Foundation. However, for the sake of clarity, a group of abbreviations that will be regularly used in the report are listed below. Community colleges will be referred as CCs, two-year, and 2YR schools while colleges and universities that offer four-year degrees, regardless of Carnegie classification, will be referred to using four-year and 4YR. A commonly understood abbreviation that is also employed is STEM for science, technology, engineering, and mathematics. The survey discussed in this report gathered responses from faculty, staff, and administrators at Hispanic-Serving Institutions plus advocates, although the responses of advocates were not employed in statistical analysis for this report about HSIs. The abbreviation FSA is occasionally employed for the phrase faculty, staff, and administrators. And, when applicable, the abbreviation IDK is used to designate "I don't know" response sets on the survey.

The text is also divided into sections. There are major divisions by primary topic and these are noted by primary headers and changes in the background. The intention is to allow readers who are seeking a specific topic or section to recognize when they have crossed from the consideration of one major topic into the portion of the report that addresses something else. Secondary and tertiary headings have been included to mark the discussion of specific subsets of ideas.

There are also introductory statements and summaries of findings at the beginning of each section of the report. Individuals who wish to form a general understanding of the findings and their context can rely on these while individuals interested in the details of analysis can read the subsequent material that provides those particulars. An overall summary of findings was also generated although it does not include as much detail as the summaries that begin each segment of the report.

Overview

Limitations and Delimitations

The reader should note several limitations that exist related to the research discussed in this report. These are:

- The research team was diverse in gender, ethnicity, race, and culture and paid particular attention to avoiding biases, still, the research process may have included unintended bias.
- Prior to the study, very little research had been completed regarding Hispanic-Serving Institutions. While the research team sought to operate based on relevant evidence and from applicable theory, there was not a generally accepted set of characteristics of HSIs to employ in the process. This made asking who, what, where, when, and how questions the focus of the investigation, an exploratory approach seeking to understand the setting, rather than why questions that would address reasons that established characteristics exist. It also made crafting a broad set of queries necessary as there was insufficient empirical evidence in many areas to formulate specific evidence-based hypotheses.
- The questions asked on the survey were developed by the project team using information from the literature, focus group and interview data, theory from several academic disciplines, and their personal experience. While the questions were read by representatives of the Texas Association of Chicanos in Higher Education to check for face validity, they cannot be considered to have been empirically established as comprising a valid and reliable instrument.
- Recruitment of participants was exclusively within a seven-state region in the south-central United States.
- The link to the survey was distributed to over 1,500 persons known to be associated with Hispanic-Serving Institutions in the seven-state region but there was no means of controlling to whom it was forwarded by these persons or to prevent an individual from completing the survey multiple times. However, it was possible to confirm, using IP

addresses, that most of the responses originated from servers associated with colleges and universities, all of which were HSIs, and that nearly all of the responses came from within the intended region of the United States.

- There was no means of seeing that every person employed by the 119 HSIs in the region had the opportunity to respond to the survey.
- All responses were the understandings and perspectives of the survey takers and could not be verified for accuracy.
- It is possible that informants with biases toward Hispanics, for or against, were motivated in their responses by personal feelings.
- The total number of persons employed in faculty, staff, and administrative roles at the HSIs in the seven-state region is unknown. This means that the exact level of confidence with which the survey results can be viewed is also unknown although the 403 complete responses fall within a 95% confidence level with a 5% margin of error for a total population from 450 to over 50,000 so it is reasonable to assume that the results can be treated with at least this level of confidence.
- For questions that asked respondents to "select all that apply" from a list of items, it is not possible to determine whether items that were not selected indicate the respondent meant they were not present or whether the respondent chose not to answer that part of the query. All of these answers were grouped as indicating the item was not present which has the potential to depress the actual the level of agreement.
- Review of the demographic data for the entire sample revealed that two persons selected the classification non-specified in respect to their gender. They were excluded from all statistical analysis based on gender as a group of two would not support meaningful comparisons.
- Data analysis revealed that a majority of the survey respondents were female (58.3%). There was a small but statistically significant difference between Hispanics and non-Hispanics by gender. Both groups had more females than males, 68.3% to 31.7% for Hispanics and 55.7% to 44.3% for non-Hispanics, but the difference was larger for Hispanics ($p = .039$, Cramer's $V = .104$). This may confound responses received from Hispanics and females and account for some of the findings that suggest that Hispanics and female respondents share an opinion.
- Data analysis also revealed that there is statistically significant difference in the distribution of institutional roles held by respondents at community colleges and four-year institutions. Distribution of faculty (58.6% at CCs, 47.0% at 4YR) and administrators (22.4% at CCs, 14.8% at 4YR) showed no significant differences but staff informants were skewed toward four-year schools (20.0% at CCs, 37.2% at 4YR; $p = .009$, Cramer's $V = .157$). When only STEM personnel are considered, statistically significant differences do not exist (faculty - 66.0% at CCs and 74.0% at 4YR, staff - 20.0% at CCs and 15.0% at 4YR, administrators - 14.0% for CCs and 11.0% for 4YR). To address the presence of a difference in the proportion of persons in staff roles and any possible influence it might have in data analysis, the relationship of faculty, staff, and administrator responses were checked during analysis.

There were several choices made by the research team which set boundaries for the investigation (delimitations). The two primary delimiters were:

- Restricting the distribution of the survey to individuals known to work for HSIs and to the limited number of advocacy groups in a seven-state region.
- Not asking respondents to identify the institution/organization for which they worked.

While these conditions existed, the research team believes that the data gathered represents the best understandings of the individuals responding and that it communicates patterns relevant to understanding Hispanic-Serving Institutions in Colorado, Kansas, New Mexico, and Texas – which may also be applicable in other regions of the country.

Overview of Findings

Summaries of findings for topic areas addressed in the survey appear at the beginning of each section of this report. Findings that were derived from larger groups of questions and deemed to be of general interest are described briefly here but readers should consult the associated sections of this report for details like level of significance and effect size for differences found between groups or by institution type. Findings from other topic areas about which fewer questions were asked are not included in the summation that follows. Those topics are articulation and transfer agreements (see page 57), developmental mathematics (see page 59), assistance for students seeking employment (see page 97), STEM outreach programming (see page 99), and limitations faced by HSIs (see page 109). The choice to not discuss these topics as part of this overview should not be seen as a statement about the value of the findings in these areas. Readers will encounter helpful information in each section of the report. The choice to exclude them here was based in the need to be brief and the smaller volume of information gathered regarding these topics.

Percentages reported are the percent of informants in a category who provided a given response. They are not the percentage of institutions exhibiting the characteristic described. This is the case because, as noted above, approximately 25% (99 of 403 respondents) could not be directly associated with a specific HSI using IP tracking (details are in Appendix 2, Research Methodology).

Staffing at the HSIs represented in the sample had several notable patterns. Hispanics were widely reported to be present as employees of the HSIs in the sample but they represented a higher proportion of employees at CCs, 44.4% of respondents from 2YR institutions indicated 31% or more of employees were Hispanic while 73.4% of personnel from 4YR institutions stated 20% or fewer of employees were Hispanic. In addition, Hispanics were less likely than non-

Hispanics to work in a STEM department, to hold a STEM degree, and to hold a doctorate in a STEM discipline. There were no significant differences though in level of experience in higher education between Latinx/a/os individuals and non-Hispanics or in their distribution across institutional roles. Yet, only 17.7% of all the faculty respondents identified as Hispanic.

Female respondents were: (1) less likely that their male peers to work in STEM departments, (2) more likely to fill staff roles than faculty or administrative posts, (3) less likely to hold STEM degrees, and (4) less likely than males to hold a STEM doctorate. Females in faculty and administrative roles were also found to have less experience in higher education than their male counterparts at statistically significant levels but there was not a significant difference in years of experience at the staff level.

STEM faculty held 84.0% of the STEM doctorates reported by respondents. STEM faculty were also reported, at statistically significant levels, to be the most likely to: (1) face the expectation of seeking grants, (2) be highly concerned about tenure and promotion, and (3) face the expectation of serving on external panels and boards. Staff were the STEM employees least likely to hold a STEM degree and the most likely to have stopped their STEM education with an Associate's or bachelor's degree.

Several common understandings about differences between community colleges and four-year institutions were confirmed in respect to the HSIs in the sample. CC personnel were found to be less likely to hold terminal degrees. Community colleges were reported to recruit faculty with teaching as their primary focus more often than four-year institutions. And CC faculty were reported to be less likely to face the expectation of seeking grant funding and producing scholarly works. Differences in response patterns also existed in respect to the types and uses of labs, the presence of research faculty, grant funding, and course load reduction for faculty who hold grant funding with more employees at four-year schools reporting these patterns.

Responses regarding programing at HSIs that are community colleges also support the reputation of CCs as teaching institutions as they were more likely to offer a number of the support mechanisms listed in the survey than 4YR institutions and appear to be more invested in offering technology-based forms of instruction and support. This even extended to activities that are considered common in higher education like the availability of online courses, regularity with which curriculum was updated, and the provision of tutoring. Departures from this pattern were areas in which four-year institutions would be expected to have more substantial commitments like internships and undergraduate research.

Approximately 50% of respondents indicated their institutional leaders emphasized support for Hispanic students, 38% noted institutional leaders regularly fund activities that support Latino/a students, and 36% of the informants reported their institutions had "personnel whose primary responsibility is interacting with and supporting Hispanic STEM students." Only 30% of the respondents reported that their institution had an orientation for parents of first-generation and Hispanic students. Individuals who identify as Hispanics stated at higher levels than their non-Hispanic peers that they felt orientation of this type was desirable. Although, 86.7% of all respondents felt low student to teacher ratios were important for "facilitating faculty/student

rapport," only 51.4% agreed or strongly agreed their employer "prioritizes low student to teacher ratios."

Students with Differed Action for Childhood Arrivals (DACA) status were reported to be present at many of the HSIs in the sample (72.6% of CC and 52.8% of 4YR respondents). Though this was the case, over 50% of the respondents did not know if the administrations at their institutions had taken measures to protect these students.

Even though 50% of respondents noted a commitment on the part of institutional leaders to support of Latinx/a/os students, less than a quarter of the respondents in the sample reported that their employer provided personnel with information about concerns of first-generation students, low-income students, and Hispanic students. Even fewer reported receiving information about Hispanic culture and that professional development was offered regarding Hispanic culture. More community college employees reported that their employers were active in these areas than personnel at four-year institutions.

Hispanics informants disagreed with their non-Hispanic peers regarding the availability of information about Hispanic culture, whether Hispanic culture is understood by higher education professionals, and about the particulars of Hispanic culture. Disagreement to the extent exhibited and at consistently high levels seems to indicate, at a minimum, limited cultural competence on the part of the non-Hispanics working at the HSIs. As was the case with Hispanic culture, individuals who identify as Latinx/a/os consistently and strongly disagreed with non-Hispanics about the characteristics of Hispanic students. This existed in respect to queries about the background of these students, their preparation for college, their commitments while in college, barriers they might face to success in college, and their preferences. Disagreement between the Latinx/a/os informants and non-Hispanics continued over statements regarding Hispanic students and STEM. Hispanics were more likely to agree Latinx students have limited personal history with STEM professionals, are unaware of STEM opportunities, are intimidated by STEM, do not identify with STEM, and are underrepresented in upper-level STEM courses. Hispanics also felt language barriers and difficulty with college culture existed for Hispanic students and that family and work commitments were inhibitors of their participation in student organizations and extra-curricular activities. Responses to a question about why Hispanic students might attend local colleges and universities did not show a significant difference in responses between Latinos/as and non-Hispanics and allowed a rank ordering of the overall responses. From most frequent to least frequent, respondents selected family influence (92.8% of all respondents), finances (86.3%), familiarity (64.2%), community connections (45.4%), personal preference (37.9%), and other (4.1%).

Latinos/as strongly disagreed with non-Hispanics about their institutions using institutional records to identify STEM interest among Latinx students. Hispanic respondents also disagreed with their non-Hispanic peers about the extent to which their employers emphasized STEM identity with Hispanic students. The majority of respondents reported their institutions provided general support programming for STEM students while a minority, less than one-fifth at CCs and less than one-eighth at 4YR institutions, reported the presence of student organizations for

Hispanic students studying STEM. The reported presence of programming for Latinas studying STEM was even lower with a high-water mark of 11.4% for CCs in one category and of 3.9% for 4YR institutions. There were nine varieties of support programming listed in the question. The low levels of programming reported stand in contrast to priorities expressed by US government agencies like the Department of Education and National Science Foundation and the reported emphasis the HSIs leaders placed on supporting Hispanic students. As would be expected based on the underrepresentation of Hispanics in higher education, less than 40% of the sponsors of the student organizations for Hispanic students were reported to be Latinx/a/os. Partnerships in "undertakings that serve Hispanic students," when present, were said to occur predominantly with another institution of higher education (76.9%) followed by a state or federal agency (73.3%), a K-12 school district (66.3%), a non-profit entity (58.6%), and a business (55.0%).

Over one-third of the respondents reported their institutions had a way of identifying early STEM interest among students, 35.5%, and close to 70%, regardless of institution type, reported the presence of an early alert system. Yet in respect to offerings targeting students who identify as Latinx/a/os, only the two most general forms of support service considered on the survey were reported by more than 50% of respondents. All others were reported by less than 30% of informants and very few institutions were reported to be using predictive analytics in student support. Approximately 60% of respondents noted their institutions provide soft skills training for students as part of student support programming but less than one-sixth of respondents, 16.0%, said representatives of Hispanic student organizations met and coordinated efforts.

Community college personnel were found to be more likely to report monitoring of effectiveness of programming than four-year institutions and STEM department employees more likely to report monitoring of the impact of curriculum changes than non-STEM departments. Administrators were more aware of ways programming was assessed although this would be expected as this activity is, generally, under their supervision. Approximately 50% of respondents indicated that effectiveness data was being used in institutional decision-making regarding STEM programming. The data also confirmed that Chairs or Deans were more likely to be the parties responsible to monitor STEM instruction at CCs than at 4YR schools and that very few specialists with responsibility to monitor STEM instruction were employed at the HSIs in the sample. Interestingly, a small minority of respondents noted that no one at their institution monitored instructional practice in STEM courses. Very few of the informants, approximately 10%, noted that their institutions provide their faculty with curriculum development assistance although community colleges reported this more frequently than four-year institutions. In fact, 50% of respondents stated their institutions leave curriculum revision in low performing classes up to the faculty.

Two-thirds of the grant-funded services listed in the survey were more likely to be reported by respondents from community colleges. For a specific subset of five student support services important for Hispanic students, more community college respondents reported forms of grant-funded student support programming than their peers at four-year institutions. This pattern continued in respect to scholarship offerings. Five of the six categories of scholarships listed were reported by approximately 30% of all respondents with the exception being "students

studying STEM" which was reported by 51.6%. Yet, informants at two-year institutions were more likely to report having institution and grant-funded scholarships for students in general, for minorities, for low-income students, and for females studying STEM.

Intra- and inter-institutional collaboration was found to be a common practice at the HSIs with few differences between responses from CC and 4YR personnel. The differences that existed aligned with other findings in the survey about the presence of dual credit courses and university classes at community colleges. Personnel at four-year institutions reported more often that they had colleagues charged with facilitating intra- and inter-institutional collaboration for instructional purposes, to facilitate various forms of experiential education, and for grant applications and projects than their peers at community colleges. Responses indicated a greater emphasis on collaboration in grant applications, grant projects, and on interdisciplinary activity when seeking or implementing grants for STEM departments than for non-STEM departments. The expectation that faculty would seek grants was reported to be significantly more likely at 4YR institutions and in STEM departments and the potential for reduction in teaching load to facilitate grant-funded activity was more likely at four-year colleges and universities. These patterns may be related to the ascending order found for faculty holding grants with CCs at the bottom of the scale, master's degree granting institutions in the middle, and colleges and universities with two or more doctoral programs at the top. When expectations of faculty were considered by association with a STEM department, more STEM personnel than their non-STEM peers reported faculty research, full-time research faculty, many faculty with research funding, and potential for reduction of teaching loads to conduct research.

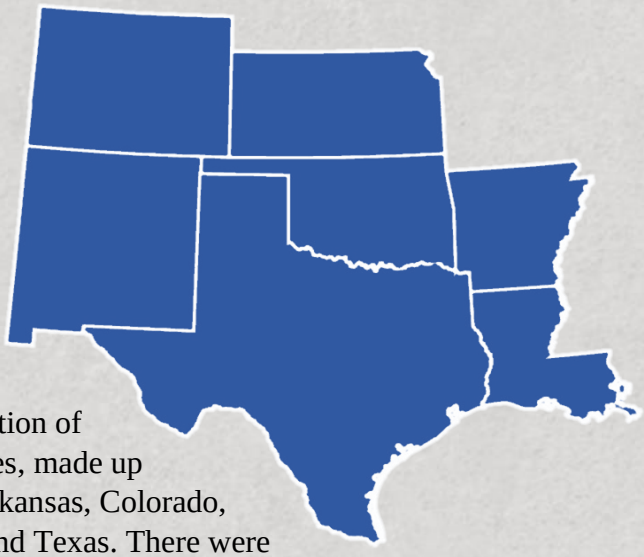
Nearly 80% of community college personnel reported grant-funded services for students at their institution while approximately 60% of employees at four-year schools did. Grant-financed services provided, ranked from most to least common, were: (1) academic support, (2) scholarships, (3) advice for and guidance of students, (4) STEM-specific services, (5) services specific to Hispanic students, (6) support of a cohort or group, and (7) other. Informants were asked about the types of grant-funded scholarships available at their institution. Ordered for the full informant pool from most frequently to least frequently noted, the grant-funded services were for: (1) students studying STEM (35.3%), (2) minorities studying in STEM (22.3%), (3) Hispanic students studying in STEM (21.3%), (4) STEM students from low-SES families (20.1%), (5) first-generation students studying in STEM (19.8%), and (6) females studying in STEM fields (15.6%). Faculty were the parties most likely to respond that their institution was "dependent on grant-funding to start new [student support] initiatives."

Overall, 89.7% of respondents affirmed their institution had professionals to help with internal collaboration on grant applications and projects while 79.6% affirmed the presence of professionals to help with external collaborations. Collaboration on grant applications and projects was reported to be very common. The most common form was personal or intra-departmental collaboration which was noted by 73.1% of respondents, followed by collaboration with other departments at 67.6%, with other disciplines at 61.1%, with another institution at 60.9%, with a state or federal agency at 58.3%, with a K-12 school district at 48.9%, with a non-profit at 44.4%, and, the least frequent, with a business entity at 42.3%. At the institutional level,

grant-seeking partnerships, ranked from most frequently to least frequently selected, were 83.9% for partnerships with another institution, 83.3% for a state or federal agency, 70.1% for non-profits, 68.3% for business entities, and 67.8% for K-12 school districts.

Approximately one-fifth of STEM personnel perceived limits on the use of grant funds to pay personnel costs as a restriction impacting their "ability to apply." "The types of qualifications expected for project leaders limit my institution's /organization's ability to apply for grants," was also viewed as a limitation by a minority of respondents, less than 20% felt this was the case. Less than 15% of respondents selected "Our faculty...may not be credited for education, student support, and scholarship funding grants in tenure and promotion." And notably, only 25% of respondents indicated that their employers sustained grant-funded projects following the award period.

Population and Sample



The identified population of interest for the survey was any faculty, staff, or administrator working at a Hispanic-Serving Institution in a seven-state region. Similarly, individuals working for non-profits that offer support to or advocate for Hispanics in higher education, like the Mexican American Legal Defense and Educational Fund or the Texas Association of Chicanos in Higher Education, were desired informants. The south-central portion of the United States, Texas and the adjoining states, made up the seven-state region. States included were Arkansas, Colorado, Kansas, Louisiana, New Mexico, Oklahoma, and Texas. There were 119 HSIs in the region at the time the survey was administered based on the US Department of Education's list of institutions recognized as HSIs in 2015-2016 but none of them were in Arkansas, Louisiana, and Oklahoma.

A total of 494 persons from Colorado, Kansas, New Mexico, and Texas accessed the survey. These were the four states in the region that had HSIs at the time the survey was distributed. Ninety-one of the submitted surveys were incomplete and were therefore excluded from consideration leaving 403 respondents from servers in Colorado, Kansas, New Mexico, and Texas.

Questions asked on the survey allowed the classification of respondents by employment categories represented at colleges and universities and as individuals who worked for non-profits which advocate for Hispanics. Ten persons listed themselves in the advocate category.

The minimum number of institutions represented, a total of 44, was determined using IP address tracking. Responses were received from at least 36 colleges and universities in Texas, five in New Mexico, and three in Colorado (Table A). Only this number of institutions could be identified as there were submissions from outside the range of IP addresses associated with the HSIs in the region. This is likely due to individuals having completed the survey either from their homes or perhaps, in a small number of instances, while they were traveling. Because this is the case, it was not possible to disaggregate the full data set definitively by institution and state. It was also not possible to conclude the 403 usable responses exclude submissions from employees of HSIs in Kansas as they might be in the set of IP addresses not associated with an HSI. There were five submissions from servers in Kansas that were not identified as the property of HSIs but that were in or near communities where HSIs exist. There were three submissions made from outside the seven-state region. Two from the Las Vegas area and one from Atlanta. These submissions were included in the data analyzed as it was deemed probable that the three persons were traveling when they completed the survey.

Table A

Distribution of HSIs by State in the Region Surveyed and Confirmed to be in the Sample

State	HSIs in 2016	HSIs in Sample
Arkansas	0	0
Colorado	9	3
Kansas	4	?
Louisiana	0	0
New Mexico	23	5
Oklahoma	0	0
Texas	83	36

Note: counts of HSIs in 2016 were obtained from the Hispanic Association of Colleges and Universities. HSIs in the sample were counted by tracing IP addresses to their known point of service. Those associated with HSIs were counted as a response from an employee of that HSI.

Two hundred and thirty-five of the respondents were females, 166 were males, and two individuals chose not to provide this information (Table B). Ninety-one of the respondents identified their ethnicity as Hispanic, the majority of whom also selected Hispanic/Latinx as the racial group with which they identified. This percentage aligns with information reported at another point in the survey about the percentage of Hispanic employees at the HSIs represented in the sample. Individuals were allowed to declare identification with more than one racial category with 300 of the respondent pool identifying as White, 75 as Hispanic/Latinx, 16 as Other (this included self-identification as American, European, Chicano/Tejano, various mixed-race identities, and non-racial), 13 as Black/African-American, 12 as Native American/Alaskan Native, and 11 as Asian/Pacific Islander.

Table B

Respondent Demographics

Gender					
Female	58.3%	Male	41.2%	Non-Specified	0.5%
Ethnicity					
Hispanic		22.6%	Non-Hispanic		77.4%
Race					
Asian/Pacific Islander				2.7%	
Black/African-American				3.2%	
Hispanic/Latinx				18.6%	
Native American/Alaskan				3.0%	
White				74.4%	
Other				4.0%	

Respondents were asked to categorize the type of institution for which they worked. The 403 complete responses were distributed across four distinct types of institutions of higher education. There were 88 persons (21.8%) who were employees of colleges that grant certificates and Associate's degrees – commonly known as community colleges. There were responses from 203 persons who worked at institutions granting baccalaureate and master's degrees (50.4%), 102 from universities granting baccalaureate, masters, and doctorates (25.3%), and ten persons who selected the "non-institutional" or advocate classification (2.5%). These advocates were asked a follow-up question which revealed that half of them worked for organizations that serve Hispanics while the other half served Hispanics in some other capacity (Appendix 3, Table 2). To facilitate comparisons between the two distinct types of institutions, community colleges and four-year institutions, proxy variables were created. All persons who indicated they worked for an institution that primarily granted certificates and Associate's degrees were classified as community college employees. All persons who noted they worked for institutions granting baccalaureate and master's degrees or granting baccalaureate, masters, and doctorates were classified as employees of four-year institutions. When these groups were disaggregated by institutional role, faculty, staff of administrator, it was discovered that three of the 403 usable surveys included incongruous responses regarding institutional role and employer

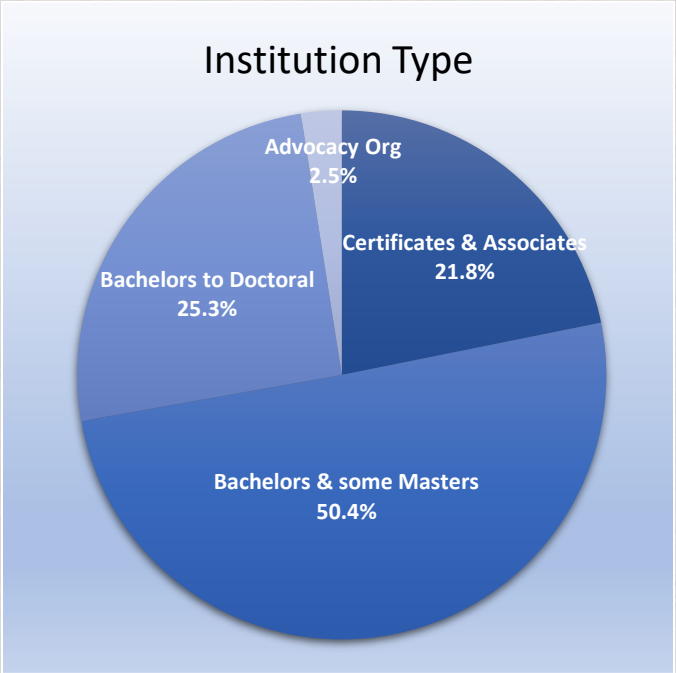


Figure 1

type. Two persons stated that their primary responsibility was being a full-time faculty person at a CC but also stated that their employer was an institution that granted baccalaurreate and master's degrees. A third person selected "adjunct faculty at a community college" as the institutional role but also said s/he worked at an institution that granted master's degrees and doctorates. This was a concern because three persons who stated that their "primary area of responsibility" was as a faculty member at a community college would have been sorted into the four-year institution group based on their answers to survey question 2.4. The longitude and latitude as well as IP address from which these individuals completed the survey were consulted to resolve this issue. All three were in communities in which four-year institutions were the only HSIs present and all three accessed the the survey through institutional servers belonging to those four-year schools. An additional check was performed using responses provided about laboratories available at the informant's institution (multi-part survey question 9.1), as the results for these questions had extremely strong effect sizes. The three respondents' answers identified them with the four-year institution patterns. As three conflicted answers out of 403 is within allowances for human error, the research team concluded that the individuals were faculty members and that they worked for four-year HSIs based on the combination of the location from which they accessed the survey, the servers that they used when accessing the survey, and their responses to questions with extremely strong effect sizes for comparison of responses from employees of 2YR and 4YR schools. It was considered plausible that they selected a descriptor when stating the particulars of their faculty role based on the first half of the statement and did not note the end of the phrase they selected as associating them with a community college. Because of this, these three persons were retained in the data set and classified as faculty and as representatives of four-year schools. This process of sorting responses from informants employed at institutions offering primarily certificates and Associate's degrees as community colleges and combining persons who worked for institutions offering baccalaurreate and master's degrees with those who worked for organizations offering bachelor's, master's, and doctoral degrees as representatives of four-year institutions was the only proxy value created for the survey response set. The persons who identified themsleves as advocates (n =10), were excluded from all analyses pertaining to institutions, their programming, and their students.

The individuals who did not identify as advocates (n = 393) were asked to place themselves in one of four categories of work responsibility: faculty, staff, administrators, or other. The respondents were distributed as follows: 192 faculty, 128 staff, 63 administrators, and nine others. The respondents who selected "Other" were not given another opportunity to ellaborate upon their work responsibilities so any interpretation of their relationship to students was not possible. As such, this small group of respondents were not included in hypothesis testing when disaggregation by institutional role (faculty, staff, administrator) was completed.

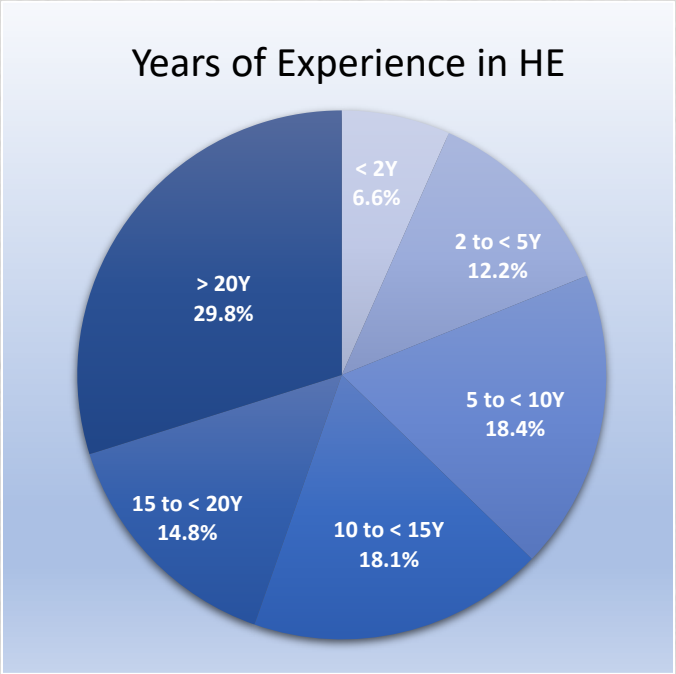


Figure 2

Survey respondents had a wide range of experience working in post-secondary education. Nearly two-thirds (62.7%) of participants had over 10 years of experience in higher education with the distribution by level of experience being: 26 with less than 2 years of experience, 48 with two or more but less than five years experience, 72 with five to less than ten years, 71 with ten to less than 15 years, 58 with 15 to less than 20 years, and 117 with more than 20 years of experience in higher education (Figure 2). This is a positive characteristic of the sample as the survey respondents skew toward higher levels of experience in higher education. Comparing Hispanics to non-Hispanics across the spectrum of experience did not yield a statistically significant finding, another positive characteristic. Yet the comparison of women to men found a highly significant difference with weak effect ($p < .001$, Z score = 3.56, $r = 0.18$). Female respondents had less years of experience in higher education, a finding which aligns with overall patterns in the US workforce (US Department of Labor, n.d.). When broken out by class of employee, significant differences existed between males and females for faculty and administrative roles, with weak and moderately weak effect respectively, but not in respect to staff positions (Table C), also paralleling national patterns of underrepresentation of women in key institution roles (Zimmerman, Carter-Sowell & Xu, 2016; Arellano, Jaime-Acuna, Graeve & Madsen, 2018).

Table C

Gender Differences in Years of Experience in Higher Education

Institutional Role	MR Males	MR Females
Faculty	104.64	88.14
Staff	63.54	65.20
Administrators	27.28	36.29

Note: Results of Mann Whitney analysis for faculty – $p = .034$, $Z = 2.117$, $r = 0.15$; for staff – $p = .817$, $Z = .231$, $r = 0.02$; for administrators – $p = .033$, $Z = 2.138$, $r = 0.27$.

The project was funded by the National Science Foundation (NSF) and had a focus on understanding how STEM education could be improved at HSIs. Because of this, the survey also asked whether the informant worked in a STEM department and, if s/he did, about his/her educational background in STEM. One hundred and seventy-nine of the 391 respondents or 45.8% of the survey takers reported that they worked in a STEM department (n = 391 for this

questions as two persons did not provide an answer). Of the persons working in a STEM department, 9.5% did not have a STEM degree, 3.9% had an associate degree in STEM, 17.3% a bachelor's in STEM, 32.4% a master's, and 55.9% possessed a doctorate in a STEM field. Table D shows how the levels of academic qualification were distributed in the sample across the faculty, staff, and administrative roles. Very small counts of persons in several of the categories prevented hypothesis testing.

Table D

STEM Degree Distribution by Institutional Role for STEM Employees

Educational Background in STEM	Overall	Faculty	Staff	Admin
No STEM degree	9.5%	1.6%	41.1%	9.5%
Assoc. Degree in STEM	3.9%	2.4%	13.8%	0.0%
Baccalaureate in STEM	17.3%	14.2%	34.5%	9.5%
Master's in STEM	32.4%	37.0%	17.2%	28.6%
Doctorate in STEM	55.9%	66.1%	6.9%	66.7%

Note: categories were not mutually exclusive so individuals may have answered that they held several degrees rather than noting only the highest degree they had achieved.

Hispanics are underrepresented in STEM fields (National Science Board, 2018; Sharkawy, 2015) and in faculty roles nationwide (US Labor, 2016; Taylor & Santiago, 2017) and little is known about how this impacts staffing at HSIs. Because of this, the proportion of Latinos/as at the institutions in the sample filling different roles, working in STEM fields, and the degrees they held were of particular interest. Overall, 17.7% of faculty respondents at the HSIs identified as Hispanic (Table E). Hispanics working in STEM departments made up 13.4% of faculty respondents, 24.1% of staff, and 14.3% of administrators. The number in each category was low ($n < 20$) so actual counts are reported in Table E and hypothesis testing comparing Hispanics to non-Hispanics by role and degree was not possible. The survey respondents included 17 Latinos/as working as faculty in STEM but 110 non-Hispanics, seven STEM staff persons identifying as Hispanic versus 22 who were not Hispanic, and three Latinx/a/os administrators versus 18 who were not Hispanic. Respondents could report more than one degree so the n and total count are not equal for several columns in Table E.

Table E

STEM Education Background of Hispanic and Non-Hispanic Respondents

Education Background in STEM	Hispanics			Non-Hispanics		
	Faculty (n = 17)	Staff (n = 7)	Admin (n = 3)	Faculty (n = 110)	Staff (n = 22)	Admin (n = 18)
No STEM degree	1	3	0	1	9	2
Assoc. degree in STEM	0	2	0	3	2	0
Baccalaureate in STEM	0	2	0	18	8	2
Master's in STEM	5	1	1	42	4	5
Doctorate in STEM	11	1	2	73	1	12

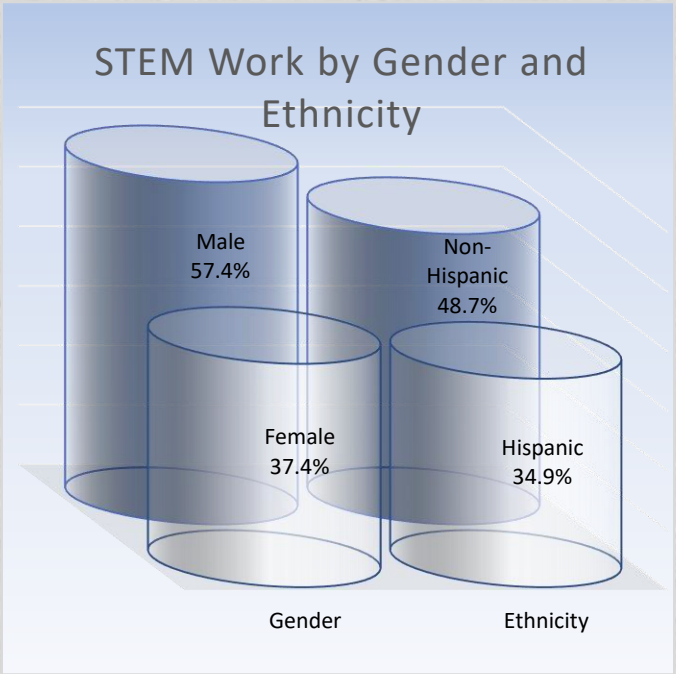


Figure 3

While counts were too low to disaggregate Hispanics working in STEM by role or degree attained, it was possible to consider STEM department affiliation by gender and ethnicity. A significant difference with a weak effect was found for gender with female respondents less likely than male respondents to report working in a STEM department ($p < .001$, phi = -.198) and Hispanics also less likely than non-Hispanics to work in STEM ($p = .026$, phi = -.113), also with a weak effect size (Figure 3). These figures parallel national trends with women and Hispanics underrepresented in post-secondary STEM education and in the STEM workforce (Sharkawy, 2015; Graf, Fry & Funk, 2018).

Individuals who identified as faculty were asked to classify their faculty role by selecting one of six descriptive phrases. The distribution of responses is in Table F. There were too few persons in several of these categories to support comparison between institution types so the actual counts of respondents in each category are reported. It was these low counts that necessitated the introduction of the proxies, community college and four-year institutions (described above) in place of the three descriptors used in the survey.

Table F

Faculty Roles by Institution Type (Submitted Responses and Proxy Values)

Faculty Roles	Submitted Responses			Proxy Values	
	Cert's + Assoc	Bach + Master	Bach thru Doctor	CC	4YR
Adjunct faculty at a community college	4	0	1	4	1
Adjunct faculty at a 4-year institution	0	10	4	0	14
Full-time community college instruction	19	2	0	19	2
Full-time non-tenure track	2	17	6	2	23
Full-time tenure track	4	28	10	4	38
Tenured faculty	20	44	21	20	65

Institutional Characteristics

HSI Employees

Hispanic-Serving Institutions are an important subset of colleges and universities in the United States as they educate approximately two-thirds of Latinx/a/os students enrolled in higher education (Revilla-Garcia, 2018). Yet, they have been the focus of very little research. This section of the report discusses the characteristics of employees at the HSIs in the sample, in general, by institution type, and in STEM and non-STEM departments. It also addresses the expectations held of faculty at the colleges and universities represented in the sample. While some of the information in this section is available in the institutional factbooks of colleges and universities, the authors are aware of no source that reports on all the topics addressed in this section in regard to a large, regional set of HSIs.

Summary: HSI employees.

Several of the findings about employees at HSIs are worth noting. Details of these, in a number of topic areas, have been presented above as part of the description of the survey sample. Details for the majority can be found following this brief summary of key findings.

Several common understandings about differences between community colleges and four-year institutions were confirmed in respect to the HSIs represented in the response set. CC personnel were found to be less likely to hold terminal degrees. Community colleges were reported to recruit faculty with teaching as their primary focus more often than four-year institutions. CC faculty were reported to be less likely to face the expectation of seeking grant funding and producing scholarly works.

A number of important comparisons of female and male respondents resulted in statistically significant findings with weak to moderate effect size. These were female respondents: (1) were less likely that their male peers to work in STEM departments, (2) more likely to fill staff roles

than faculty or administrative posts, (3) less likely to hold STEM degrees, and (4) less likely than males to hold a STEM doctorate. Females in faculty and administrative roles were also found to have less experience in higher education than their male counterparts, at statistically significant levels, but there was not a significant difference in years of experience at the staff level.

Over 93% of survey respondents at community colleges and 85% at 4YR institutions affirmed Hispanics were employed at their HSI but the distribution of Latino/a employees at CCs and 4YR institutions showed markedly different patterns. Other findings for Hispanics were very similar to those for females. At statistically significant levels but with weak effect sizes they were less likely than non-Hispanics to work in a STEM department, to hold a STEM degree, and to hold a doctorate in a STEM discipline. There were no significant differences though in level of experience in higher education between Latinx/a/os individuals and non-Hispanics and in their distribution across faculty, staff, and administrative roles, although only 17.7% of all faculty respondents and 13.4% of STEM faculty informants identified as Hispanic.

Since the survey asked about STEM department affiliation, findings specific to STEM personnel were possible. STEM faculty were the parties that held 84.0% of the STEM doctorates reported by respondents. STEM faculty were reported, at a statistically significant level with moderate effect size, to be the most likely to face the expectation of seeking grants. They were also reported to be the most likely to be highly concerned about tenure and promotion with a moderately strong effect size and, they were the most likely, with weak effect size, to face the expectation of serving on external panels and boards. Staff in STEM departments were the STEM employees least likely to hold a STEM degree and the most likely to have stopped their STEM education with an Associate's or bachelor's degree.

Details: HSI employees.

The paragraphs that follow present details regarding the employee pool of the HSIs in the sample. Distribution of males and females, Hispanics and non-Hispanics, by gender and ethnicity within various roles, and by institution and affiliation with a STEM department are discussed.

Table G

Distribution of Males and Females across Institutional Roles

Role	Male	Female
Faculty	57.2%	45.0%
Staff	22.0%	41.4%
Administrator	20.8%	13.5%
Note: $p < .001$, Cramer's V = .206		

As was noted above, female respondents were less likely to work in STEM departments. In the respondent group, 37.4% of females worked in STEM departments/disciplines while 57.4% of males worked in STEM ($p < .001$, phi = -.198) (Figure 3). When viewed as the percentage of persons working in STEM departments, the figures change and appear more favorable to females. Females were 47.5% of the STEM personnel in the survey sample while males were 52.0%, and 0.5% elected to not specify a gender. But, as Table G shows, over 41% of the females respondents were staff. Not only were women more likely at a statistically significant level with weak effect to be staff than faculty or administrators, they were also more likely to not hold a STEM degree at statistically significant and weak levels ($p < .001$, Cramer's V = -.191), and less likely to hold a STEM doctorate than their male counterparts at

significant and moderate levels ($p < .001$, Cramer's V = .260). In addition, female respondents (MR 88.14) were found to have fewer years of experience in higher education than the male respondents (MR 104.64) at significant levels for faculty ($p = .034$) and administrators ($p = .033$, MR for females: 27.28, MR for males: 36.29) but not for staff ($p = .817$, MR for females: 63.54, MR for males: 65.20) (Table C).

Hispanics were less likely than non-Hispanics, at weak but statistically significant levels, to work in a STEM department ($p = .026$, phi = -.113). They were also more likely to not have a STEM degree ($p = .044$, Cramer's V = .101) and to not hold a doctorate in a STEM discipline than their non-Hispanic peers at weak but statistically significant levels ($p = .040$, Cramer's V = .104). There were, though, no statistically significant differences in the distribution of Hispanics and non-Hispanics across the three institutional roles, faculty, staff, and administrators. There was also no significant difference in the sample between the years of experience reported by Latinx individuals and their non-Hispanic peers ($p = .055$; MR for Hispanics of 171.2 and 197.4 for non-Hispanics). Survey respondents were asked about educational background in STEM (Tables D and E above, Table 4 in Appendix 3). Only responses from individuals working in STEM departments are considered in the discussion that follows.

Staff persons in STEM departments were the most likely by a wide margin to not have a STEM degree (Table H), were the most likely to have stopped their STEM education with either an Associate's degree or at the baccalaureate level, and were the least likely to hold a STEM master's degree. Only 6.9% (n = 2) of the staff respondents in STEM departments held doctoral degrees in a STEM field. Among STEM personnel, 66.1% of faculty and 66.7% of administrator respondents held STEM doctorates but the lower number of STEM administrators responding (n = 7) masks the preponderance of STEM doctorates being held by faculty; 84.0% of the persons holding STEM doctorates were faculty, 14.0% were administrators, and 2.0% (n = 2) were staff. Comparisons considering the entire spectrum of possible degrees were not possible as no administrator of a STEM department had only an associate degree in STEM and there were low counts in many of the other categories.

Table H

STEM Education Background for STEM Department Personnel

Staff STEM Degree Description	Faculty	Staff	Admin
Does not hold a STEM degree.	1.6%	41.4%	9.5%
Stopped STEM education with an associate degree	2.4%	13.8%	0.0%
Stopped STEM education with a baccalaureate.	14.2%	34.5%	9.5%
Holds a master's degree in a STEM field.	37.0%	17.2%	28.6%
Holds a doctorate in a STEM field.	66.1%	6.9%	66.7%

Note: categories were not mutually exclusive so individuals may have answered that they held several degrees rather than noting only the highest degree they had achieved.

It would have been desirable to consider the distribution of males and females as well as Hispanics and non-Hispanics across the categories of faculty. For example, when Hispanic opinions were found to differ from those of non-Hispanics, did the difference also exist between

Hispanic and non-Hispanic faculty who were adjuncts or who were full-time faculty? Considerations of this type were, however, not possible in the data set due to low counts in several of the categories. Table I presents actual counts of male and female as well as Hispanic and non-Hispanic respondents who reported filling a faculty role and the position description they selected. Latinos/as held 17.7% of the faculty positions reported, 34 to 158 for non-Hispanics, and females outnumbered males among the faculty responding, 100 to 91 or 52.4%.

Table I

Distribution of Males and Females and Hispanics and Non-Hispanics by Faculty Role

Faculty Role	Male	Female	Hisp	Non-Hisp
Adjunct faculty at a community college	1*	4*	3*	2*
Adjunct faculty at a four-year institution	6	8	1*	13
Full-time community college instruction	8	13	5*	16
Full-time non-tenure track	9	15	4*	21
Full-time tenure track	22	20	8	34
Tenured faculty	45	40	13	72
Note: * violated assumptions of statistical test due to low cell count.				

In addition to being asked questions about themselves, the faculty, staff and administrators at the HSIs were asked a group of questions about their institution's characteristics. These addressed topics like the percentage of the college or university's employees who were Latino/a (the term Hispanic was used on the survey), the qualifications of and expectations for faculty, and practices related to tenure and promotion.

Two questions were asked about the presence of Latinos/as in the employee pool (Appendix 3, Tables 6 and 7). One asked about the presence of Hispanic individuals in the department or organization and the second for an estimated percentage of Latinos/as in the informant's department or organization. Both CCs and 4YR institutions were reported to have Hispanics as employees, 93.1% of CC personnel and 85.6% of employees from 4YR institutions affirmed this. There were, though, too few persons answering "No" or "I don't know" to allow hypothesis testing. Responses for the estimated percentage of Latinos/as in the informant's department or organization could support hypothesis testing. There was a statistically significant finding when comparing the community colleges to four-year institutions ($p < .001$, MWU 3416.0, $Z = -4.76$, CC MR: 154.78, 4YR MR 108.30) with a moderate effect ($r = -0.31$) and the distribution of the responses was very different (see Figure 4). Community college responses were bi-polar (Figure 4). Hispanic faculty, staff, and administrators were reported to represent 10% or less of the institution's employee pool by 22.2% of CC respondents and 11% to 20%, again by 22.2% of respondents but also to be more strongly represented at others, 31% to 40% of employees, 12.7% of CC respondents, and 41% or more, 31.7% of community college respondents. Responses from persons employed at 4YR institutions showed a steady decline across the categories from a high of 41.8% reporting 10% or less of faculty, staff, and administrators were Hispanic to a low of

3.4% reporting 41% or more were Hispanic. A total of 73.4% of 4YR personnel reported 20% or fewer of employees at their institution were Hispanic,a characteristic reported by 44.4% of CC personnel while 55.6% of CC versus 26.6% of 4YR personnel reported 21% or more of their institutions employees were Hispanic. No statistically significant differences existed when comparing STEM departments to non-STEM departments and when comparing between the responses from the three categories of employee, faculty, staff, and administrators.

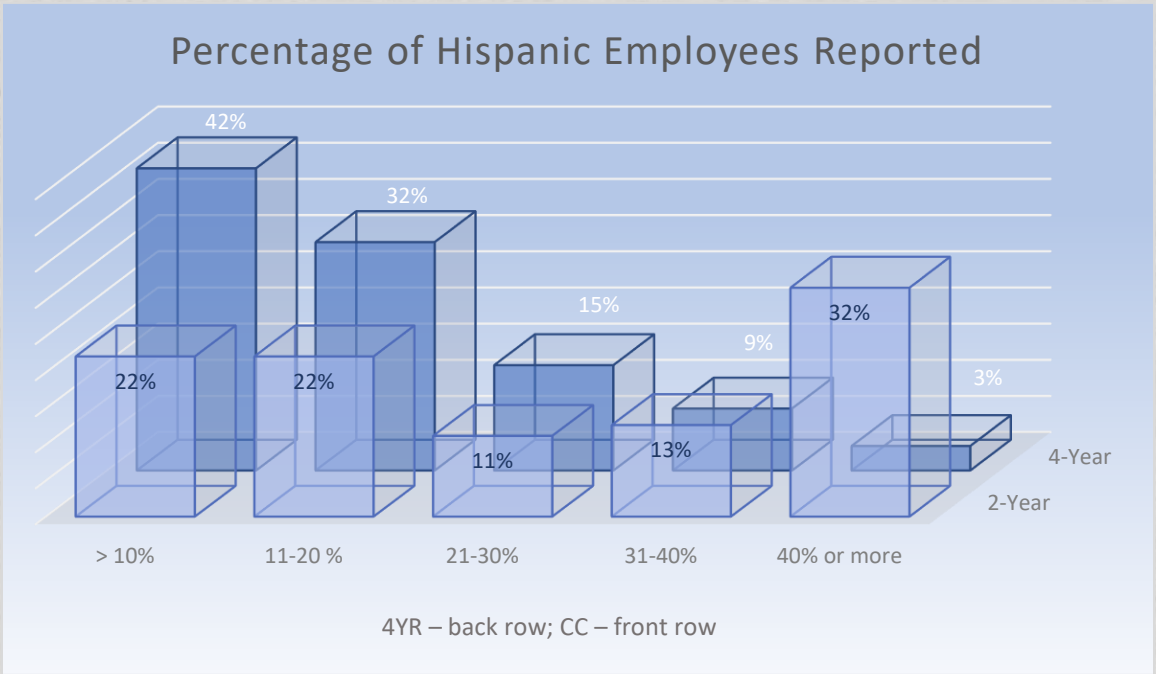


Figure 4

The survey asked if faculty at the respondent's institution held the highest possible degrees in their field (terminal degrees) (Appendix 3, Tables 8a and 8b). Community college respondents (36.4%) were less likely to report this characteristic than respondents at four-year institutions (51.1%). This occurred at weak but statistically significant levels (p = .014, phi = .123). Over half of the individuals working in STEM departments (55.9%) reported that their faculty had terminal degrees, and this occurred at a higher rate than for individuals working in non-STEM departments (40.6%). This difference was weak and statistically significant (p = .003, phi = -.153) regardless of the type of institution.

Respondents were asked about expectations their institution had of its faculty (Appendix 3. Tables 8a and 8b). The first requirement of faculty addressed in a multi-part question was faculty having been recruited to teach "which represents the majority of their work." Community college informants (58.0%) were found, at weak but statistically significant and higher levels, to report faculty were recruited with the intention that their primary commitment would be teaching versus their colleagues at four-year institutions (40.7%) (p = .004, phi = -.145). While a comparison of the responses from STEM department personnel to those from non-STEM

departments did not produce a significant result on its own, dividing it further by institution type revealed a weak partial effect that was statistically significant ($p = .013$, phi = -.186). The STEM personnel at CCs reported faculty were recruited primarily to teach 66.7% of the time while their colleagues at 4YR schools affirmed this 46.1% of the time. A comparison of responses from non-STEM personnel for the same characteristic did not demonstrate a significant difference ($p = .257$, phi = -.078).

The expectation that faculty would seek grants was the next topic queried. Respondents indicated that faculty at four-year institutions (27.9%) and faculty in STEM departments (32.4%) were more likely to be expected to seek grant funding than faculty at CCs (6.8%) and in non-STEM departments (15.1%). Both comparisons had a moderate effect size and were statistically significant at $p < .001$ (Appendix 3, Tables 8a and 8b).

Another commonly held expectation in higher education is that faculty persons would produce scholarly works (Appendix 3, Tables 8a and 8b). Respondents reported that faculty at community colleges are far less likely to be expected to produce scholarly works and publications (2.0% of CC respondents, 41.0% at four-year institutions). Statistical analysis of the difference between CCs and four-year institutions for this topic was not possible due to a very a low count of persons at CCs who stated faculty were required to produce scholarly publications. Only two people selected this option. Comparing responses from STEM, 35.8% agreement, and non-STEM personnel, 29.7% agreement, for the same topic resulted in a non-significant outcome.

Only a comparison of STEM to non-STEM faculty yielded statistically significant results for faculty being encouraged to serve on external panels and boards (Appendix 3, Tables 8a and 8b). STEM faculty were more likely to report this expectation, 34.6% STEM personnel and 24.5% of non-STEM respondents ($p = .028$). The relationship was weak (phi = -.111).

The final two topics in the multi-part question addressed tenure and promotion patterns (Appendix 3, Tables 8a and 8b). Like above, only a comparison of STEM to non-STEM faculty yielded statistically significant results for faculty being highly concerned about tenure and promotion. STEM faculty (43.6%) were reported to be more likely to have this characteristic than non-STEM (32.1%) with a weak effect ($p = .019$, phi = -.118). Further analysis was performed to determine if institution type might contribute to this effect. A partial effect was found. A majority of STEM personnel at 4YR institutions (53.1%) reported that faculty were highly concerned about tenure and promotion with less than one fifth of CC STEM personnel (19.6%) agreeing with this statement. There was a moderate effect and high statistical significance ($p < .001$, phi = .305). The responses from non-STEM personnel for the same comparison were not found to have a significant difference ($p = .225$, phi = .083).

A final query addressing tenure and promotion was included in the survey based on the experience of members of the research team and statements made by informants during the initial

qualitative phase of the investigation. It was “Our faculty...may not be credited for education, student support, and scholarship funding grants in tenure and promotion.” No significant differences were found when comparing by institution type and between STEM and non-STEM faculty with less the 15% of respondents stating this was the case in any subset of informants (STEM vs. non-STEM, CC to 4YR, Hispanic vs. Non-Hispanic, and comparison between faculty, staff, and administrators).

Articulation and Transfer

The opportunity to earn college credit without attending a course on campus, like dual credit classes offered at a high school or online courses, introduces a broad range of options for earning college credit and makes the ability to transfer credits from one school to another important. Discussion of responses to the survey questions addressing this topic, described on the survey as articulation or transfer agreements, follows.

Summary: articulation and transfer.

The responses received communicate little difference in the patterns of articulation and credit transfer between the community colleges and four-year institutions. Most reported having articulation agreements that maximize hours, determining transfer hour and course equivalents for each student seeking to transfer hours, and accepting transfer students at the same course level or year in school. CC and STEM personnel were more likely to believe that articulation agreements can limit change in STEM degree programs and course content although this opinion was held by less than one-third of CC and STEM personnel.

Details: articulation and transfer.

A three-part question was asked about transfer credits and course equivalents (Appendix 3, Table 9). The question stem was “Regarding transfer credits and course equivalents, my institution...” and this was completed by “has articulation agreements that maximize hours,” “determines these individually,” and “accepts students at the same course level/year.” There were no statistically significant differences between responses from community college personnel and employees for four-year institutions for these statements. In every case, the predominant response was agreement (median response for each comparison) indicating most of the HSIs in the sample exhibit all three traits. Overall agreement for entire sample, calculated by combining the “Agree” and “Strongly Agree” responses, was 61.5% for “has articulation agreements that maximize hours,” 52.5% for “determines these individually,” and 45.5% for “accepts students at the same course level/year.”

Responses were also sought regarding “Our state or system directs college credit transfer including recognized course equivalents” (Appendix 3, Table 9). For this statement, there was a strongly significant difference between responses from community college personnel and respondents from 4YR schools. Responses from staff were removed for this comparison as it was found that the staff, especially at four-year institutions, tended to respond, “I don’t know.” Removing the staff responses was a means of determining if the level of uncertainty they had

was influencing the statistical analysis. The comparison between CC and 4YR respondents who were either faculty or administrators still yielded a highly significant finding with moderate effect ($p = .003$, Cramer's $V = .255$) as 79.6% of CC personnel and 62.8% of 4YR personnel agreed with the statement. Disaggregating this further by state, which would be desirable as college and university system organization can vary from state to state and several states are represented in the sample, was not possible as the employer for approximately 25% of the survey respondents was unknown.

Two statements about articulation agreements and STEM programming were addressed at another point in the survey (Appendix 3, Table 25). These were included based on comments made by informants in focus groups and interviews. The first was "Articulation agreements can limit the amount of change possible within STEM degree programs." Comparisons were made between responses from CC and 4YR personnel as well as STEM and non-STEM personnel. Both were highly statistically significant. CC personnel were more likely to agree with this statement, 35.2% versus 10.5% with a moderate effect size ($p < .001$, phi = -.281), as were STEM personnel but at the moderately weak effect level. STEM agreement was 24.6% while non-STEM was 9.0% ($p < .001$, phi = -.212).

The second statement about articulation agreements and STEM was "Articulation agreements can limit the degree of change possible in STEM course content." This is related to the first question but is a specific subset within it. The same comparisons were made, by institution type and STEM affiliation, with the same result. Both comparisons produced highly significant results. CC personnel were more likely to agree with this statement with a moderately strong effect size, 31.8% versus 9.2% ($p < .001$, phi = -.270) as were STEM personnel but with a weak effect size. STEM agreement was 20.1% while non-STEM was 9.4% ($p = .003$, phi = -.152).

Mathematics Offerings and Developmental Mathematics

The level of preparation for college level mathematics on the part of entering students has been and continues to be a concern in higher education. Informants in the focus groups noted this challenge existed at their HSIs. The material that follows describes responses to the two survey questions asked about this topic.

Summary: mathematics offerings and development math.

Community college personnel were more likely to believe state mandates impact offerings in mathematics. They also reported developmental mathematics courses at higher levels than their peers at 4YR institutions. Nearly 90% of the community college personnel reported their employer offered developmental mathematics and approximately 75% of respondents from four-year institutions indicated that their institutions offered these courses.

Details: mathematics offerings and developmental math.

In response to comments made by focus group informants, several statements about mathematics offerings were included in the survey (Appendix 3, Table 10). The more general of these relates

to the influence of state requirements on mathematics, "State mandates impact our mathematics offerings." A comparison of responses from employees of two-year and four-year institutions was completed and found to be highly statistically significant. However, it was also found that staff persons at four-year institutions were more likely in multiple instances, at statistically significant levels, to answer "I don't know" to questions about their institutions. Because of this, the institution type comparison was repeated excluding staff responses. The results were nearly identical to the first analysis with CC personnel were more likely to indicate that state mandates impacted offerings in mathematics. With staff included response percentages were 66.2% for CCs and 31.3% at 4YR schools ($p < .001$, Cramer's $V = .332$). Without the staff, percentages were 68.5% for CC personnel and 35.3% at 4YR schools ($p < .001$, Cramer's $V = .326$). In both cases, a moderate effect size was found.

As under-preparation for college mathematics has long been a concern regarding incoming students (Preuss, 2008; 2009), a question was asked about the presence of developmental mathematics courses (Appendix 3, Table 10). Respondents answered "Yes," "No," or "I don't know" to the prompt "We offer developmental mathematics courses." A Fischer's Exact Test considering only the "Yes" and "No" responses was not significant ($p = .073$, phi = 0.14) for a difference for the presence of developmental mathematics by institution type. Notable outcomes were, only one of the community college respondents replied "No" and 89.6% of CC personnel stated their employer offered developmental math courses while 74.7% responded in the affirmative at four-year schools.

Laboratories and Grant-Funded Research

The types of facilities available at an institution directly impact ability to offer certain types of educational programming and to pursue different service and research opportunities. The survey included a question with six statements about laboratories and grant-funded research asking respondents to respond "Yes" if the statement represented the situation at their institution, "No" if it was not representative of their institution, or to indicate "I don't know." The material below addresses the findings from these queries.

Summary: laboratories and grant-funded research.

The responses to the survey paralleled many common understandings of differences between 2YR and 4YR institutions in respect to the types and uses of labs, the presence of research faculty, grant funding, and course load reduction for faculty who hold grant funding. At the HSIs in the sample, more employees at four-year schools reported facilities to conduct research, emphasis on research, that there were full-time researchers at the institution, that many faculty held grant funding, and that faculty might receive course load reductions to facilitate research. More STEM department personnel than their non-STEM peers reported full-time research faculty and many faculty with research funding.

An interesting but logical finding occurred in respect to knowledge about departmental offerings. Here and with other topics specific to STEM or other subsets of institutional programming, there is indication that one should not expect college and university employees to be informed about

what is happening outside of their department. This was made apparent by the volume of "I don't know" responses submitted.

Details: laboratories and grant-funded research.

One multi-part question was asked about this topic (Appendix 3, Table 13a). The results are discussed below as bullet points related to each concept addressed in the question in the order in which they were presented on the survey.

1. Community college personnel were more likely to report teaching laboratories and not research labs (67.6%) than were their peers at four-year institutions (12.3%) at extremely strong and highly significant levels ($p < .001$, Cramer's $V = .559$). Subsequent post hoc analysis, excluding IDK responses to allow comparison of responses from persons with knowledge about this characteristic of the institutions, confirmed the initial finding ($p < .001$, phi = .610).

2. Initial Chi-Square tests of responses regarding the presence of both teaching and research labs at 2YR and 4YR institutions returned a highly significant difference with strong effect ($p < .001$, Cramer's $V = .527$). Post hoc analysis, excluding IDK responses, also returned a highly significant finding with an extremely strong effect ($p < .001$, phi = -.587). Four-year institutions were more likely, at extremely strong and highly significant levels, to have both teaching and dedicated research laboratories (73.7%) than community colleges, although 31.9% of the CC respondents reported that both existed at their employer.

3. A Chi-Square test was conducted comparing two-year and four-year institutions for PhD holding faculty who do research. A strongly significant result was found with an extremely strong effect ($p < .001$, Cramer's $V = .664$). A second Chi-Square test was performed for full-time research faculty with another highly significant finding but with moderately strong effect ($p < .001$, Cramer's $V = .359$). Post hoc Fischer's Exact tests confirmed the findings ($p < .001$, phi = -.744 and $p < .001$, phi = -.398 respectively) when IDK responses were excluded. Personnel at four-year colleges and universities were more likely, at strong to extremely strong and highly significant levels, to report PhD holding faculty who do research than were those at community colleges, 78.6% to 18.8%, and that the institution had full-time research faculty, 33.9% to 5.8%.

4. A significant difference was found for the comparison of STEM department personnel to non-STEM personnel for reports of PhD holding faculty who do research, 68.0% to 58.0%, and full-time research faculty, 29.9% to 23.3% ($p < .001$ for both, Cramer's $V = .286$ and .381 respectively). Post hoc analysis, excluding the IDK responses, indicated there were no significant differences for either comparison ($p = .190$, phi = -.100 for "doing research;" $p = .270$, phi = -.090 for full-time research faculty). The initial finding was related to the responses of "I don't know" rather than the item of interest, affirmation of the presence of PhD holding faculty who do research.

5. Responses from 2YR and 4YR institutions were compared in respect to faculty having grant funding producing a highly significant finding with moderately strong effect ($p < .001$, Cramer's $V = .379$). Post hoc analysis, excluding IDK responses, revealed employees of four-year institutions in the sample were more likely, with strong effect, than those at CCs to report that many faculty at the institution had grant funding, 60.7% at four-year schools and 24.6% at CCs ($p < .001$, phi = -.438). Within four-year institution 52% of respondents at schools offering primarily bachelor's degrees and some master's degrees and 80% at schools offering two or more doctoral degrees responded in the affirmative.

6. Initial Chi-Square analysis showed non-STEM personnel (58.3%) were more likely than STEM personnel (49.2%) to respond that many faculty at their institution have grant funding ($p < .001$, Cramer's $V = .332$). Post hoc Fischer's Exact tests confirmed this result ($p < .001$, phi = -267) when "I don't know" responses were excluded. This result may be related to the way the query was worded. It asks whether the institution had many faculty members with grant funding rather whether the department did.

7. Initial analysis showed employees of four-year institutions (39.5%) were more likely to report potential for reduction of a faculty person's teaching load to facilitate grant-funded research than their peers at CCs (21.7%) at significant levels with a moderately small effect ($p < .001$, Cramer's $V = .225$). Fischer's Exact post hoc analysis confirmed the finding ($p = .001$, phi = -.271).

8. Initial Chi-Square analysis comparing STEM department personnel to non-STEM personnel for the potential for reduced course loads to facilitate faculty's grant-funded research (42.2% to 27.9%) showed a significant difference with a moderate effect size ($p < .001$, Cramer's $V = .342$). Post hoc Fischer's Exact test analysis found the significant finding was triggered by differences in IDK responses ($p = .526$, phi = -.051) as non-STEM personnel were more likely to respond, "I don't know."

9. Not surprisingly, personnel outside of STEM departments were far more likely to not know what labs and grant-funded research exist in their institution's STEM departments than the personnel in the STEM departments. This was the case for all six of the prompts listed in Table 13a in Appendix 3 and each difference was significant at the $p < .001$ level with moderate effect sizes (Table J).

Table J

Distribution of "I don't know" Answers for Question 9.1

My institution…	STEM	Non-STEM
…has teaching labs but not research labs.	9.9%	33.1%
…has teaching and dedicated research labs.	10.2%	30.2%
…has PhD-holding faculty whose job includes conducting research.	7.8%	29.0%
…employs full-time research faculty.	11.8%	45.7%
…has many faculty members who have grant funding.	14.1%	34.6%
…reduces teaching loads for conducting grant-funded research.	18.8%	51.2%

Distribution of Information about Student Needs and Concerns

Addressing the needs and concerns of students is a frequently discussed topic in higher education with multiple models advanced toward this end (Castellanos & Gloria, 2007; Pascarella & Terenzini, 1991; Tinto, 1993) and entire volumes dedicated to serving subsets of students

(Upcraft, Gardner & Barefoot, 2005). However, dissemination of this information to the front-line personnel who interact with students at colleges and universities is not always practiced or successful. To understand whether dissemination of information about students at the HSIs in the sample was conducted and how it was conducted, two multi-part questions asked about information distributed to college personnel by their employers. These addressed Hispanic culture and the general characteristics of several categories of students including those who identify as Latinx/a/os. One of the questions also asked about provision of professional development regarding Hispanic culture.

Summary: information about student needs and concerns.

Less than a quarter of the respondents in the sample reported that their employer provided personnel with information about concerns of students in the categories queried and/or professional development regarding Hispanic culture. The ordering from most frequently to least frequently reported was information provided about first-generation students, low-income students, Hispanic students, Hispanic culture, and offering cultural competence professional development. In every case, survey respondents at community colleges reported the distribution of the information at higher levels than respondents from four-year institutions and the difference in the overall number of offerings provided was statistically significant when comparing CCs to 4YR institutions.

Details: information about student needs and concerns.

Two questions were asked about information the HSIs provided their personnel regarding students and a number of other key topics. Only the queries related to information about students will be addressed here. The question stem was "My institution/organization provides persons in

my role with....” There were few statistically significant differences between two- and four-year institutions in these response sets but that is the result of very little activity being reported. Very few of the HSIs provide information in the six areas listed and, as a result, there were not many points at which differences by institution type existed. Since there were multiple respondents from many of the institutions, the percentage of HSIs providing their employees information in the areas listed is even lower than the percentage of affirmative responses reported here. The responses regarding the six statements that completed the prompt, reported as agreement based on a select if applies response pattern, are as follows.

1. “Information about Hispanic culture” - Only 12.5% of CC employees and 9.8% of four-year school informants answered “Yes.”
2. “Information about the needs and concerns of first-generation students” - 27.3% of CC employees answered in the affirmative while 18.7% of their peers at four-year institutions noted distribution of this type of information on their campus.
3. “Information about the needs and concerns of Hispanic students” - like with the preceding topics, more community college personnel reported this occurred than 4YR personnel, 19.3% to 12.5%, but less than 20% of respondents noted that their institution did this.
4. “Information about the needs and concerns of low-income students” - this is the first topic for which the comparison of responses by institution type yielded a statistically significant result ($p = .004$, phi = -.146). Community college informants indicated they received this type of information at higher rates than their peers at four-year institutions (27.3% to 14.1%) with a weak effect size.
5. “Professional development regarding Hispanic cultural competency” - this comparison also produced a statistically significant result with a weak effect size. More CC respondents selected “Yes” than employees of four-year institutions (12.5% vs. 5.6%; $p = .026$, phi = -.112) although rates of affirmation were very low.
6. Community college personnel reported that more of the topics listed were addressed at their institutions than informants from four-year institutions. This difference was statistically significant at $p = .005$ with a higher mean response at CCs than at four-year institutions (CC MR: 220.8, 4YR MR: 190.1). The average number of services noted at CCs was 1.1 out of five but it was 0.68 for four-year schools. These figures fit the 95% level of confidence with small gaps between the upper and lower limits (CC lower bound of 0.74 and upper bound of 1.46, 4YR lower bound of 0.51 and upper bound of 0.84).

Individuals who agreed with at least one of the above statements were asked a follow-on question. They were to select all that applied from the following statements:

> (1) “I have used these services,” (2) “I find these services helpful/valuable,” and (3) “I have made changes to my course curriculum I believe to be advantageous for Hispanic students in response to information from a professional development session.”

There were no significant differences in the responses to these questions when comparing CCs to four-year institutions. Respondents stated that 10.9% of them had used at least one of the services listed, 16.4% noted that they found the services helpful/valuable, and 4.7% that they had made changes to course curriculum they believed would be advantageous to Hispanic students based on a professional development session.

Orientation for Parents of Hispanic and First-Generation Students

Student orientation is a longstanding student service pattern (Upcraft, Gardner & Barefoot, 2005). Some institutions are now also providing orientation for the parents of students who are coming to college from families with limited or no experience in higher education. The survey asked two questions about this topic. These questions concerned orientation for the parents of Hispanic and first-generation students coming to the institution.

Summary: orientation for parents.

Only 30% of the respondents reported that their institution had an orientation for parents of first-generation and Hispanic students. As there could be multiple responses from one institution, these offerings exist at less than 30% of the HSIs in the sample. Individuals who identify as Latinx/a/os stated they felt orientation in this area was desirable more often than their non-Hispanic peers.

Detail: orientation for parents.

The questions asked about orientation for parents were: "My institution has an orientation process for parents of Hispanic and/or 1st gen students" and "I would favor the implementation of an orientation process for the parents of Hispanic and/or 1st gen students" (Appendix 3, Table 11). Comparison of community college to four-year institution responses for the first question, 31.3% and 30.3% affirming respectively, was statistically significant with a weak effect ($p = .011$, phi = .180) but Fischer's Exact test post hoc analysis, excluding the IDK responses, was not significant ($p = .098$, phi = -.142) indicating the "I don't know" responses were triggering the significant finding. Comparisons between two- and four-year institutions, personnel in STEM versus non-STEM departments, by gender, and between faculty, staff, and administrative respondents revealed no statistically significant differences for the second question. However, a comparison of the responses of Hispanics and non-Hispanics was statistically significant with ($p = .002$, Z score = -3.13, r = -0.24) with Latinx/a/os at the HSIs more likely to be in favor of an orientation process for the parents of Hispanic and/or 1st gen students. The mean ranks were 107.4 for them and 80.9 for non-Hispanics and the effect size was moderately small.

DACA students

Deferred Action for Childhood Arrivals (DACA) was an executive action of the Obama administration (Alcindor & Stohlberg, 2017). It allows persons brought to United States when they were under the age of 16 and who have lived in the US since 2007 to apply for work permits which are renewable (Napolitano, 2012). These provisions have been controversial and potential applicants were concerned about unintended consequences of applying for DACA status. Institutions of higher education have taken up the cause of these students (American Council on Education, 2019). The survey asked two questions about DACA students. The first asked whether they were present in the institution's student population and the second asked whether the college or university's administration had taken steps to protect DACA students.

Summary: DACA students.

Individuals with Differed Action for Childhood Arrivals (DACA) status were reported to be present at many of the HSIs in the sample with 72.6% of CC and 52.8% of 4YR respondents affirming their presence. Even though this was the case, over 50% of the respondents did not know if the administrations at their institutions had taken measures to protect these students.

Detail: DACA students.

DACA students were reported at a majority of the institutions (Appendix 3, Table 12). None of the respondents selected "No" when asked if DACA students were represented in their institution's student population and more CC personnel agreed with this statement than employees of four-year institutions, 72.6% to 52.8%, at a significant level with a weak effect size ($p = .001$, $phi = .168$). Faculty and staff at four-year institutions also answered "I don't know" much more than their CC peers with an overall IDK response of 42.7%. Only persons who agreed with the statement that DACA students were present at their institution were asked if these students had been provided protected status by the administration. More than half of the respondents at CCs and at four-year institutions responded, "I don't know," 55.0% and 52.3% respectively, and the percentage of persons agreeing were very similar for the two types of institutions, 33.3% for two-year and 28.9% for four-year schools.

Perceptions about Hispanics

Perceptions about Hispanic Cultural Values

Vincent Tinto (1993) developed a theory regarding the causes of student attrition. Academic and social integration as experienced by students are key components of his model and inability to feel fully integrated, especially in a social and cultural sense, is often cited as a barrier to persistence of Hispanic college students (Gil, n.d.; Chavez, 2014). This topic was also discussed by informants in the focus groups and interviews conducted as the first stage of the investigation. Because of this, understanding of and ability to relate to persons identifying as Hispanic were two topics that received significant attention on the survey. The first group of questions related to this topic considered survey respondents' perceptions of the availability of information about and the elements of Hispanic culture.

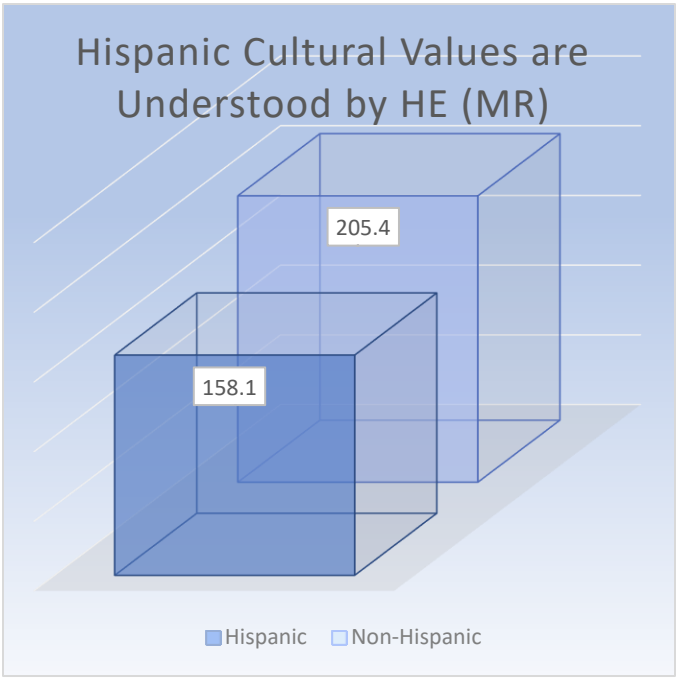


Figure 5

Summary: perceptions about Hispanic cultural values.

Hispanics informants disagreed with their non-Hispanic peers regarding the availability of information about Hispanic culture, whether Hispanic culture is understood by higher education

professionals, and about the particulars of Hispanic culture. Disagreement to this extent and at consistently high levels of significance and effect seems to indicate, at a minimum, limited competence regarding Hispanic culture on the part of the non-Hispanics working at HSIs. This could result in unintended slights and misunderstandings often termed micro-aggressions (Sue et al, 2007; Perez II, Garcia-Louis, Ballysingh & Martinez, 2018). It could also result in Latinx/a/os individuals, employees and students, feeling a sense of cultural dissonance (Sharkawy, 2015).

The consistency in the responses provided by Hispanics supports the validity of the list of cultural characteristics in the survey. It suggests that the list of values presented represents commitments within the Hispanic community, at a minimum, for the south-central portion of the United States.

Details: perceptions about Hispanic cultural values.

The survey included questions about Hispanic cultural values (Appendix 3, Table 14). The questions were developed based on information in the literature about Mexican-American culture, comments made by focus group and interview informants, and team conversations as two of the researchers identify as Hispanic. Mexican –American cultural values were the focus as much of the seven-state region in which the survey was deployed was once a part of Mexico and a large portion of the Hispanics in the region claim Mexican heritage. The question about cultural values grouped 13 statements following the prompt "Hispanic values are..." One was a general statement about the comprehension of Hispanic cultural values in higher education and the other 12 statements described specific cultural commitments. A five-point Likert scale was employed for responses (the range was from strong disagreement to strong agreement). For the general statement and ten of the 12 cultural commitments, persons who identified as Latino/a (Hispanic on the survey) had a statistically significant difference in understanding than their institutional peers. Details of findings from the analysis of the responses are in Table K (mean rank figures are in Table 14 of Appendix 3). Hispanic respondents were less likely to agree that "Hispanic cultural values...are understood by higher education" ($p = .006$, Z score = 2.77) with small effect ($r = -0.14$) (Figure 5). The remainder of the responses support this finding as Hispanic informants had different response patterns than their non-Hispanic peers. Hispanic respondents were more likely to agree with most of the 12 statements about Hispanic cultural values listed on the survey than their non-Hispanic counterparts at statistically significant levels with small to moderately small effect sizes (Table K).

Table K

Responses of HSI Faculty, Staff, and Administrators Re: Hispanic Cultural Values

Hispanic Cultural Values...	p value	Z score	r
Emphasize hard work.	< .001	-5.78	-0.29
Are diverse.	< .001	-4.04	-0.20
Include confidence in one's ability to succeed.	< .001	-4.01	-0.20
Include accepting uncertainty in life.	= .040	-2.05	-0.10
Include taking each day as it comes.	= .081	-1.75	-0.09
Hold that events are predetermined.	= .179	-1.34	-0.07
Emphasize esteem, patience, and politeness.	< .001	-4.07	-0.21
Prioritize strong family relationships.	= .003	-2.97	-0.15
Reinforce deferring to authority.	< .001	-3.71	-0.19
Prioritize earning income over attending college.	=.011	-2.54	-0.13
Reinforce gender norms in family roles.	= .005	-2.81	-0.14
Hold a common set of beliefs.	< .001	-3.50	-0.18

Note: denotes a statistically significant difference.

Figures 6 and 7 below provide a visual representation of the differences between Latinos/as and non-Hispanics in responses to these questions.

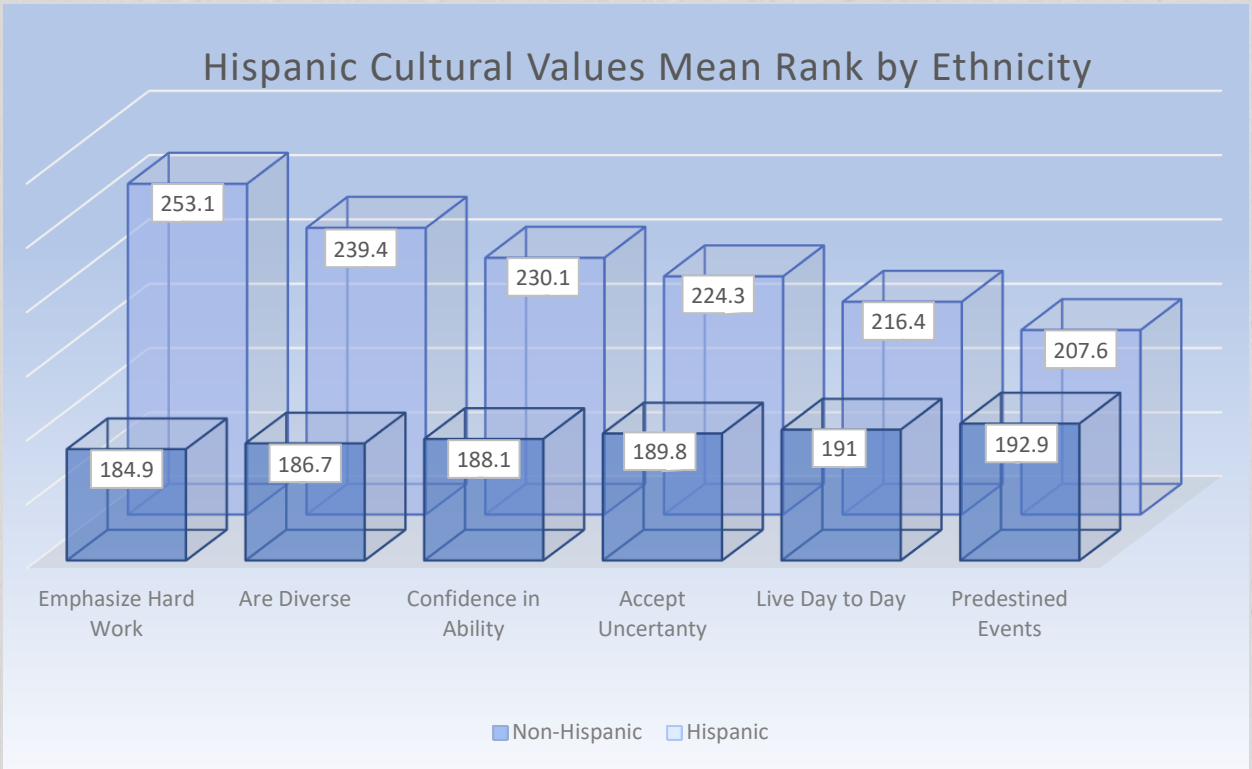


Figure 6

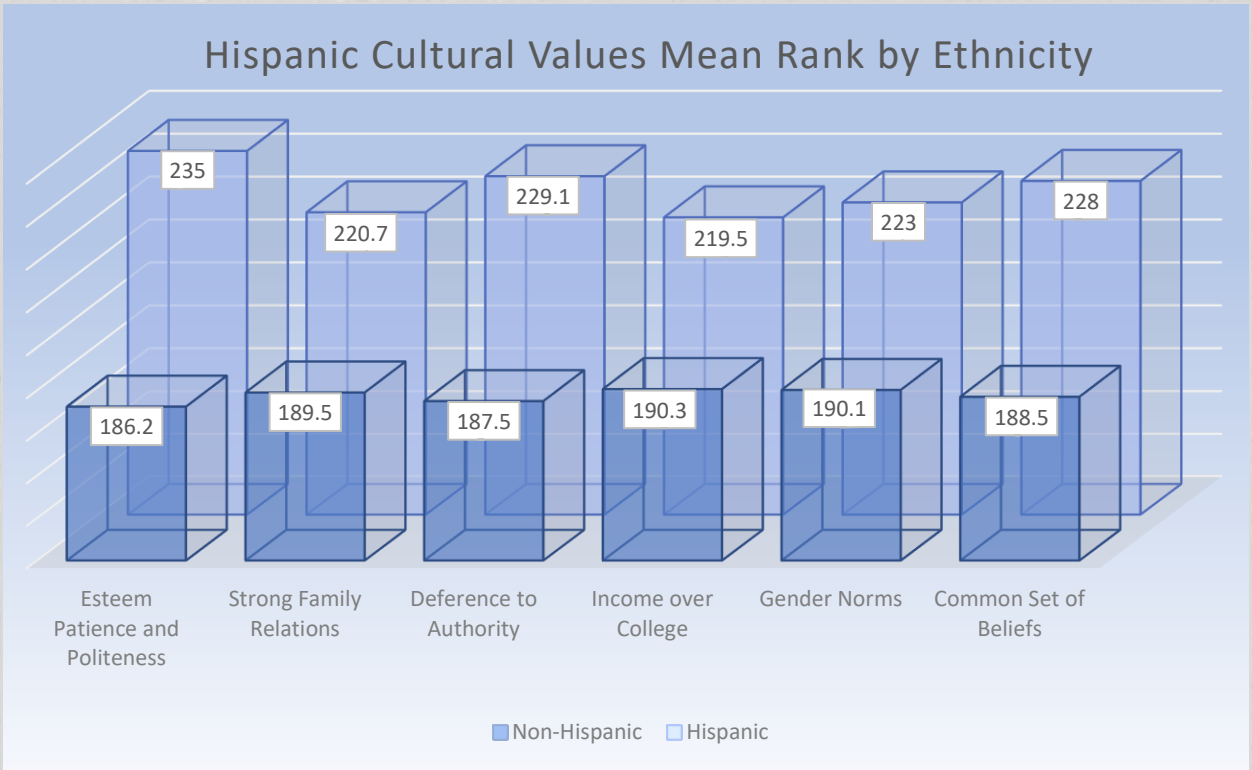


Figure 7

The survey takers were also asked questions about the families of students. The question stem was, "Regarding families, Hispanic students have..." Two statements followed, "parents who influence their decisions" and "families who demand time/resources" (Appendix 3, Table 15a). For both of the statements, responses were analyzed based on gender, ethnicity, institutional role, and type of institution. The results are as follows.

1. In respect to "parents who influence their decisions," there were no statistically significant differences for ethnicity, institutional role, or type of institution, though the Hispanic to non-Hispanic comparison approached statistical significance ($p = .051$, Z score = -1.95). Overall, 84.2% of respondents agreed with this statement. However, females were more likely to agree than their male peers ($p = .039$, Z score = -2.09) with weak effect ($r = -0.11$). This may be an artifact of the high percentage of survey respondents who identify as both Latinx/a/os and female.

2. For "families who demand time/resources," institutional role and institution type showed no significant differences and the overall level of agreement was 79.5%. Hispanics and females, though, were more likely to agree with this statement ($p = .006$ for both, Z score respectively of -2.75 and -2.73). Both comparisons had small effect sizes ($r = -0.14$ for both). This also may be a situation in which the number of respondents identifying as Hispanic and female influenced the finding.

Two other questions were asked that are directly associated with Hispanic culture (Appendix 3, Table 20). A prompt "Actionable information is available..." was followed by two short statements. These were "about challenges Hispanics face in higher education" and "comparing Hispanic culture to higher education culture." Comparisons of responses to these questions were made for gender, ethnicity, institutional role, and type of institution. Both ethnicity and gender showed statistically significant results. Latinx personnel were less likely to agree with small effect sizes with these statements than their non-Hispanic peers ($p = .009$, Z score = -2.68, $r = 0.14$; $p = .002$, Z score = -3.02, $r = 0.16$ respectively). Women were less likely to agree than men, again with small effect sizes ($p = .025$, Z score = 2.24, $r = 0.11$; $p = .042$, Z score = 2.03, $r = 0.10$ respectively). The agreement between Lationx/a/os and females may, as noted above, be an artifact of the Hispanic sample skewing female.

The Hispanic informants, regardless of area of responsibility, gender or employer, disagreed with their non-Hispanic co-workers consistently and in every topic area. They felt more strongly than their non-Hispanic peers that the values listed on the survey represented Hispanic culture. They also felt to a greater degree that families making demands on time and resources was an accurate description of the circumstances of Latinx/a/os college students. Lastly, they were less inclined to agree that actionable information is available "about challenges Hispanics face in higher education" and "comparing Hispanic culture to higher education culture." These contrasts are all the more striking as they occurred even for topics that are generally accepted to be characteristics of Hispanic culture and lifestyle like strong family relationships and commitment of time and resources to one's family of origin.

Perceptions about Hispanic Students

What faculty, staff, and administrators know or even believe about the students they serve is important. It is these understandings that are relied on in policy development and decision making. Having a good understanding of the backgrounds, common characteristics, and cultural orientations of Hispanic students is important if appropriate decisions are to be made about policies intended to benefit them and programming intended to reach and support them. The survey asked three multi-part questions in this topic area.

Summary: perceptions about Hispanic students.

Like was the case with Hispanic culture, individuals who identify as Latinx consistently and strongly disagreed with non-Hispanics about the characteristics of Hispanic students. This existed in respect to queries about the background of Latinx/a/os students, their preparation for college, their commitments while in college, barriers they might face to success in college, and their preferences. There were also some differences by institution type and STEM affiliation which may be related to the portion of the student population served by the informant although at each point these opinions align with the general opinion of Hispanics in the topic area.

Responses to a question about why Hispanic students might attend local colleges and universities allowed a rank ordering. Listed from most frequently to least frequently selected they are family

influence (92.8% of respondents), finances (86.3%), familiarity (64.2%), community connections (45.4%), personal preference (37.9%), and other (4.1%).

Details: perceptions about Hispanic students.

The information about how faculty, staff, and administrators in the sample perceive Hispanic students was obtained using matrix questions (Appendix 3, Tables 16a and 16b). These involved a short question stem followed by a series of responses. This pattern was employed to ask a series of short questions about what the respondents felt described the backgrounds of their institution's Latinx students and how these students could be characterized in a number of areas of concern in higher education. The question stems were simple three-word phrases. The first to occur on the survey was "Hispanic students have…," the second was "Hispanic students are…." Both matrices employed a five-point Likert scale for responses. The bullet points that follow will present findings from nine of the statements associated with "Hispanic students are…" and then three others from the "Hispanic students have…" group. Other subjects addressed in the matrices will be discussed later in this report. Notable information from the question "Hispanic students are…" is as follows (Table L).

1. The most striking and substantial pattern was that for all nine of the queries considered here, individuals identifying as Hispanic expressed a viewpoint that was significantly different than non-Hispanics regarding Latinx/a/os students. In each case, Hispanics were far more likely to agree with the statements that were part of the survey. The effect sizes ranged from small (r = -0.15 and -0.16) to moderate (r = -0.30 and -0.31). The statements, respective p values, associated Z scores, and Pearson's r values appear in Table L.

Table L

Comparison of Hispanic to Non-Hispanic Responses Regarding the Characteristics of Hispanic Students

Hispanic Students Are...	p value	Z score	r
Under-prepared for college math.	< .001	-3.68	-0.19
Under-prepared to navigate college processes.	< .001	-6.14	-0.31
Primarily first-generation students.	= .002	-3.09	-0.16
From low SES backgrounds.	= .001	-3.23	-0.16
Working to attend college.	< .001	-4.35	-0.22
Routinely involved with family members.	= .004	-2.91	-0.15
Unlikely to seek help.	< .001	-5.87	-0.30
Arriving with inaccurate information about college.	< .001	-4.87	-0.25
Going to college in or near their home towns.	< .001	-4.03	-0.20
Note: denotes a statistically significant difference.			

This is a second instance in which the understanding of Latinx/a/os at the HSIs diverged from that of their non-Hispanic peers in a consistent and statistically significant manner about a topic important at HSIs, the characteristics of Latinx students.

2. There were no statistically significant differences in responses of males and females regarding the nine items listed in Table L.

3. Responses from community college employees differed from those of persons employed at four-year institutions for three of the items: (1) under-prepared for college math ($p = .031$, Z score = -2.16) with small effect ($r = -0.11$), (2) arriving with inaccurate information about college ($p = .005$, Z score = -2.80) with small effect ($r = -0.14$), and (3) going to college in or near their home town ($p < .001$, Z score = -4.16) with moderately small effect ($r = -0.21$). In each case, CC personnel were more likely to agree with the statement. It is possible that this response pattern is related to the student population of the 2YR institutions in the sample attract.

4. Comparison of responses from STEM and non-STEM personnel resulted in three statistically significant findings with STEM personnel more likely to agree. These were for the statements that Latinx students are under-prepared for college math ($p = .044$, Z score = -2.02), under-prepared to navigate college processes ($p = .019$, Z score = -2.34), and primarily first-generation students ($p = .026$, Z score = -2.23). Each of these differences had a small effect size, $r = -0.10$, -0.12, and -0.11 respectively.

5. Responses of faculty, staff, and administrators showed statistically significant differences for seven of the nine items with staff and administrators disagreeing with each other in respect to each (Appendix 3, Tables 16a and 16b) but there were not statistically significant differences between the responses of faculty and administrators even when divided into 2YR and 4YR pools. This may be a product of the responsibilities and professional associations of faculty and administrators placing greater emphasis on information about minority students than those associated with staff.

Results for the three statements that completed the question stem "Hispanic students have…" and that addressed general understandings about Latinx/a/os students and their background were as follows (Appendix 3, Tables 15a and 15b).

1. The statement "preference for majors leading to local employment" elicited responses exhibiting multiple statistically significant patterns. Hispanics were more likely to agree with this statement than non-Hispanics ($p = .004$, Z score = -2.89), with small effect ($r = -0.15$), as were community college personnel in comparison to their peers at four-year institutions ($p = .002$, Z score = -3.12) also with small effect ($r = -0.16$). An even stronger result was found comparing faculty, staff, and administrators ($p < .001$, H score = 17.3) with administrators far more likely to agree with the statement, staff more likely to disagree, and faculty occupying a middle ground. STEM versus non-STEM personnel had a lower level significant result ($p = .047$, Z score = -1.99) and small effect ($r = -0.10$), with STEM personnel more likely to agree while there was not a statistically significant difference between responses from males and females.

2. There was one primary finding for the statement "language barriers hindering success." This was in the Hispanic versus non-Hispanic comparison ($p < .001$, Z score = -4.66) with Hispanics more likely to agree with the statement with moderately small effect ($r = -0.24$). The only other significant difference was between males and females with females more likely to agree ($p = .045$, Z score = -2.01) with small effect ($r = -0.10$) but this could reflect the high percentage of the Hispanic respondents who were female (over 68%).

3. Hispanics also felt that the statement "difficulty with college culture" was accurate to a significantly greater extent than non-Hispanics ($p < .001$, Z score = -7.03). This was a strongly significant result with a moderate effect ($r = -0.36$). The distribution of responses from Latinos/as and non-Hispanics were polar opposites. The only other comparison that was significant was for faculty, staff, and administrators with administrators far more likely to agree with the statement, staff more likely to disagree, and faculty occupying a middle ground ($p = .007$, H score = 9.86).

The question about Hispanic students attending college in or near their home town was the final one in the matrix. Individuals who agreed or strongly agreed with the statement were asked to select all that applied from a group of possible explanations for the behavior (Appendix 3, Table 17). Six possible explanations were offered, "personal preference," "family influence," "familiarity," "finances," "community connections," and "other." Comparisons were made on the basis of ethnicity, gender, STEM affiliation, and area of responsibility.

1. There were no statistically significant findings for "personal preference" in the comparisons as 30% to 40% of respondents in each of the subsets agreed with this statement.

2. The "family influence" response set yielded one statistically significant finding with a weak effect size ($p = .005$, phi = .165). Employees of four-year institutions were more likely to agree with this statement than their CC peers.

3. While there was only one statistically significant result for "family influence." all subcategories of respondents felt the Latinx students' families had a strong influence as between 90% and 98% of informants by subcategory (e.g., male and female, faculty, staff, and administrators) agreed with this statement.

4. "Familiarity" yielded no significant differences in the comparisons but was also felt to be a strong influence with males being the only subcategory that agreed with this statement at a rate below 60% (males = 57.6%).

5. "Finances" and "community connections" also had no statistically significant differences when comparisons were made using the respondents' ethnicity, gender, role, and STEM employee status. However, "finances" was considered to be another strong influence as the lowest level of agreement with this statement was for staff at 84.6%.

6. Very few informants selected “Other” and there were no statistically significant findings even though ethnicity, gender, institution type, institutional role, and STEM affiliation were considered.

A rank ordering of the ratings of reasons for Latinos/as attending college in or near their home towns is, using overall response rates: (1) family influence (92.8%), (2) finances (86.3%), familiarity (64.2%), (3) community connections (45.4%), (4) personal preference (37.9%), and (5) other (4.1%).

Perceptions about Hispanic STEM Students

Several topics of interest to higher education professionals form the background of questions asked about Latinx/a/os students and STEM fields. The first is, as described above, the underrepresentation of Hispanics in STEM study and the STEM workforce. The second is the potential for positive impact by student organizations. Student organizations at colleges and universities are formed based on a variety of student commitments, interests, and forms of identity. These offerings are also considered to be means of social support and integration (Kraemer, 1997; Guiffrida, 2003; Museus, 2008). The survey asked questions about the informants’ understanding of the personal background of, relationship to STEM for, and participation in student organizations by Hispanic students. The findings are addressed below beginning with questions about background and ending with a question about influences on participation in student organizations.

Summary: Hispanic students in STEM.

In the survey responses, there continued to be disagreement between Latinos/as and non-Hispanics over the characteristics of Hispanic students. While there were mixed results by institution type and institutional role, Hispanics disagreed with their peers about Latinx/a/os students having limited personal history with STEM professionals, being unaware of STEM opportunities, being intimidated by STEM, not identifying with STEM, and being underrepresented in upper-level STEM courses. The Hispanic FSA surveyed felt each of these was the case to a greater degree than non-Hispanics. The preceding section of the report noted Hispanics felt language barriers and difficulty with college culture existed for Latinx/a/os students. Impediments to participation in student organizations and extra-curricular activities were also addressed. Both family and work commitments were seen as primary inhibitors to Latinos/as studying STEM participating in student organizations and extra-curricular activity.

Detail: Hispanic students in STEM.

Hispanics are underrepresented in the US STEM workforce and in STEM degree programs. And close to two-thirds of the Hispanic students attending college are enrolled at HSIs (Revilla-Garcia, 2018). This makes understanding what employees of Hispanic-Serving Institutions know and believe about Latinos/as studying STEM an important concern. A matrix question was asked about the background of Latinx/a/os students in STEM, their orientation toward STEM, and their representation in STEM study at the institutions of respondents.

1. Three significant findings occurred for the statement "Hispanic students have…limited personal history with STEM professionals" (Appendix 3, Tables 15a and 15b). Most Hispanics agreed with this while most non-Hispanics did not ($p < .001$, Z score = -4.78) with a moderately small effect ($r = -0.24$). Persons working in STEM departments agreed far more often than persons not working in STEM departments ($p = .001$, Z score = -3.09) with small effect ($r = -0.16$). There was also a statistically significant difference in responses provided by faculty, staff, and administrators ($p = .001$, H score = 13.6) with administrators far more likely to agree with the statement, staff more likely to disagree, and faculty occupying the middle ground.
2. Hispanics and community college personnel both agreed with the idea that "Hispanic students are…unaware of STEM opportunities" (Appendix 3, Table 18) at much higher rates than, respectively, non-Hispanics ($p < .001$, Z score = -6.05) with a moderate effect ($r = -0.31$), and employees of four-year institutions ($p = .011$, Z score = -2.54) with a small effect ($r = -0.13$). No other comparisons yielded significant results.
3. Only Hispanics, in comparison to non-Hispanics, and females, in comparison to males, felt that "Hispanic students are…intimidated by STEM" (Appendix 3, Table 18). This was another instance in which the responses from Latinx and non-Hispanic FSA were polar opposites with Hispanics responding predominantly and with moderate effect that Latinx/a/os students are intimidated by STEM while their non-Hispanic peers responded that this was not the case ($p < .001$, Z score = -6.74, $r = -0.34$). The p value for the difference found by gender was $p = .004$ (Z score = -2.89) which was also strongly significant although with a small effect ($r = 0.15$). This result may have been influenced by approximately two-thirds of the Latinx respondents being female.
4. Hispanics and community college personnel both agreed with the idea that "Hispanic students are…not identifying with STEM" (Appendix 3, Table 18) at much higher rates than, respectively, non-Hispanics ($p < .001$, Z score = -6.10) and employees of four-year institutions ($p = .032$, Z score = -2.15). Like with the preceding question, the effect size for the Latinx/a/os to non-Hispanic comparison was moderate ($r = -0.31$). The institution type comparison had a small effect ($r = -0.11$). No other comparisons yielded significant results.
5. Strongly statistically significant differences in response patterns existed for Hispanics and non-Hispanics ($p < .001$, Z score = -6.48), with moderate effect ($r = -0.33$), and between faculty, staff, and administrators ($p = .001$, H score = 13.65) for the statement "Hispanic students are…under-represented in upper-level STEM classes."

Five possible influences were listed in respect to "Hispanic STEM students' ability to participate in student organizations or extra-curricular activity" (Appendix 3, Table 19a and 19b). Table M lists the areas in which significant findings occurred for the set of prompts.

Table M

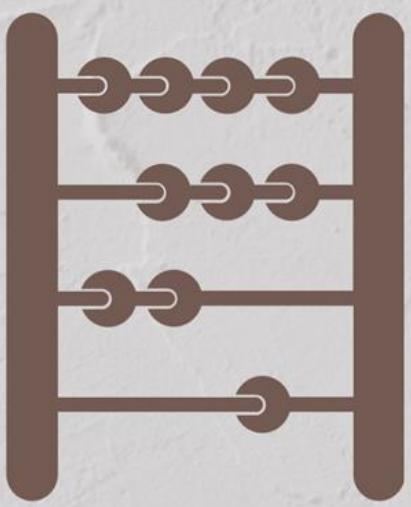
Areas in Which Statistically Significant Findings Occurred Regarding Hispanic Student Participation in Student Organizations and Extra-Curricular Activities

Hispanic STEM students' ability to participate in student organizations or extra-curricular activity is impacted by…	Gender	Hispanic vs. non-Hispanic	2YR vs. 4YR	STEM vs. non-STEM	Faculty, Staff, Admin
…living off campus.	Sign.	Sign.	-	-	-
…heavy course loads.	-	Sign.	-	-	-
…family commitments.	Sign.	Sign.	Sign.	-.	Sign.
…work commitments.	Sign.	Sign.	Sign.	-	Sign.
…language barriers.	-	-	-	Sign.	-

The particulars of statistical analysis for this question are as follows.

1. Hispanics ($p = .025$, Z score = -2.24) and females ($p = .043$, Z score = -2.03) felt "living off campus" was a likely explanation, both with weak effect size ($r = -0.12$ and -0.11 respectively), although this may be an instance in which the high number of females in the Latinx/a/os respondent pool impacted the result.
2. Only Hispanics felt that "heavy course loads" were a plausible explanation at significant levels with small effect ($p = .003$, Z score = -3.00, $r = -0.16$).
3. Only the comparison of responses from STEM personnel to persons who did not work in a STEM department was without a significant result with small effect size for the statement "family commitments" (Hispanics vs. non-Hispanics – $p = .002$, $r = -0.16$; CC vs. four-year – $p = .010$, $r = -0.13$; female vs. male – $p = .001$, $r = -0.17$; faculty, staff, and administrators – $p = .001$, H score = 13.28).
4. Like the preceding topic, for the statement "work commitments" only the STEM to non-STEM comparison did not yield significant results. Hispanics were far more likely to agree than non-Hispanics ($p < .001$, Z score = -4.35, $r = -0.22$), community college personnel were more likely to agree than employees of four-year institutions ($p = .037$, Z score = -2.08, $r = -0.11$), females more likely to agree than males ($p = .013$, Z score = -2.50, $r = -0.13$), and administrators more likely to agree than faculty or staff ($p = .022$, H score = -7.60). For "work commitments," all the comparisons had small effect sizes.
5. For the last influence, "language barriers," only the STEM versus non-STEM personnel yielded a significant result. Non-STEM personnel were more likely to agree with this statement with small effect ($p = .042$, Z score = 2.03, $r = 0.11$).

While these findings do not present a precise and well-defined result, they do indicate that Latinx faculty, staff, and administrators in the sample continue to disagree with their non-Hispanic peers about Latinx/a/os students and that there is a general consensus around family and work commitments as the primary inhibitors of participation by Hispanic student who study STEM in student organizations and extra-curricular activities.



Institutional Systems to Aid and Support Students

Academic and Support Programming

Theories advanced in the realm of student support programming like those of Tinto (1990) and Terenzini and Pascarella (1980; Pascarella & Terenzini,1991) and Alexander Astin (1993) have become widely accepted in higher education. Much research has been completed regarding facilitating student success based on the work of these individuals and that of others. Entities like the John N. Gardner Institute for Excellence in Undergraduate Education have devoted considerable energy to "improving outcomes associated with teaching, learning, retention, and completion" (2018) and professional organizations and journals have been founded in this area like the National Association of Academic Advisors (NACADA) and its NACADA Journal. These efforts have included a significant emphasis on "equity and social justice" (Gardner Institute, 2018) with a growing emphasis on impacts on Hispanic students. As continuing improvement in means of aiding and supporting college and university students, and increasingly Latinos/as, continues to be an important topic, the survey sought information in this area. Questions addressing patterns of academic support offered to students at the informants' HSIs occurred at various points in the survey. These included consideration of student to instructor ratio, 26 different forms of instruction and/or academic support often present at colleges and universities and frequently considered in the research literature, and topics addressed specific to Latinos/as who are studying STEM.

Summary: academic support programming.

The survey asked for responses about dozens of topics in the realm of academic support programming. From these, key findings are as follows. Over one-third of the respondents, 35.5%, reported their institutions had a way of identifying early STEM interest among students and close to 70%, regardless of institution type, reported the presence of an early alert system, a

means of informing faculty and staff of academic challenges arising for a student. Yet in respect to offerings targeting Hispanic students, only the two most general forms of support service considered on the survey were reported by more than 50% of respondents. All others were reported by less than 30% of informants and very few institutions were reported to be using predictive analytics in student support.

Similarly, low student to teacher ratios were generally felt to be important although there were some differences about how beneficial it was in STEM and with specific groups of students. Even though 86.7% of all respondents felt low student to teacher ratios were important for "facilitating faculty/student rapport," only 51.4% agreed or strongly agreed their employer "prioritizes low student to teacher ratios."

Responses regarding programing at community colleges support their reputation as teaching institutions as they were more likely to offer a number of the support mechanisms listed in the survey than 4YR institutions and appear to be more invested in offering technology-based forms of instruction and support. This even extended to activities commonly occurring in higher education like the availability of online courses, regularity with which curriculum was updated, and the provision of tutoring. Departures from this pattern were areas in which four-year institutions would be expected to have more substantial commitments, internships and undergraduate research.

Approximately 50% of respondents indicated institutional leaders emphasized support for Latinx/a/os students, 38% noted institutional leaders regularly fund activities that support Hispanic students, and 36% of the informants reported their institutions had "personnel whose primary responsibility is interacting with and supporting Hispanic STEM students." Faculty, staff, and administrators who identify as Hispanic strongly disagreed with non-Hispanics about their institutions using institutional records to identify STEM interest among Latinx students. Less than one-third of the respondents noted their institution had an orientation for the parents of Latinx and/or first-generation students. Latinx FSA also disagreed with their non-Hispanic peers about the extent to which their employers emphasized STEM identity with Hispanic students.

Details: academic support programming.

a. Student to instructor ratio.

Several questions on the survey addressed the ratio of faculty to students in academic settings (Appendix 3, Table 23). The first requested a response to a simple statement, "A low student to teacher ratio is important for facilitating faculty/student rapport." Response options were "Yes," "No," and "I don't know." All categories of respondents felt low student to instructor ratios were important with 86.7% overall agreement for this query and 93.0% when it was repeated. Since very few individuals responded "No," hypothesis testing was not possible between STEM and non-STEM personnel and for comparison of responses given by faculty, staff, and administrators. At a separate point in the survey, a related question was asked. That was "My institution...prioritizes low student to teacher ratios." Like with the first question, the primary

response was agreement (median response = agree on a five-point Likert scale) with 51.4% of respondents agreeing or strongly agreeing.

The question immediately following the first query about the ratio of students to faculty allowed respondents to select all that applied from a list of six possible endings to "Low student to teacher ratio is important..." (Appendix 3, Table 24). Overall, more than 70% of survey respondents indicated they felt low student to teacher ratios were important. Comparisons of responses based on ethnicity, gender, type of institution, affiliation with a STEM department, and role at the institution were completed for all six possible answers. For the first statement, "in STEM instruction," STEM personnel showed greater agreement (90.2%) than non-STEM (73.2%), significant at $p < .001$ with a moderately weak effect size (phi = -.220). For the second statement, "for Hispanic students," there was also only one statistically significant finding. This was related to ethnic identity with Hispanics (84.1%) feeling more strongly that non-Hispanics (66.5%) that Latinx/a/os students benefited from low student to teacher ratios ($p = .007$, phi = -.160) with a weak effect. The next group of students considered was first-generation students. As approximately 80% of respondents or more, in all categories, felt that first-generation students benefited from low student to teacher ratios, there were no statistically significant differences. The same result was found in respect to "students from low SES backgrounds" as between 70% and 80% of persons in all categories felt these students would benefit from the lower student to instructor ratios. Results for "female STEM students" were similar, although in this case the levels of agreement were lower (low of 59.7% and high of 77.6%). The last statement in this set mimicked the original query as it was "to facilitate faculty/student rapport." There were no statistically significant differences found in the comparisons made and the percent agreement was high like for the earlier question (range 89.4% up to 98.0%). These responses make a rank ordering possible. Informants felt low student to teacher ratios were beneficial for: (1) facilitating faculty/student rapport (93.0%), (2) first-generation students (84.1%), (3) in STEM instruction (81.9%), (4) for students from low SES backgrounds (73.9%), (5) for Hispanic students (70.4%), and (6) for females studying STEM (62.7%).

b. Types of support programming offered.

To gauge the types and variety of student support programming offered by HSIs, a list of 26 possible interventions was generated by the research team (Appendix 3, Tables 28a, 28b, 28c, 33a, 33b, and 33c). These were gathered from the literature, referred to by informants in the qualitative phase of the investigation, or suggested by research team members based on experience. Respondents were asked to state whether any of the interventions were enacted by their department and whether "all...STEM departments implement this." Comparisons of responses from community college personnel and employees of four-year institutions were made for each of the 26 activities. The percent agreement for each is listed in Table N. For the second set of comparisons, "All our STEM departments implement this," only STEM personnel answers are reported in the table to prevent statistically significant response patterns triggered by differences in the number of "I don't know" answers submitted by non-STEM personnel.

Table N

Percent Agreement Regarding Presence of a Variety of Student Support Programs

Activity/Intervention	My Department has Implemented This		All Our STEM Departments Implement This	
	CC	4YR	CC	4YR
Course podcasts	9.0%	5.4%	2.9%	2.4%
Course video-casts	27.9%	19.5%	31.4%	12.0%
Dual credit courses	84.5%	45.3%	73.0%	27.7%
Early College programming	74.3%	24.1%	58.3%	16.9%
Emphasis within courses on Hispanic contributions	25.4%	8.0%	11.1%	4.9%
Experiential or project-based learning	73.9%	58.0%	52.8%	37.3%
Field Trips	58.8%	51.5%	38.9%	25.9%
Freshman seminars	42.6%	50.0%	29.7%	45.1%
Guest lecturers	66.2%	63.1%	40.5%	40.2%
Guided pathways	75.7%	23.4%	64.9%	17.3%
Holistic approach to student support (academic, psychological, social, cultural)	53.6%	35.3%	36.1%	14.8%
Hybrid classes	76.8%	51.2%	56.8%	26.3%
Instructional labs	82.6%	62.4%	80.6%	62.2%
Interdisciplinary instruction	44.1%	38.8%	38.9%	21.0%
Internships	47.8%	61.5%	25.0%	33.3%
Inverted classrooms (online vide instruction + classroom application time)	48.6%	30.8%	27.8%	21.0%
Leadership training for students	36.8%	36.5%	19.4%	16.3%
Learning communities	50.7%	42.9%	44.4%	31.3%
Faculty formally mentoring students	42.0%	43.5%	36.1%	32.5%
Online courses	85.5%	64.0%	88.3%	37.0%
Students mentoring other students	50.7%	53.0%	44.4%	30.9%
Regular updating of course curriculum	81.2%	66.2%	72.2%	49.4%
Supplemental instruction	68.1%	56.8%	63.9%	37.0%
Tutoring	84.3%	63.3%	83.3%	48.1%
Undergraduate research	33.8%	70.6%	41.7%	61.0%
University classes taught at community colleges	36.8%	14.6%	31.4%	12.3%

Note: denotes a statistically significant difference. See Appendix 3 and Tables 28a, 28b, 28c, 33a, 33b, and 33c for significance values and effect size.

Notable findings are as follows. Community college personnel reported the practices listed more frequently than 4YR personnel in all but a few categories. The exceptions were areas in which one would expect the four-year schools to offer programming, freshman seminars, internships, and undergraduate research. There were also two that had mixed results. These were faculty formally mentoring students and students mentoring other students were there was a virtual tie

for the respondents' department but a switch to CC personnel reporting them more for all STEM departments. Community colleges led in areas in which one would expect them to, dual credit, early college programming, guided pathways, and university courses taught at community colleges. A third observation worthy of note is CCs being reported to be more broadly innovative as respondents indicated they engage in most of the practices to a greater extent than 4YR institutions with statistically significant differences in video-casting, emphasis of Hispanic contributions to the discipline, hybrid classes, online courses, and regular updating of curriculum.

A three-part question was positioned immediately after the large matrix that Table N summarizes. One of the options is applicable to this discussion as it asked whether the institution targeted "Hispanics with the practices" respondents selected from the list in Table N (Appendix 3, Table 34). There were no significant differences in the responses received from two-year and four-year institutions with the median response being "Neither Agree or Disagree."

At a separate point in the survey a question was asked about a specific type of field trip (Appendix 3, Table 36c). The survey statement was "My institution...organizes course trips to local businesses, labs, and facilities." The mean ranks for CCs (MR 113.2) and 4YR schools (MR 125.8) were similar and there was no statistically significant difference found by institution type with the median response being "Neither Agree or Disagree."

As described in the institutional characteristics section of this report, the survey also asked for responses to two statements about student orientation (Appendix 3, Table 11). These were: "My institution has an orientation process for parents of Hispanic and/or 1st gen students" and "I would favor the implementation of an orientation process for the parents of Hispanic and/or 1st gen students." Less than one third of respondents, 30.6%, reported their employer had an orientation for parents of Hispanics or first-generation students and when asked if they would favor such an orientation the median and mode response was "Agree." Community college respondents were more likely to respond "No" to the first question at statistically significant levels ($p = .011$, phi = .180) with a weak effect size. Comparisons between two- and four-year institutions, personnel in STEM versus non-STEM departments, by gender, and between faculty, staff, and administrative respondents revealed no statistically significant differences for the second question. However, a comparison of the responses of Hispanics and non-Hispanics was statistically significant ($p = .002$, Z score = -3.13) with Hispanic respondents more likely to be in favor of an orientation process for the parent of Hispanic and/or 1st gen students with a moderately weak effect size ($r = -0.24$).

c. Support for Hispanic students studying STEM.

The survey included the statement "My institution/organization has personnel whose primary responsibility is interacting with and supporting Hispanic STEM students" (Appendix 3, Table 40). The responses possible were "Yes," "No," and "I don't know. " There was no significant difference between responses from community colleges and four-year schools, approximately 36% of all the HSI employees noted persons filling this role (43.5% for CCs and 33.6% at 4YR).

A multi-part question included two queries relevant to support for Hispanic students (Appendix 3, Table 29). The question stem was "Regarding student support programming, our institution/organization...." Respondents were asked to provide "Yes," "No," or "I don't know" responses in respect to their institutional leadership's orientation toward support for Hispanic students. For "Regarding student support programming, our institution/organization...leaders emphasize providing services to Hispanic students," 58.3% of CC personnel and 50.5% of 4YR personnel agreed. There was a highly significant difference for this question with a weak effect ($p = .003$, Cramer's $V = .181$) when the IDK responses were included. Fischer's Exact post hoc analysis, excluding IDK responses, was not significant ($p = .155$, phi = -.097). The next statement was "Regarding student support programming, our institution/organization... leaders regularly fund efforts to serve Hispanic students." The percentage of CC personnel who agreed was 50.6% while it was 33.7% for employees of 4YR schools. The comparison between answers provided by CC personnel and their peers at four-year institutions was highly significant with a weak effect ($p = .002$, Cramer's $V = .187$) with the IDK responses included. Post hoc analysis, excluding "I don't know" answers, had a p value of 1.00 and a phi of .006 indicating that there was no statistically significant difference for the item of interest, agreement versus disagreement.

Two other questions on the survey asked about support provided to Hispanic students studying STEM. The stem for the two questions was the same, "Regarding Hispanic students in STEM, my institution..." Some of the statements that completed the question stem addressed general patterns of student support and others specific patterns causing the research team to separate them into two groups (Appendix 3, Tables 35, 36a, 36b, and 36c). The findings from comparisons starting with general patterns and moving to more specific and proactive practices follow.

1. "Has no means of identifying early STEM interest" – This statement was worded in the negative with 10.9% of all respondents agreeing and 35.5% disagreeing (disagreement indicated means of identifying STEM interest was present). Statistically significant results were found for the STEM to non-STEM comparison and between reporting by faculty, staff, and administrators. About one-fifth of STEM department personnel (18.8%) felt this statement accurately described their institution but fewer of their non-STEM peers did (4.4%). The difference was significant and had a moderate effect sized ($p < .001$, Cramer's $V = .278$). There were also high percentages of persons in both groups responding that they did not know whether this was an accurate statement (STEM – 41.2%, non-STEM 64.5%). Post hoc analysis using Fischer's Exact test upheld the significant finding for the STEM to non-STEM comparison ($p = .004$, phi = .226) with a moderately weak effect although this may indicate different levels of familiarity with the practice more than anything else. The affirmative responses from faculty (13.1%), staff (5.7%), and administrators (15.0%) occurred at low levels with larger numbers, over 50% of responses, in the "I don't know" category for faculty and staff. The FSA comparison was highly significant and had a weak effect size ($p < .001$, Cramer's $V = .191$). Post hoc analysis excluding the IDK responses found no significant difference in perception between faculty, staff, and administrators regarding their institution's ability to identify early STEM interest.

2. **“**Has an Early Alert system” – 69.9% of respondents agreed with this statement and the percentages for community colleges and four-year institutions were very similar, 69.8% and 69.9%. Even though this was the case, statistically significant results were found in regard to the Hispanic to non-Hispanic, STEM to non-STEM, and faculty, staff, and administrator comparisons. Post hoc analysis revealed the STEM to non-STEM comparison and faculty, staff, and administrator comparison were not significant when “I don’t know” responses were excluded (STEM to non-STEM: $p = .137$, phi = .090; FSA: $p = .477$, Cramer’s V = .072). The difference in response patterns between Hispanics and non-Hispanics was confirmed post hoc ($p = .008$, phi = -.164) with non-Hispanics more likely to disagree with the statement. That approximately two-thirds of the Hispanic informants were female and that both Hispanics and females were found to be more likely to be staff, the parties least likely to be regularly involved with information about or from early alert, could have influenced this finding.

3. **“**Sends announcements about support services” – 57.2% of all respondents reported this to be the case with 68.6% of CC informants and 53.8% of 4YR respondents agreeing. There were four areas of significant findings for this statement. Hispanics were more likely to disagree ($p = .020$, phi = .147), CC personnel were more likely to agree than their peers at 4YR schools ($p < .001$, phi = .221), faculty, staff, and administrators did not select this option in the same proportions ($p = .020$, phi = .126), and STEM personnel were more likely than non-STEM employees to agree this occurred at their institutions ($p < .001$, phi = .250). Application of Fischer’s Exact test excluding the “I don’t know” responses showed that the final three comparisons were, in fact, not significant for the item of interest, level of agreement (CC versus 4YR – $p = .284$, phi = -.067; FSA – $p = .618$, Cramer’s V = .062; STEM versus non-STEM – $p = .512$, phi = .046). The comparison of responses from Hispanic and non-Hispanic informants remained significant when the IDK responses were excluded ($p = .008$, phi = -.172) with a weak effect.

4. **“**Identifies their early interest using institutional records” – The median score was “Neither Agree or Disagree” as was the mode score since 55.2% of all respondents selected this answer. The only significant difference was for the Hispanic (MR 152.5) to non-Hispanic (MR 193.3) comparison. Hispanics were much less likely to agree with this statement and with a moderate effect size ($p = .001$, Cramer’s V = .278).

5. “Emphasizes STEM identity development” – The overall level of agreement for this prompt was 28.7% but both the median and mode values were “Neither Agree or Disagree” with 48.3% of all respondents selecting this option. The Hispanic to non-Hispanic comparison produced significant results with Latinos/as (MR 149.9) far less likely to agree with this statement ($p < .001$) than non-Hispanics (194.7) with weak effect ($r = 0.19$).

6. “Proactively sends personalized guidance” – 29.3% of all respondents stated this occurred at their institution. Initial comparisons found significant differences existed for the two-year to four-year, STEM personnel to non-STEM personnel, and faculty, staff, and administrator comparisons but post hoc analysis excluding the IDK responses revealed these were not significant for the item of interest, the level of agreement as the significance was related to the number of persons answering “I don’t know” rather than differences in the reported presence of the practice.

7. **“**Uses predictive analytics to monitor activity” – Very few institutions were reported to be using predictive analytics in respect to Latinos/as in STEM study, 21.4% agreement, with the majority of respondents selecting “Neither Agree or Disagree” (55.2%) which was both the median and mode score. Hispanics disagreed with their non-Hispanic peers about the use of predictive analytics, mean ranks of 149.2 and 194.8 respectively, generating a highly significant difference with moderately weak effect ($p < .001$, $r = 0.20$). Administrators were more likely to agree with this statement than faculty and staff, at a significant level ($p = .033$) but they would also be the parties most likely to know whether it was an institutional practice.

These support patterns for Latinos/as studying STEM can also be rank ordered. They follow, listed from most frequently reported to least frequently reported. The level of affirmation for having a means of identifying early STEM interest is reported. Only two patterns, the most general and common forms of support which are also activities that would be unlikely to be focused solely on reaching Hispanic students, were reported by more than 35% of respondents. All others were reported by less than 30%.

- Has an early alert system (69.9%).
- Sends announcements about support services (57.2%).
- Has a means of identifying early STEM interest (35.5%).
- Proactively sends personalized guidance (29.3%).
- Emphasizes STEM identity development (28.7%).
- Identifies early STEM interest using institutional records (23.6%).
- Uses predictive analytics (21.4%).

Student Support Programming

Several questions addressed student support programming and how it relates to students identifying as Hispanic, and within that group, Latinas.

Summary: student support programming.

Up to 58% of the respondents, 50.0% of 4YR personnel and 58.4% of CC personnel, stated the leaders at their HSI emphasized providing services to Latinx/a/os students. Affirmative responses regarding institutional leaders regularly funding services for these students occurred less frequently, 33.7% of employees of four-year institutions and 50.6% of CC personnel. These

figures roughly match the levels of STEM support programming reported in this section and the percentages in the "All our STEM departments implement this" column for community colleges in Table N above. They are not supported, though, by the level of services reported as targeting Hispanics studying STEM or Latinas studying STEM. Between one-third and one-half of respondents reported their institutions provided support programming for STEM students while a minority, 18% in one category and less in the eight other areas, said there were forms of programming focused specifically on aiding Hispanic students in STEM. The reported presence of programming for Latinas studying STEM was even lower for the nine options with a high water mark of 11.4% for CCs in one category and a low water mark of 1.6% for 4YR institutions in another. These low to very low counts of informants at the HSIs reporting programming for Latinx/a/os students, in general, and for Latinas studying STEM do not align with the reported level of emphasis on providing services to Hispanic students. They also stand in contrast to the priorities expressed by US government agencies like the Department of Education, National Science Foundation, and the National Aeronautic and Space Agency.

Approximately 60% of respondents noted their institutions provide soft skills training for students as part of student support programming. For four of the six categories of grant-funded services listed in the survey, CCs respondents were more likely report the service existed at their institution. Each of these is a support important for Hispanic students interested in STEM. This pattern continued in respect to scholarship offerings. Five of the six categories of scholarships were reported by approximately 30% of respondents with the exception being "students studying STEM" which was reported by 51.6%. Yet, more CC personnel reported both institution and grant-funded scholarships for students in STEM in all six categories listed.

Less than one-fifth of respondents, 18.2% at CCs and 12.8% at 4YR institutions, reported the presence of student organizations for Hispanic students studying STEM at the HSI for which they worked. As would be expected based on the underrepresentation of Hispanics in higher education, less than 40% of respondents said the sponsors of these organizations were Hispanic. Less than one-sixth of respondents, 16.0%, said representatives of Hispanic student organizations met and coordinated efforts.

Details: student support programming.

On the survey, there were five statements that followed the stem "Regarding student support programming, our institution/organization..." (Appendix 3, Table 29). Three of these will be considered here and the two others in respect to grant-funded projects. Of CC respondents, 56.6% said their institution "provides soft skills training (research presentation, professional dress/etiquette, etc.)" while 60.3% of their peers at 4YR schools did. This comparison was strongly statistically significant ($p < .001$, Cramer's $V = .207$) with moderately weak effect. Post hoc analysis without the "I don't know" responses also returned a significant finding with a moderately weak effect ($p = .003$, $phi = -.204$). The other two queries focused on Latino/a students and have been discussed above. For "Regarding student support programming, our institution/organization...leaders emphasize providing services to Hispanic students," 58.4% of CC personnel and 50.0% of 4YR personnel agreed. For "Regarding student support

programming, our institution/organization...leaders regularly fund efforts to serve Hispanic students," 50.6% of CC respondents and 33.7% of their peers at 4YR schools responded "Yes." Post hoc analysis demonstrated no significant difference for these questions as the proportions of persons selecting "I don't know" had triggered significant findings in initial analysis.

A question with the stem "In respect to student support..." was followed by the statements "our programming for Hispanic students is based on published research or strong institutional data," "services for Hispanic students take a holistic approach (academic, psychological, social, and cultural needs)" and "we are dependent on grant-funding to start new initiatives" (Appendix 3, Table 26). A separate but related question asked for a "Yes," "No," or "I don't know" response to "representatives from all of the Hispanic student organizations meet regularly to coordinate activities" (Appendix 3, Table 30).

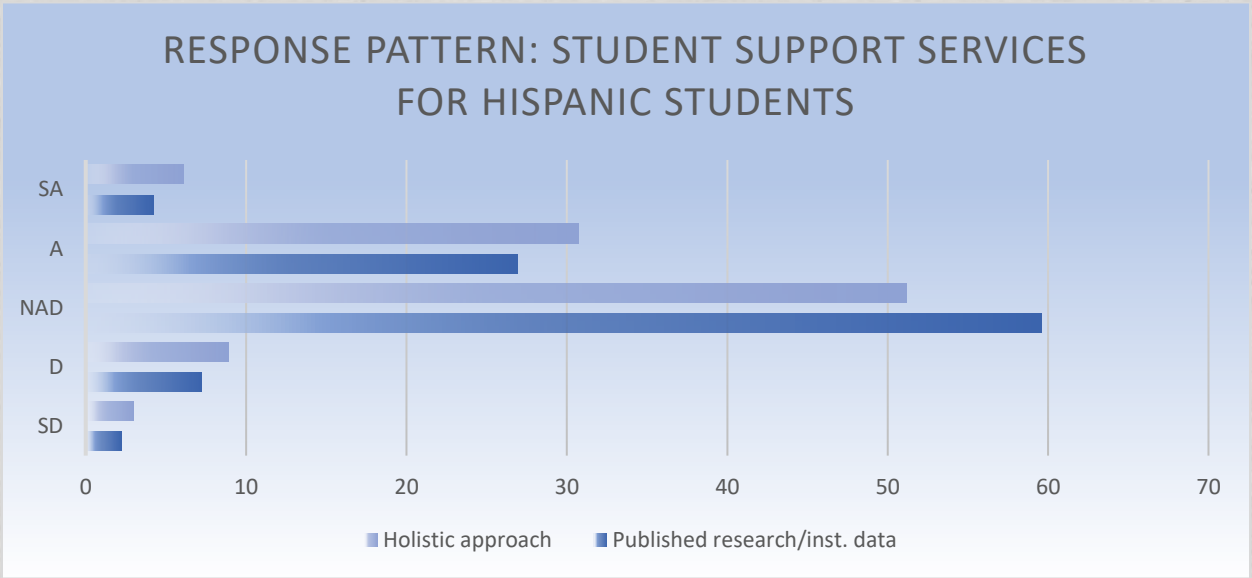


Figure 8

As Figure 8 illustrates, "neither agree or disagree" was by far the most common answer given for the first two queries, published research/institutional data and a holistic approach. Combining "Agree" and "Strongly Agree" for an overall affirmation results in 31.1% agreement with reliance on published research or institutional data as part of programming for Latinx students and 36.8% agreement for a holistic approach. The only statistically significant difference in programming for Latinx students being based on "published research or strong institutional data" was for the STEM to non-STEM personnel comparison. STEM employees were more likely to state that programming was empirically based than non-STEM employees with weak effect ($p = .010$, MR: STEM 195.6, non-STEM 168.7, $r = -0.14$). Community college personnel, though, were more likely than personnel at four-year institutions to state, with weak effect size, that their programming for Latinos/as took a holistic approach ($p = .004$, MR: CC 207.0, 4YR 173.0, $r = -0.15$). None of the other comparisons, gender, ethnicity, STEM versus non-STEM, FSA, yielded a significant result for "holistic approach." The question regarding coordination among representatives of Hispanic student organizations (Appendix 3, Table 30) was also statistically

significant for institutional type with a moderately weak effect size (p = .001, Cramer's V = .204) but this was related to the number of responses in the "I don't know" category and almost three times as many CC personnel selecting the answer "No." Only 15.9% of CC personnel and 16.3% of 4YR employees said the Hispanic student organization representatives met and coordinated with each other. STEM personnel and faculty were more likely to report that their institution was dependent on grants to start new student support initiatives. The STEM personnel mean rank was 208.6 while that for non-STEM employees was 158.3 (p < .001). A pairwise analysis completed with the faculty, staff, and administrator responses showed a significant difference (p = .010) between faculty responses, with an MR of 188.4, and staff responses, which had an MR of 154.8.

One question asked on the survey regarding student support programming relates directly to priorities set by the National Science Foundation, National Aeronautics and Space Agency, and other federal agencies regarding involving and supporting minority students in STEM study (NSF, n.d.; NASA, 2018). Respondents were asked to state if each of a list of nine means of supporting students, was being enacted for STEM students at their institution, then specifically for Hispanics studying STEM, and finally for female Hispanics (Latinas) studying STEM (Appendix 3, Tables 39a and 39b). The responses provided by community college employees and their peers at four-year institutions are listed in Table O.

Table O

Student Support Programming for STEM Students, Hispanic Students Studying STEM, and Latinas Studying STEM

In respect to specific student groups, we have …	STEM		Latinx/a/os in STEM		Latinas in STEM	
	CC	4YR	CC	4YR	CC	4YR
Departmental support that operates separately from other efforts on campus.	47.7%	37.7%	15.9%	8.2%	5.7%	3.9%
Collaboration with other departments to provide support.	40.9%	33.4%	14.8%	7.2%	5.7%	2.0%
Student organizations.	52.3%	44.9%	18.2%	12.8%	11.4%	3.9%
Assistance in college process navigation.	42.0%	32.5%	10.2%	11.1%	6.8%	4.3%
Leadership training for students.	38.6%	30.2%	13.6%	9.2%	10.2%	3.3%
Activities to increase interaction between faculty and Hispanic students.	33.0%	23.0%	12.5%	6.9%	5.7%	1.6%
Faculty mentors.	42.0%	34.4%	11.4%	10.8%	9.1%	3.9%
Peer mentors.	35.2%	26.2%	13.6%	7.5%	10.2%	3.3%
Associations with professional networks.	33.0%	37.7%	15.9%	10.5%	5.7%	3.3%

Note: denotes statistically significant differences. See Appendix 3, Table 39a for details of significance levels and effect size.

The percentage of respondents reporting their institutions use the practices listed in Table O to support Hispanic students studying STEM and/or Latinas studying STEM is low. There was a high-water mark of 18% for CCs and of approximately 13% for 4YR institutions in regard to Hispanic students studying in STEM fields. Only one category was selected by more than 10% of respondents for Latinas pursuing STEM study. Community colleges personnel responded that these practices existed at their employer, in every category, at higher levels than employees at 4YR institutions. Some of these differences were statistically significant with weak and moderate effect sizes (Appendix 3, Table 39a and 39b). The limited emphasis on Hispanic students as a group and on Latinas stands in direct opposition to the priorities communicated by federal agencies in grant programs like:

- The US Department of Education's Title V and Developing HSIs programs.
- NSF's Improving Undergraduate STEM Education: Hispanic-Serving Institutions (HSI Program).
- USDA's Hispanic-Serving Institutions Education Grants Program.
- The US Department of Energy's Minority Serving Institutions Partnership Program.
- The National Aeronautics and Space Agency's Minority University Research and Education Project.

a. Grant-funded student support programming.

In the Student Support Programming section above, three parts of the question "Regarding student support programming, our institution/organization..." were addressed. One of the remaining two statements about grant-funded programming, "Provides grant-funded services to students," is discussed here. The second, "Retains services established with grant dollars once the grant expires" will be considered as the last topic in this section.

As regards the provision of "grant-funded services for students," there were differences in responses between CCs and 4YR schools (Appendix 3, Table 29). More CC personnel, 78.3%, answered "Yes" than their colleagues at four-year institutions did (59.8%) and only four CC employees replied "No." Fischer's Exact tests found the difference in agreement by institution type was not significant ($p = .603$, phi = 0.05).

A separate matrix question asked, "What kind(s) of grant-funded services are provided for students?" (Appendix 3, Table 27). The response patterns are below in Table P.

Table P

Grant-Funded Services Provided for Students at HSIs

Kinds of grant-funded services…	Overall	CC	4YR
Academic Support	78.3%	80.0%	77.6%
Advice and direction	53.9%	64.6%	49.7%
A cohort or group	30.9%	29.2%	31.5%
Scholarships	64.3%	66.2%	63.6%
STEM specific services	51.3%	58.5%	48.5%
Services specific to Hispanic students	36.5%	30.8%	38.8%

Note: denotes statistical significance (p =.041, phi = -.135). Another option, "Other (please specify)," was available but only eight answers were submitted which prohibited meaningful disaggregation.

Using the overall response rates, a rank ordering from most to least commonly reported forms of grant-funded services is as follows.

- Academic support (78.3%).
- Scholarships (64.3%).
- Advice and direction provided to students (53.9%).
- STEM-specific services (51.3%).
- Services specific to Hispanics (36.5%).
- Support of a cohort or group (30.9%).
- Other (3.5%).

As noted above, a question with the stem "In respect to student support..." was followed by the statement "we are dependent on grant-funding to start new initiatives" (Appendix 3, Table 26). The response pattern for this question was a five-point Likert scale and the median overall response was "Neither Agree or Disagree" as was the mode with 38.8% of respondents selecting that response. STEM personnel and faculty were more likely, with moderately weak effect (r = -0.25), to report that their institution was dependent on grants to start new student support initiatives. The STEM personnel mean rank was 208.6 while non-STEM employees had mean rank of 158.3 ($p < .001$). A pairwise analysis completed with the faculty, staff, and administrator responses showed a significant difference ($p = .010$) between faculty responses, with an MR of 188.4, and staff responses, which had an MR of 154.8. This may be an artifact of faculty being the persons who most frequently pursue grants that include financial support for student programming as faculty respondents had a median score of "Agree" and mode of "Neither Agree or Disagree." A total of 39.0% of faculty respondents submitted the mode score.

Half of the material in Table Q regarding scholarships is relevant to the current consideration, grant-funded students support programming. CCs respondents reported more grant-funded scholarships than 4YR institutions in the following areas: (1) for students studying in STEM, (2) for first-generation students studying in STEM, (3) minorities studying in STEM, (4) Hispanic students studying in STEM, (5) STEM students from low-SES families, and (6) females studying in STEM fields. All of these comparisons were statistically significant but post hoc pairwise

analysis demonstrated that the significance was coming from comparisons in the "No" and "I don't know" categories rather than the level of agreement. Thus, the only accurate observation is that CC personnel reported these more frequently and may be more aware of the types of scholarships available at their institution.

Unfortunately for persons interested in grant-funded support service or scholarships, only 38.6% of CC respondents and 20.9% of respondents employed at four-year institutions said their employer "Retains services established with grant dollars once the grant expires" (Appendix 3, Table 27). This was found to be a significant difference with a moderately weak effect (p = .001, Cramer's V = .202) but post hoc analysis confirmed proportion differences between IDK, "Yes," and "No" responses within institution types caused the significant finding rather than a difference in affirmation by institution type (p = .470, phi = .067). Thus, the overall responses rate for retaining services established with grant dollars, 25.0% of informants, is the finding from the survey.

b. Scholarship opportunities.

One question presented as a matrix asked for information about scholarships available at the institutions. The question asked whether institutional scholarships existed in six different categories and again whether grant-funded scholarships existed in the same six categories. The percentage of respondents from community colleges and four-year institutions that responded "Yes" is listed in Table Q. In every case, statistically significant differences were found in the omnibus comparison of the offerings reported at community colleges and four-year institutions (Appendix 3, Tables 41a, 41b, 41c, 42a, 42b, and 42c). Post hoc analysis indicated that the significance was coming, for five of the six analyses, from comparisons in the "No" and "I don't know" categories rather than the level of agreement at CCs and 4YR schools. The one exception was for "students studying STEM" in the list of institutional scholarships. For that comparison, there was a significant finding (p = .002) with a moderately weak effect (phi = -.244). The best summary is that more CC personnel reported that scholarships of each type were available at their institution but, in nearly every case, the differences were not significant.

Table Q

Scholarship Opportunities Available in STEM

Scholarships for...	*Institutional*		*Grant-Funded*	
	CC	*4YR*	*CC*	*4YR*
Students studying in STEM	61.0%	48.6%	47.9%	31.5%
First-generation students studying in STEM	41.6%	28.9%	28.2%	17.2%
Minorities studying in STEM	43.4%	26.7%	32.9%	19.0%
Hispanic students studying in STEM	41.6%	25.1%	28.2%	19.1%
STEM students from low-SES families	43.4%	27.0%	31.9%	16.6%
Females studying in STEM fields	37.3%	24.4%	20.0%	14.3%

Note: denotes statistical significance confirmed in post hoc comparison.

c. Student organizations for Hispanics.

Survey takers were asked to respond to "In respect to student support...our programming for Hispanic students is based on published research or strong institutional data." Overall agreement was 31.0%. Comparisons between responses were completed based on ethnicity, gender, institution type, role at the institution, and association with a STEM department (Appendix 3, Table 26). Significant differences were found by institution type and STEM versus non-STEM affiliation. The responses from community college personnel resulted in a mean rank of 199.2 while those from personnel at four-year institutions had a mean rank of 175.5 ($p = .038$). This comparison had a weak effect size ($r = -0.11$). STEM personnel were more likely to agree resulting in an MR of 195.6 while non-STEM employees had an MR of 168.7 ($p = .010$). The comparison also had a weak effect size ($r = -0.14$). While there appears to be some variability in responses, the effect sizes were small. The most meaningful result is the affirmation by 31.0% of all respondents that the programming "is based on published research or strong institutional data."

As has been noted above, less than 45% of the employees at CCs and 34% at 4YR HSIs affirmed that their employer had "personnel whose primary responsibility is interacting with and supporting Hispanic STEM students" (Appendix 3, Table 40). A separate but related multi-part question asked about student support programming and the emphasis institutional leadership placed on providing services for Latinx/a/os students (Appendix 3, Table 29). Responding to "Regarding student support programming, our institution/organization... leaders emphasize providing services to Hispanic students," 58.4% of CC personnel agreed while 50.5% of 4YR personnel agreed. For "Regarding student support programming, our institution/organization... leaders regularly fund efforts to serve Hispanic students," agreement occurred 50.6% of the time for CC personnel and 33.7% with their peers at four-year institutions. Based on these figures, 50% or less of HSIs appear to be emphasizing support for Hispanic students. This is confirmed by the content of Table N which notes: (1) that 50% or less of the respondents reported student organizations for STEM students, (2) 40% or less of respondents noted the presence of seven of the nine forms of support listed as being available to STEM students, (3) 18% or fewer of the respondents reported student organizations for Hispanics studying STEM, and (4) 11.4% of CC personnel and 3.9% of 4YR personnel reported student organizations for Latinas studying STEM.

A question about the persons who serve as sponsors of student organizations for Latinx students offered seven distinct descriptions: male Hispanic (Latino), Female, Female Hispanic (Latina), minorities, White, other, and "We don't have faculty/staff sponsors for student organizations" (Appendix 3, Table 30). Comparisons were made between responses from community college employees and their peers at four-year colleges and universities. No significant differences were found between the responses from personnel at the two types of institutions. However, the raw percentages are informative.

1. Male Hispanic (Latino) was selected by 35.2% and 36.7% of CC and 4YR respondents, respectively.
2. Female was selected by 25.0% of CC respondents and 20.1% of 4YR informants.
3. Female Hispanic (Latina) showed an irrational response pattern as more persons said, for both types of institutions, that there were Latina sponsors of student organizations than responded that there were female sponsors of student organizations (CC: 37.5% versus 25.0%; 4YR: 32.8% versus 20.1%).
4. Responses regarding minorities also exhibited a slight variance from what would be expected given the other responses. Community college personnel selected this option 26.1% of the time while employees of four-year schools selected this 22.0% of the time. Yet, over 30% of both groups state that Latinos and Latinas filled these roles.
5. White was selected by 30.7% of CC informants and 23.9% of respondents from 4YR schools.
6. Other was nearly the same for both types of institutions with 10.2% and 9.5% for CCs and 4YR institutions respectively.
7. Eight percent of CC respondents said their employer did not have faculty/staff sponsors for student organizations while 3.3% of 4YR respondents did.

The inconsistencies in response patterns noted above are examples of conjunctive fallacy (Tzersky & Kahneman, 1983). When faced with a number of possibilities, people think combinations of factors are more likely to exist than individual factors are to occur separately. An example in the findings from this investigation is that female Hispanics were reported more frequently to be sponsors of student organizations for Latinx students than the larger set of which they would be a part, females. A pattern known as the availability heuristic contributes to this (Kahneman & Tzersky, 1979). When asked to make estimates without immediate and specific knowledge, people will use the frequency with which they can recall examples as a proxy. Using the same data point from this investigation, if a respondent could recall a number of Hispanic females who sponsor student organizations they would be likely to overestimate the frequency with which that occurred even though they could also have answered "I don't know." As a result, responses for this topic did not provide a clear description of the circumstances at the HSIs.

Helping Students Seek Employment

Most students attending college are pursuing a credential that will qualify them to work in a profession or field. As this is the case, knowing about employer interest in Hispanics and whether HSIs provide assistance to students who are seeking employment was deemed desirable. A multi-part question on the survey asked about faculty, staff, and administrators' perception of STEM employer interest in Hispanic and bilingual employees. It also asked about assistance respondents and their institutions provide to STEM and Hispanic students who are seeking

employment. While the intention of the research team was that these queries would address seeking jobs after completing higher education credentials, the phrasing of the questions may not have made this clear to respondents.

Summary: helping students seek employment.

Informants agreed that Hispanics graduating with STEM degrees, especially if they speak both English and Spanish, are desired by employers. Community college personnel were reported to be more likely to assist students in pursuing employment, although this could be influenced by the patterns of workforce preparation present at these types of institutions. Faculty and males were found to be the most likely to assist Latinx students in seeking employment. The predominance of faculty in the male respondent group may have confounded these results. Career planning targeting STEM students and Latinos/as studying STEM was reported more frequently, at significant levels, by community college respondents, by STEM personnel, and by males. The last two may be an artifact of males making up the majority of the STEM employees responding to the survey.

Details: helping students seek employment.

a. STEM employer interest in Hispanic or bilingual candidates.

A seven-part question was asked about ways the respondents and their institutions facilitated student movement into careers. The first two queries addressed the respondent's perception of employer's interest in Hispanics with STEM credentials and the advantage of being bilingual (English/Spanish) (Appendix 3, Tables 22a, 22b, and 22c).

The first statement survey takers responded to was "Hispanics who have completed STEM degrees are desired by employers" and 48.1% of all respondents agreed with this statement. Comparisons of responses from males and females, Hispanics and non-Hispanics, persons representing two-year and four-year institutions, STEM and non-STEM personnel, and faculty, staff and administrators were completed. Statistically significant differences existed for the STEM versus non-STEM comparison and for the responses when divided by area of institutional responsibility. Both differences had p values of $< .001$ and weak effect sizes with STEM personnel more likely to agree that Hispanics with STEM degrees are desired by employers (58.7% to 38.7%, phi = -.199) and faculty and administrators also more likely to agree than staff persons (administrators 68.3%, faculty 51.6%, staff 34.4%; Cramer's V = .200).

The second statement in the list was "Hispanics who speak English and Spanish have an advantage when seeking a job in STEM," an assertion with which 60.6% of respondents agreed. None of the comparisons between groups of respondents, Hispanic versus non-Hispanic, type of institution, STEM versus non-STEM, gender, and area of responsibility, yielded a statistically significant result. In every class, the majority of respondents agreed with the statement. The percentages for each group can be found in Tables 22a, 22b, and 22c in Appendix 3.

b. Assistance seeking employment.

The seven-part question continued by asking about help provided to Hispanic students seeking employment (Appendix 3, Tables 22a, 22b, and 22c). The statements to which informants responded were: "I help Hispanic students identify potential employers" and "I help Hispanic students pursue potential employment." For the first, 32.1% of all respondents agreed and there were three highly significant findings. While ethnicity and institution type did not show significant differences, STEM personnel, males, and faculty were far more likely to agree with the statement.

- STEM personnel were more likely to agree than non-STEM personnel at a highly significant level ($p < .001$) and with a moderate effect size (phi = -0.262).
- Males were more likely to agree than females at a highly significant level ($p < .001$) and with a weak effect size (phi = 0.194).
- There was also a highly significant finding ($p < .001$) with a moderate effect size (Cramer's V = 0.251) for the comparison of faculty, staff, and administrators. Faculty (41.7%) were the most likely to agree, administrators (33.3%) were second, and then staff (15.6%).

These findings may be confounded as STEM personnel responding, faculty in STEM, and administrative respondents were predominantly male.

The second statement, "I help Hispanic students pursue potential employment," was affirmed by 35.6% of the respondents and had four significant comparisons.

- Community college personnel were more likely to agree with the statement than their 4YR peers at significant levels with a weak effect size ($p = .015$, phi = -.123).
- STEM personnel were more likely to agree with the statement than non-STEM personnel at highly significant levels with a moderate effect size ($p < .001$, phi = -.267).
- Males agreed more often than females as significant levels with a weak effect size ($p = .007$, phi = .137).
- Faculty were the most likely to note they helped "Hispanic students pursue potential employment" (46.4%) while administrators followed them (38.1%), and staff were the least likely (16.4%). This was a highly significant difference with a moderate effect size ($p < .001$, Cramer's V = .283).

The predominance of males in STEM and as STEM faculty and administrative respondents may also have confounded these results. And, workforce education programming at CCs might account for the difference by institution type.

The final statement presented in the group of queries addressed institutional programming. It read, "My institution/organization collaborates with businesses in job training/placement for Hispanic students" and 31.0% of the respondents agreed. The only statistically significant result

was for the comparison of responses from CC personnel to those of employees of four-year institutions. Community college employees were more likely at significant levels with a weak effect size (p = .011, phi = -.128) to state that their institution collaborated with businesses to train and place Hispanic students. As was just noted regarding assistance provided to Latinx students, this may be related to the workforce training programs which are often a part of CC offerings.

Two statements were presented about career planning activities. They were "My institution/organization sponsors career planning activities for STEM students" and "My institution/organization sponsors career planning activities targeted to Hispanic STEM students." Overall agreement was 48.6% for the first statement and 21.6% for the second. Statistically significant results for both were found for the CC to 4YR, STEM to non-STEM, and gender comparisons.

- Community college personnel were more likely to agree, 64.8% to 43.9% and 34.1% to 18.0% respectively for the two statements. Both were highly significant, the p values were the same (p = .001), and both had weak effect sizes, phi values were -.174 and -.163 respectively.
- The STEM to non-STEM comparisons produced similar results, 57.0% agreement from STEM personnel and 42.0% from non-STEM (p = .003, phi = -.150) for sponsoring career planning for STEM students and 27.4% to 17.0% (p = .013, phi = -.126) for sponsoring career planning targeting Hispanic STEM students. Both had weak effect sizes.
- Like above, males were more likely to agree with these statements than females at highly significant levels with weak effect sizes, p = .001 and phi = .164 for the first statement and p = .004 with phi = .145 for the second. However, this may be due to the predominance of men in STEM fields rather than a true gender difference.

In summary, community college personnel were more likely, with weak effect, to report helping students seek employment and that their institution sponsored career planning activities for STEM and Hispanic STEM students. Faculty and STEM personnel, informant groups in which the majority of individuals were male, as well as the male respondents overall were more likely with weak to moderate effect to report helping students identify prospective employers, helping them pursue employment, and that career planning for STEM students, in general and Hispanics studying STEM, were available. As the majority, 57.2%, of males in the sample held faculty roles and the majority of STEM employees were male, 57.4%, there may have been a confounding relationship in the response patterns of faculty, STEM personnel, and males to these queries.

STEM Outreach

As minorities and women are underrepresented in STEM study and the STEM workforce (Sharkawy, 2015; Graf, Fry & Funk, 2018), outreach that might pique or reinforce interest in STEM among these groups has been advocated. Respondents were asked on two multi-part

questions to provide information about outreach undertaken with existing students. A third matrix question addressed forms of outreach to prospective students.

Summary: STEM outreach.

Over 55% of survey respondents indicated their employers had STEM outreach activities for existing students. Approximately one-third of these said the events were well attended, just over 40% said that Hispanic students were targeted with these events, and of those noting the event was well attended approximately 40% noted that their institution kept data about the effectiveness of these events. A query regarding eight patterns of outreach to prospective students revealed several patterns were practiced by over 40% of the institutions but showed little difference in offerings between CCs and 4YR institutions. Campus visits by high school groups and K-12 demonstrations were the most common means of outreach to prospective students and sharing social, cultural or historic STEM content and profiles were the least common.

Details: STEM outreach.

a. For existing students.

Survey takers were asked several questions about ways their institution promoted STEM study among their existing students. The first of these questions asked whether there were activities at the college or university that are "designed to inspired STEM interest among students" (Appendix 3, Table 32). Of all informants, 57.2% agreed with this statement. There were significant differences in responses to this question in two areas. The comparison of responses from CC personnel and employees of 4YR schools was strongly significant with a moderate effect size ($p = < .001$, Cramer's $V = .262$) as 76.7% of CC respondents and 51.4% at four-year institutions agreed. Personnel at four-year institutions were less informed in this area with 38.3% of them responding "I don't know" while 9.3% of CC personnel made that selection. Post hoc analysis excluding "I don't know" responses ($p = .856$, phi = .017) showed the difference in IDK responses was triggering the omnibus finding. The STEM versus non-STEM comparison, 70.0% agreement versus 46.1%, was also strongly significant and had a moderately strong effect size ($p < .001$, Cramer's $V = .325$). STEM personnel at four-year institutions were three times less likely to know if these activities existed, 45.6% at four-year schools did not know while 15.3% gave this answer at CCs. Post hoc analysis excluding the IDK responses ($p = .735$, phi = -.027) demonstrated the IDK response pattern had produced the original significant finding. Thus, the noteworthy finding is that 57.2% of the respondents stated that their HSI had outreach activities "designed to inspire STEM interest among students."

A similar question was asked later in the survey, "We have on-campus activities intended to inspire STEM interest among current students." The majority of respondents, 55.1%, reported this existed at their institution (Appendix 3, Table 38). The comparison of responses from CC and 4YR personnel was statistically significant with a moderately weak effect size ($p = .002$, Cramer's $V = .224$) with community college employees again reporting this was the case far more often than their peers at four-year institutions (68.2% to 50.3%). Post hoc analysis excluding IDK responses did not support the difference in agreement being significant ($p = 1.00$,

phi = -.01). Thus, the most that can be said based on results for the two questions is just over 55% of respondents stated that outreach designed to inspire STEM interest among current students took place at their college or university.

For both "designed to inspire STEM interest among students" and "on-campus activities intended to inspire STEM interest among current students" a follow-on question was asked. This was whether the events were well-attended. Only persons who had answered "Yes" to STEM-promoting activity being present were offered the opportunity to respond to this question (Appendix 3, Tables 32 and 38). For "designed to inspire STEM interest among students", CC personnel responded at greater rates, 37.9% versus 25.7% for 4YR, that activities were well attended. This was not a significant difference and the overall response rate was 29.4%. For "on-campus activities intended to inspire STEM interest among current students," 42.9% of CC and 28.4% of 4YR personnel agreed that activities were well-attended. Significance and effect size findings were p = .020, Cramer's V - .192. However, there were many persons who answered, "I don't know." Post hoc analysis, which did not return a significant finding, revealed that is was the relationship of the IDK and "Yes" responses rather than a difference in "Yes" responses between STEM and non-STEM personnel that made the omnibus comparison significant. The four "I don't know" response rates were 41.5%, 42.4%, 62.8% and 75.5% while the "Yes" responses ranged from approximately 15% to 40%,

Persons who responded that the events were well-attended were asked if their institution kept data regarding the effectiveness of these events (Appendix 3, Tables 32 and 38). Comparisons of responses from community college personnel and their peers at four-year institutions showed no significant difference for either appearance of the question. The overall response rate was 40.7% for the first instance and 42.4% for the second. STEM to non-STEM comparisons could not be made as there were small counts in some of the categories, like two non-STEM employees responding "Yes." This was a product of the question being the third in a winnowing sequence. Informants would have answered "Yes" there were activities, cutting response pool to approximately 60% of all respondents, and then "Yes" again to the events being well attended, cutting the pool of respondents to approximately 20% of the original 403.

An important question in this set was the last which asked persons indicating that activities promoting STEM to existing students were present at their institution whether these events "target Hispanic students" (Appendix 3, Tables 32, 37, and 38). The overall affirmation rate was 41.2% for the first instance and 42.4% for the second. Hispanics and non-Hispanics provided very similar responses as did community college and personnel at four-year schools. The only significant finding was for STEM versus non-STEM comparison, 46.5% to 31.2% agreeing. There was a moderately strong effect size (p < .001, Cramer's V = .280). Post hoc analysis revealed this was related to the proportion of "No" and "I don't know" responses rather than a difference by STEM affiliation.

The findings regarding STEM outreach to existing students can be summarized as follows. Approximately 55% of all respondents reported "on-campus activities intended to inspire STEM interest among current students." Of those noting this form of activity at their employer, 29.4%

said the events were well-attended and approximately 40% noted their institution targeted Latinos/as with these offerings. Of those stating the event was well-attended, close to 40% noted that data regarding the effectiveness of these events was gathered and considered.

b. To prospective students.

A multi-part question on the survey asked about the variety of STEM outreach activity. The first half of the query was "Outreach activities at my institution/organization include..." which was followed by eight different conditions. This was a "select all that apply" question so parties who intended to communicate that the situation did not exist at their institution and those who did not make a selection because they had no relevant knowledge, on other questions an "I don't know" response, were combined as one group, persons who made no selection. Analyses were completed by institution type and comparing responses from STEM personnel to non-STEM personnel. Based on the patterns seen in these and the possible influence of non-STEM personnel lacking relevant knowledge rather than the condition not existing, it was decided that the analyses would be limited to STEM personnel who would be the most likely to know what was happening in STEM outreach and that institutional comparisons would be made within this group. There were no statistically significant differences between responses from STEM personnel at community colleges and those at four-year institutions. The percentages of persons selecting each of the stated conditions are listed in Table R.

Table R

Outreach Activities at My Institution Include…

	CC	4YR
Campus visits to our STEM facilities by high school groups.	47.1%	44.5%
STEM demonstrations in the community.	35.3%	41.4%
STEM demonstrations in K-12 settings.	43.1%	45.3%
Our STEM students serving as representatives of the institution/org.	21.6%	32.8%
Non-residential summer STEM camps/programs.	35.3%	33.6%
Residential summer STEM camps/programs.	17.6%	20.3%
STEM demonstrations or content as web pages, videos, audio files, or tweets.	25.5%	24.2%
Social, cultural, historic STEM content and profiles.	9.8%	17.2%

A rank ordering using the overall response rates from most to least frequently reported is:

- Campus visits by high school groups (45.3%).
- STEM demonstrations in K-12 settings (44.7%).
- STEM demonstrations in the community (39.7%).
- Non-residential summer camps/programs (34.1%).
- Current STEM students serving as institutional representatives in outreach (29.6%)
- STEM demonstrations or content on digital platforms (24.6%)
- Residential summer camps/programs (19.6%)
- Social, cultural, and historic STEM content and profiles (15.1%).

Intra- and Inter-Institutional Collaboration

"The history of science shows a shift from single investigator 'little science' to increasingly large, expensive, multinational, interdisciplinary and interdependent 'big science'" (Vermeulen, Parker & Penders, 2013). While there is national and even international interest in "big science" collaboration (Cooke & Hilton, 2015; Coccia & Wang, 2016), intra- and inter-institutional collaboration is not limited to science. There are many forms of collaboration present in higher education like the collaboration between departments to complete institutional initiatives, with K-12 entities to provide STEM outreach programs, with business for internships, and between community colleges and four-year institutions in offering university courses at the CC or for student transfer initiatives. For these reasons, the conception and practice of collaboration was addressed with a number of survey questions. These asked about staffing to facilitate various forms of collaboration, patterns of collaboration that have been undertaken, and the types of partners with which the informant's HSI collaborated.

Summary: intra- and inter-institutional collaboration.

Personnel at four-year institutions reported the presence of individuals charged with facilitating intra- and inter-institutional collaboration for instructional purposes, to facilitate various forms of real-world experiential education, and for grant applications and projects more often than their peers at community colleges. Intra- and inter-institutional collaboration was found to be a common practice with few differences between CCs and 4YR schools in the forms of collaboration and those that existed aligning with other findings in the survey about the presence of dual credit courses and university classes taught at a CC. There were a greater number of differences, ten versus two, and more pronounced differences occurring between STEM and non-STEM departments regarding collaboration in the 24 patterns of collaboration queried. These were statistically significant with effect sizes ranging from weak to moderate. This appears to indicate a greater emphasis on collaboration in grant applications and grant projects for STEM departments and on interdisciplinary activity when seeking or implementing grants. Two specific purposes for collaboration, "to seek grant funding" and "for undertakings that serve Hispanic students" were probed further by asking about five types of collaborative partnerships for each. The response levels were similar across institution types and there were no statistically significant findings when comparing responses from CCs to 4YR institutions. Using overall response rate, grant-seeking partnerships were ranked in the following order, moving from most commonly reported to least: partnering with another institution (83.9%), a state or federal agency (83.3%), a non-profit entity (70.1%), a business (68.3%), and a K-12 school district (67.8%). For partnerships in "undertakings that serve Hispanic students," the ranking was with another institution (76.9%), a state or federal agency (73.3%), a K-12 school district (66.3%), a non-profit entity (58.6%), and a business (55.0%).

Details: intra- and inter-institutional collaboration.

A three-by-two matrix question in the survey ask about the presence of professionals at the respondents' institutions who have responsibility to facilitate collaboration "within the university" and "with external parties" (Appendix 3, Table 43). The three areas of possible collaboration queried were "for instructional purposes," "to provide students with real-world experiences," and "on a grant application or project." For the purpose of this investigation, research collaboration was viewed as part of grant-funded projects, although not all research is grant-funded and some grants do not fund research. For all three areas of collaboration, within institutions and with external parties, personnel from 4YR schools reported the presence of professional facilitators more than their peers at CCs (Table S). Three of the six comparisons were statistically significant and both in the "to provide students with real-world experiences" were strongly significant with moderate effect sizes.

Table S

Facilitation of Collaboration by Professionals Tasked with that Responsibility

My institution has professionals to help collaborate...	*Within Institution*		*With External Parties*	
	CC	*4YR*	*CC*	*4YR*
For instructional purposes	75.5%	87.4%	55.6%	66.3%
To provide students with real-world experiences	65.2%	88.6%	57.9%	84.7%
On a grant application or project	83.7%	92.0%	75.0%	81.2%

Note: denotes statistical significance. See Appendix 3, Table 43 for details.

A separate but related question that was also structured as a matrix asked about collaboration with internal and external parties (Appendix 3, Tables 45a and 45b). The stem for this set of queries was "My departmental colleagues and/or I have collaborated..." and this was followed by eight statements describing intra- and inter-institutional collaboration patterns each of which was considered in respect to the three conditions in Table S, instructional purposes, real-world experiences for students, and grant applications or projects. The results of comparisons appear in Table T.

Table T

My Department Colleagues and/or I Have Collaborated...

	CC	4YR	STEM	Non-STEM
…among ourselves…				
For instructional purposes	91.9%	88.3%	94.1%	83.5%
To provide students with real-world experiences	89.1%	83.0%	89.5%	78.9%
On a grant application or project	70.6%	74.0%	81.9%	60.0%
…with other departments…				
For instructional purposes	89.5%	82.3%	87.4%	80.4%
To provide students with real-world experiences	77.6%	67.4%	67.4%	72.4%
On a grant application or project	66.0%	68.3%	77.5%	52.2%
…with other disciplines…				
For instructional purposes	82.1%	74.2%	81.0%	70.7%
To provide students with real-world experiences	68.1%	62.5%	66.3%	60.8%
On a grant application or project	62.8%	60.5%	71.6%	43.3%
…with another institution…				
For instructional purposes	81.0%	60.8%	73.0%	59.7%
To provide students with real-world experiences	54.2%	47.7%	49.4%	48.6%
On a grant application or project	68.9%	57.7%	74.2%	39.3%
…with a non-profit entity…				
For instructional purposes	63.8%	51.4%	52.4%	58.9%
To provide students with real-world experiences	61.4%	54.1%	55.8%	56.0%
On a grant application or project	45.7%	43.9%	50.6%	34.5%
…with a business entity…				
For instructional purposes	60.4%	53.9%	59.8%	50.7%
To provide students with real-world experiences	65.3%	64.3%	75.6%	51.3%
On a grant application or project	40.0%	43.3%	52.7%	25.9%
…with a state/federal entity…				
For instructional purposes	66.7%	56.1%	61.0%	57.1%
To provide students with real-world experiences	55.3%	52.4%	57.5%	47.0%
On a grant application or project	56.8%	58.9%	68.4%	44.4%
…with a K-12 school district…				
For instructional purposes	81.0%	64.9%	76.4%	61.0%
To provide students with real-world experiences	53.3%	59.8%	59.6%	56.2%
On a grant application or project	53.7%	46.9%	55.1%	39.7%

Note: denotes statistical significance. See Table 45a and 45b in Appendix 3 for details.

The HSIs in the sample were reported to be active collaborators. Of the 24 different categories in the three-by-eight matrix, there were only two in which the overall response rate was less than 49% (Appendix 3, Table 45a) and they were for collaboration with non-profits and businesses on grant applications or projects. Internal forms of collaboration, described on the survey as among ourselves, with other departments or with other disciplines, ranged from a low of 64.1% reporting collaboration with other disciplines to provide students real-world experience to a high of 89.4% for collaboration among department peers for instructional purposes. While external forms of collaboration, with another institution, a non-profit, a business, a state/federal agency or a K-12 school district, were less common, they were reported to be practiced by most of the institutions. The range in overall agreement extended from a low of 42.3% for collaboration with a business on a grant application or project to a high of 69.8% for collaboration with a K-12 school district for instructional purposes.

There were two significant findings by institution type. Both were collaborations with an external entity for instructional purposes, the first with another institution and the second with a K-12 district. The difference between CCs and 4YR schools in collaboration with another institution, 81.0% to 60.8% agreement, was significant with a moderately weak effect size ($p = .007$, $phi = .202$). The difference by institution type for collaboration with a K-12 district, 81.0% agreement for CCs to 64.9% for 4YR schools, had a weak effect size ($p = .026$, $phi = .162$).

There were ten significant findings for STEM to non-STEM comparisons regarding collaboration (Table T, Appendix 3, Table 45b). They have been grouped below by purpose (Table U). Two were in the instruction purposes subset, two in the providing students real-world experiences subset, and the other six in the grant application or project subset. Each was consistent with common practice in higher education and other findings in this investigation.

Table U

Significant Findings for STEM to Non-STEM Comparisons for Collaboration

My department colleagues and/or I have collaborated...	S %	NS %	p value	Phi	Effect size
Instructional subset					
Among ourselves for instructional purposes.	94.1%	83.5%	.013	.170	Weak
With a K-12 school district for instructional purposes.	76.4%	61.0%	.022	.167	Weak
Real-world experiences for students' subset					
Among ourselves to provide students real-world experiences.	89.5%	78.9%	.039	.146	Weak
With a business entity to provide students real-world experiences.	75.6%	51.3%	.001	.253	Mdrt
Grant application or project subset					
Among ourselves on a grant appl./project	81.9%	60.0%	.001	.243	Mdrt
With other departments on a grant appl./project	77.5%	52.2%	.001	.264	Mdrt
With other disciplines on a grant appl./project	71.6%	43.3%	<.001	.282	Mdrt
With another institution on a grant appl./project	74.2%	39.3%	<.001	.348	Mdrt
With a business entity on a grant appl./project	52.7%	25.9%	.002	.268	Mdrt
With a state/fed. entity on a grant appl./project	68.4%	44.4%	.004	.240	Mdrt

Note: Mdrt = moderate; MS = moderately strong; see Appendix 3, Table 45b.

The results demonstrate there was not as pronounced a difference between STEM and non-STEM departments in collaboration for instructional purposes and for providing students with real-world experiences as only four of 16 comparisons returned significant findings with weak effects. There was, however, a consistent and stronger emphasis on grant funding among STEM personnel than non-STEM informants. The results also demonstrate a greater emphasis on interdisciplinary collaboration for STEM personnel involved in grant applications and projects in comparison to non-STEM personnel. This aligns with information in the literature (Cooke & Hiltion, 2015: Vermeulen, Parker & Penders, 2013) and emphases in conferences like the Science of Team Science annual gathering which is in its 11th year (International Network of the Science of Team Science, 2018).

Two purposes for HSIs' partnerships with other institutions or organizations were probed with a matrix question (Appendix 3, Table 46). The stem was "My institution/organization partners with…" and this was followed by five different categories of partnership. Respondents were asked to "select all that apply" from the five categories in respect to primary purposes, "to seek grant funding" and "for undertakings that serve Hispanic students." Response patterns are listed in Table V. The response levels were similar across institution types and there were no statistically significant findings when comparing responses from CCs to those from 4YR institutions for this question. The only response set that did not approach or exceed 60% agreement was for four-year schools in partnerships with business entities for undertakings that serve Hispanic students. The range of overall responses was 55.0% for partnerships with business entities for undertakings that serve Hispanic students to 83.9% for seeking grants with another institution.

Table V

My Institution/Organization Partners with...

	Overall	CC	4YR
To seek grants			
With another institution.	83.9%	86.8%	82.9%
With a non-profit entity.	70.1%	60.5%	74.2%
With a business entity.	68.3%	64.7%	69.8%
With a state/federal entity.	83.3%	81.6%	84.0%
With a K-12 school district.	67.8%	64.9%	69.1%
For undertakings that serve Hispanic students			
With another institution.	76.9%	77.1%	76.7%
With a non-profit entity.	58.6%	57.6%	59.3%
With a business entity.	55.0%	59.4%	52.1%
With a state/federal entity.	73.3%	69.7%	75.0%
With a K-12 school district.	66.3%	63.6%	67.8%
Note: details in Table 46 in Appendix 3.			

Limitations Faced by Hispanic-Serving Institutions

In the focus groups and interviews employed in the first step of the investigation, several possible limitations faced by Hispanic-Serving Institutions were mentioned. These involved articulation agreements, accrediting bodies, as well as some requirements of federal and private organizations that funded grants. Each was investigated in the survey.

Summary: limitations faced by HSIs.

The focus groups and interviews completed in the first phase of the investigation included references to limitations inherent in articulation agreements, imposed by accrediting agencies, and related to funder requirements in respect to grants. In the survey responses, CC and STEM personnel saw more potential for articulation agreements to limit change possible in STEM instruction than did employees of 4YR institutions or non-STEM employees but this was a minority opinion in both cases, approximately one-fifth of the respondents. Up to 42% of community college and 32% of STEM personnel reported that accrediting agency requirements can limit change possible in STEM degree programs, STEM course content, and innovation in STEM instruction. There was also a minority opinion present in the sample supporting the ideas that the “limits on personnel cost imposed by funders” and “qualifications expected for project leaders” serve a practical limit on their organization’s ability to apply for grants.

Details: limitations faced by HSIs.

a. Articulation agreements and STEM instruction.

A question on the survey asked about a group of limitations that had been discussed by focus group participants and interviewees in the first step of the investigation. There were seven challenges listed (Appendix 3, Table 25) and informants were asked to "select all that apply" at their institution. Several of these made specific reference to articulation agreements and have been discussed above in that section of the report. Those results will be briefly reviewed here.

As regards articulation agreements between institutions, 35.2% of CC personnel agreed that "Articulation agreements can limit the amount of change possible within STEM degree programs" while 10.5% of employees of 4YR schools did. This was highly significant comparison with a moderate effect size ($p < .001$, phi = -.281). STEM personnel (24.6%) were also far more likely to agree than non-STEM employees (9.0%) ($p < .001$, phi = -.212) at highly significant rates but with a moderately small effect size. For "Articulation agreements can limit the degree of change possible in STEM course content," the same result occurred. Both comparisons produced highly significant results. CC personnel were more likely to agree with this statement, 31.8% versus 9.2% ($p < .001$, phi = -.270), with a moderate effect, as were STEM personnel although with a weak effect size. STEM personnel agreement was 20.1% to 9.4% for non-STEM ($p = .003$, phi = -.152). Neither of the response sets exceeded 16% overall agreement, so these results need to be approached with caution. However, approximately 15% of respondents felt that articulation agreements can limit the amount of change possible in STEM instruction.

b. Accrediting bodies and STEM instruction.

Three other questions asked about the impact of accrediting agency requirements on STEM instruction. The statements to which informants were asked to respond were, "Accrediting agency requirements can limit the amount of change possible within degree programs," "Accrediting agency requirements can limit the degree of change possible in course content," and "Accrediting agency requirements can limit the innovation possible when planning instructional patterns." Comparisons of responses submitted by CC and 4YR personnel and STEM and non-STEM employees of the HSIs for each statement resulted in statistically significant findings. As was the case with articulation agreements, CC personnel and STEM employees were more likely to agree and the differences between them and four-year and non-STEM employees were highly statistically significant at every point with weak to moderately weak effect sizes (Appendix 3, Table 25).

c. Grant-making organization requirements as limitations.

The final group of potential limitations were limits imposed on personnel costs by grant-making entities and the required qualifications for project leaders on grant-funded undertakings (Appendix 3, Table 25). One CC to 4YR comparison was statistically significant, one STEM to non-STEM comparison was, and one STEM to non-STEM was marginally significant.

For the statement “Limits on personnel cost imposed by funders in STEM grants impact institutions’ ability to apply,” there was no significant difference between the CC and 4YR response sets and 11.5% of the sample agreed with this statement. For the same statement, STEM personnel were more likely to agree (17.3%) than non-STEM personnel (6.6%) at a statistically significant level with a weak effect ($p = .001$, phi = -.167). While not a majority, approximately one-sixth of STEM personnel perceived limits on the use of grant funds to pay personnel costs as a restriction that impacted their “ability to apply.”

The second statement, “The types of qualifications expected for project leaders limit my institution’s /organization's ability to apply for grants,” was included in the survey in response to statements by community college personnel that requirements for a terminal degree, a publication record, and research outcomes limited the ability of their faculty to apply for some grants. Community college personnel (17.0%) were much more likely to agree with this statement than their peers at four-year institutions (6.2%) at highly significant levels with a weak effect size ($p = .001$, phi = -.160) although less than 20% of respondents felt this was the case. STEM personnel were more likely to agree as well, 11.7% versus 6.1% for non-STEM, although the statistical significance calculation falls exactly on the line between a significant and non-significant finding and the effect size was weak ($p = .050$, phi = -.099). These findings denote the existence of a minority opinion in the sample supporting the notion that the “qualifications expected for project leaders” is a practical limit on their organization’s ability to apply for grants.

Support and Evaluation of Institutional Processes and Programming

The focus group informants included administrators, deans, department chairs, faculty members, a grant administrator, a research developer, and a curriculum development specialist. Interactions around several topics in the focus group discussion included facilitating institutional change, supporting curricular updates, and evaluating outcomes for the institution and students. Consequently, questions on the survey touched on a number of topics related to monitoring institutional practice, supporting desired patterns of change, and evaluating outcomes. These have been divided into three groups, evaluation of effectiveness, monitoring instructional practice, and curriculum development assistance.

Summary: support and evaluation of processes and programming.

Community colleges employees were found to be more likely to report monitoring of effectiveness of programming than four-year institutions and STEM departments were reported to be more likely to monitor impact of curriculum changes. Administrators were more aware of ways programming is assessed although this would be expected as it is part of their area of responsibility.

CCs and STEM departments were more likely to monitor impact of academic support programming with administrators and STEM personnel more likely to report use of data to track outcomes associated with changes. The majority of the HSIs in the sample were said to monitor course effectiveness for first-generation (74.9%), minority (72.1%) and low-SES students (58.1%). Data regarding effectiveness was stated to be used in institutional decision-making

regarding STEM programming by approximately 50% of HSI informants. The data also confirmed that chairs or deans are more likely to be the parties responsible to monitor STEM instruction at CCs than at 4YR schools and that very few specialists with responsibility to monitor STEM instruction were employed by the informants' institutions. Interestingly, a small minority of respondents noted that no one monitored instructional practice in STEM courses.

Very few of the informants, approximately 10%, noted that their institutions provided their faculty with curriculum development assistance although community colleges reported this more frequently than four-year institutions. In fact, 50% of respondents stated their institutions leave curriculum revision in low performing classes up to the faculty.

Details: support and evaluation of processes and programming.

a. Evaluation of effectiveness.

Questions were asked at various points in the survey about ways institutions gather information regarding instruction and other institutional practices. The first of these to occur was "We use institutional data to evaluate the effectiveness of..." followed by three statements, "academic support programming targeted for STEM students," "co-curricular programming targeted for STEM students," and "curricular changes made in STEM courses (post-implementation)" (Appendix 3, Table 49). Response rates for the entire pool were 38.4% for "academic support programming targeted for STEM students," 21.1% for co-curricular programming, and 29.0% for "curriculum changes in STEM courses." Institution type and STEM to non-STEM comparisons produced significant findings for the first statement while institutional role did not. CC personnel were more likely to agree than persons employed by four-year institutions, 50.0% to 35.1% ($p = .011$, phi = -.128) as were STEM personnel, 45.8% versus 31.6% for non-STEM ($p = .004$, phi = -.146). Both comparisons produced a statistically significant finding with a weak effect size. Co-curricular programming evaluation had a significant result for institutional role with administrators more likely to select this statement (33.3%) than faculty (18.8%), or staff (18.8%) with a weak effect ($p = .035$, Cramer's V = .132). For evaluation of curricular changes in STEM courses, CC personnel noted this occurring more than four-year personnel, 35.2% to 27.2%, but the difference was not statistically significant. However, STEM employees (37.4%) were significantly more likely to select this answer than non-STEM personnel (21.2%) with weak effect size ($p < .001$, phi = -.179) as were administrators (44.4%) in comparison to faculty (27.6%) and staff (23.4%) also with a weak effect size ($p = .009$, Cramer's V = .157). To summarize, evaluation of effectiveness for academic support targeting STEM students was more likely at CCs and in STEM. For the same action in respect to co-curricular activities targeting STEM students and changes to STEM curriculum, administrators, the parties most likely to be responsible for the process, were the most likely to report it. STEM personnel were also more likely than their non-STEM colleagues to report use of data to determine effectiveness of curriculum changes.

The question immediately following asked whether effectiveness assessment included considering outcomes for three subsets of the student population, minorities, first-generation, and

low-SES students (Appendix 3, Table 50). Overall 72.1% of respondents said effectiveness for minorities was considered, 74.9% noted this regarding first-generation students, and 58.1% for low-SES students. Administrators were the most likely of any group to note this took place, 85.7% for minorities and first-generation students and 68.6% for low-SES students with the first two displaying statistically significant differences and moderate effect sizes when compared with the responses from faculty and staff. 64.8% of faculty, 77.6% of staff, and 85.7% of administrators responded effectiveness assessment included outcomes of minority students ($p = .041$, Cramer's $V = .191$) and for first-generation students, 67.0% of faculty, 81.6% of staff, and 85.7% of administrators noted consideration ($p = .042$, Cramer's $V = .190$). Both of these comparisons had weak effect sizes. STEM personnel were also found to be less likely to note that effectiveness assessment included consideration of minorities, first-generation, and low-SES students than non-STEM personnel. Each was a highly significant finding with moderately weak effect size for minorities and first-generation and a moderate effect size for low-SES. Post hoc analysis was completed for all the significant findings and none of the individual proportions were found to be significant. The most that can be said based on the findings is that the majority of the HSIs in the sample were said to monitor course effectiveness for first-generation (74.9%), minority (72.1%) and low-SES students (58.1%) and that administrators, who are frequently responsible for institution performance and institution-wide assessments, reported most frequently that effectiveness assessment extends to outcomes for subcategories of students.

A question near the end of the survey asked respondents to "select all that apply" from "My institution uses data to...," "identify courses with low completion/success rates," "identify courses in which minority students have low completion/success rates," and/or "regularly monitor short-term student outcomes in courses with low completion/success rates" (Appendix 3, Table 47). Analyses were completed based on institution type, STEM affiliation, and area of institutional responsibility. Eight of the nine analyses, the exception was the FSA sort for "identify courses in which minority students have low completion/success rates," were found to be highly significant with weak to moderate effect sizes.

For "identify courses with low completion/success rates," a significant result was found for the 2YR to 4YR comparison. Overall, 39.0% of informants selected this option with 59.1% of CC personnel doing so while 34.4% of 4YR personnel made the selection. This difference was highly significant with a moderately weak effect ($p < .001$, phi = -0.21). The STEM to non-STEM and FSA comparisons were also significant on their own with moderately weak and weak effects, respectively. Prior analyses had shown that non-STEM personnel might not be aware of what is done or available in the STEM departments and staff might not be familiar with some institutional practices. Because of this, the 2YR to 4YR sort was disaggregated by STEM affiliation and again by institutional role to understand the relationships within the larger institutional context rather than relying on the initial omnibus comparison.

Faculty at community colleges (61.2%) noted data use to identify courses with low completion rates more frequently than faculty at four-year schools (35.0%) at a highly significant level with a moderately small effect size ($p = .001$, phi = .232). However, the comparisons for staff and administrators did not produce significant results as the staff and administrators of CCs and 4YR

schools responded at reasonably similar rates, although the CC affirmations were higher in each instance. Administrators, for whom the difference was not significant but who would be likely to know whether this type of activity occurred, responded in the affirmative 63.2% of the time for CCs and 52.3% for 4YR schools. Faculty would be the parties most likely to be informed about courses with low completion rates, as this is often a departmental concern, followed by administrators who monitor overall institutional effectiveness making these logical results. The only notable item is that community college personnel in the sample reported more frequently, at a significant level with a moderately weak effect, that data was used to identify courses with low completion or success rates.

The STEM to non-STEM comparison for data use when identifying courses with low completion rates was also significant as an omnibus comparison, 50.3% for CCs and 30.7% for 4YR institutions ($p < .001$, phi = -.200). When the 2YR and 4YR sort was disaggregated by STEM affiliation, there were statistically significant differences between the responses of the CC and 4YR STEM personnel (68.6% to 43.0%, $p = .002$, phi = -.232) and the non-STEM personnel by institution type (45.9% to 27.4%, $p = .026$, phi = -.152). It appears possible that STEM personnel are more aware of or may be the more active parties in using data to track student success in courses. For this comparison, as above, the community college personnel were more likely to report this action at their institution.

For use of data to "identify courses in which minority students have low completion/success rates," a significant result was again found in the 2YR to 4YR comparison ($p < .001$, phi = -.257). Less than one-fifth of all respondents, 18.4%, stated this was the case at their institution with 37.5% of CC and 13.4% of 4YR personnel making this selection. These results were disaggregated by FSA standing and STEM affiliation. The responses from faculty at 2YR and 4YR institutions were found to be significantly different with a moderately strong effect ($p < .001$, phi = -379). The affirmation rate was 40.8% for CC faculty and 8.4% for those at 4YR institutions while the staff and administrative responses were higher for CCs but without significant differences. Disaggregation by STEM affiliation produced a result very similar to that for the first question in this series. STEM and non-STEM personnel at CCs were more likely at significant levels to report data use to identify courses in which minority students had low success rates than their peers at 4YR institutions ($p < .001$, phi = -.333 and $p = .026$, phi = -.153 respectively). Like above, CCs in general and their faculty, staff, administrators, STEM and non-STEM personnel reported the use of data to monitor minority student success more than the equivalent parties at 4YR schools.

For the final prompt, using data to "regularly monitor short-term student outcomes in courses with low completion/success rates" the omnibus comparison of CC to four-year responses was highly significant ($p < .001$, phi = -.198) with a weak effect. Like for the first prompt in the series, the overall comparisons by FSA standing and STEM affiliation were significant, both with weak effect. When the CC to 4YR comparison was disaggregated by FSA standing and STEM affiliation, the patterns reported in the preceding paragraphs continued. Faculty responses, CC 34.7% to 15.4% for 4YR schools, showed a significant difference with moderately weak effect ($p = .004$, phi = -.209) while the comparison of staff and administrative responses did not

produce significant result, although CC personnel reports were higher in each category. The 2YR STEM to 4YR STEM ($p = .003$, phi = -.224; CC 41.2%, 4YR 19.5%) and non-STEM to non-STEM comparisons ($p = .034$, phi = -.145; CC 27.0%, 4YR 13.1%) also were significant with the CC personnel reporting the practice at higher levels. This is a third instance in which CCs in general and their faculty, staff, administrators, STEM and non-STEM personnel reported the use of data to monitor student success, in this case short-term outcomes, more than the equivalent parties at 4YR schools.

The final effectiveness assessment question addressed patterns of change based on the data compiled. The question stem was "Based on effectiveness data, we have adapted or rejected..." with three options presented. These were, "Academic support programming targeted for STEM students," "Co-curricular programming targeted for STEM students," and "Curricular changes made in STEM courses" (Appendix 3, Table 47). The sample for this group of statements was limited to persons who had noted that their institution gathered effectiveness data in respect to at least one of minorities, first-generation students, or low-SES students. The overall response rates were 31.7% for "co-curricular programming targeted for STEM," 46.9% for "curricular changes made in STEM courses," and 56.6% for "academic support targeted for STEM students." This suggests that effectiveness data is being used in institutional decision making in these STEM programming areas at approximately 50% of HSIs. Comparisons were made between responses received from employees of community colleges and four-year institutions, STEM and non-STEM personnel, and faculty, staff, and administrators. Across all these comparisons, only one statistically significant finding occurred. That was for faculty, staff, and administrators in regard to "curricular changes made in STEM courses." Administrators (59.4%) and faculty (53.7%) were more likely to agree than staff (30.2%) at a significant level with a moderately small effect ($p = .019$, Cramer's $V = .237$). This is not revelatory as faculty and administrators would, logically, be more informed about patterns of curricular change than staff persons.

b. Monitoring instructional practice.

One statement in a multi-part query and a second in a separate multi-part question addressed monitoring STEM instruction. The first was "My institution...has personnel with advanced degrees in Education who monitor instructional practice in STEM courses" (Appendix 3, Table 47). Overall, 33.5% of respondents agreed with this statement (combining agree and strongly agree), 26.9% disagreed (combining disagree and strongly disagree) and 39.6% neither agreed of disagreed. A separate question which occurred later in the survey asked a similar question, "Who monitors instructional practice in STEM courses at your institution?" but with three possible responses provided, "department Chair/Dean," "specialists with advanced degrees in Education," and "no one" (Appendix 3, Table 47). Naïve percentages for the entire informant pool were 34.2% for chair/dean, 6.7% for specialists, 6.7% for no one, and 5.5% for other. Comparisons between responses from community college personnel and employees at four-year institutions were performed. The findings for the first question, presence of personnel with advanced degrees in Education who monitor instructional practice in STEM courses, were not statistically significant with a median response value on the five-point Likert scale of "Neither Agree or Disagree." For the second query, only the responses from STEM personnel were considered as

analysis for many of the other survey questions had shown that non-STEM personnel frequently did not know what was happening in STEM departments. To provide a further control on uncertainty, the STEM personnel were divided by institutional role. This allowed independent comparisons in the three groups, CC faculty to 4YR faculty, CC administrators to 4YR administrators, etc., while preventing the staff, who would be the least likely to be informed in this area, to impact the overall level of significance. There was a marginally significant finding in the faculty comparison for the chair or dean being responsible to monitor instructional practice in STEM courses. Faculty at CCs were more likely to agree (54.5% to 35.1%; p = .050, phi = -.174) with this statement with weak effect. There were no significant findings for the "specialists with advanced degrees in Education" option although the number of affirmations was low, only 6.7% of all respondents selected this option (Appendix 3, Table 47). There were also no significant findings for the response "no one" although the overall response rates were the same as for "specialists with advanced degrees in Education," 6.7%. It was possible to answer "Other," but so few responses were received in that category that it was impossible to complete meaningful analysis.

c. Curriculum development assistance.

The survey asked whether "'How to' guidance regarding curriculum development" was provided to faculty. Only 7.9% of all respondents indicated that this occurred at their institution. The distribution was 11.4% of CC informants answering "Yes" while only 6.9% at four-year schools did. While this difference was not significant the researchers wanted to confirm that grouping faculty, staff, and administrative responses had not influenced the outcome. That was not the case as faculty (10.4%) and administrators (9.5%) agreed with the statement at levels similar to the institution type responses. These two groups would be the most likely to be aware of guidance being provided in curriculum development. A small group of staff, three persons or 2.3%, agreed. That only three informants in the staff group agreed made statistical analysis of faculty, staff, and administrative response patterns impossible.

Questions were also asked about responsibility for curriculum revision and curriculum development assistance. There was a stand-alone question regarding this responsibility that was phrased "My institution leaves planning for improvement of courses with low completion and success rates in the hands of departmental faculty." While the stem assumes institutions identify "courses with low completion and success rates" that is, in the research team's experience, a common practice and monitoring of outcomes was confirmed by responses received to questions 6.12 (Appendix 3, Table 49), 6.13, 6.14, 10.16, and 10.17 (Appendix 3, Table 47). Responses were analyzed by institution type with two interesting findings. First, 55.2% CC faculty and 50.0% of 4YR faculty agreed with this statement. Second, there was a statistically significant finding, but it was related to the level of uncertainty between employees by institution type, 25.4% of CC respondents answering "I don't know" and 41.1% of their peers at 4YR schools selecting this answer. Post hoc analysis was completed and none of the individual proportions were found to be significant.

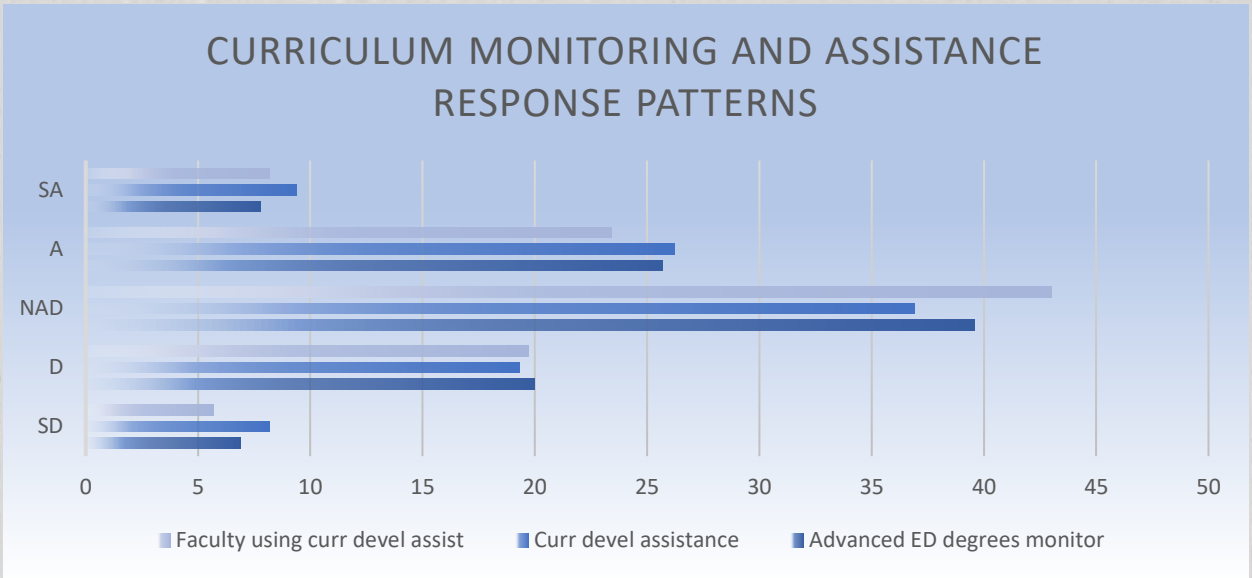
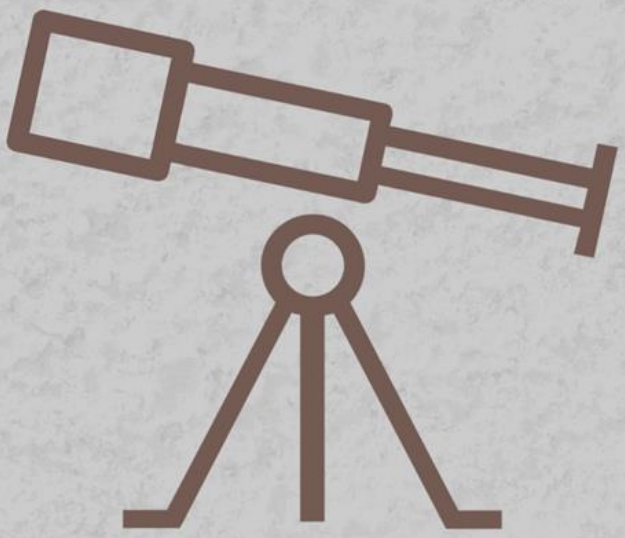


Figure 9

As has been just been noted above, approximately one-third of the HSI personnel reported that their institution had "specialists with advanced degrees in Education" who "monitor instructional practice in STEM courses (Appendix 3, Table 47) although this may include chairs and deans who were reported by 34.2% or respondents to be the parties most likely to do this.

A related question was asked as the next query on the survey (Appendix 3, Table 48). It was "My institution has...support personnel with advanced degrees in curriculum development who aid faculty in preparing or revising courses" with a Likert-scale response pattern. The same question was asked near the end of the survey in a "select all that apply" list. In its first appearance with a five-point Likert scale, there was no statistically significant difference between answers received from community college and four-year institution personnel, MRs were within five points of each other, and the median response was the middle value, "Neither Agree or Disagree." The agreement rate, a combination of the agree and strongly agree responses, was 35.6%, 25.7% selected either disagree or strongly disagree. When reiterated as a select if applies question, there was a statistically significant difference with faculty at community colleges (22.4%) more likely to state this existed at their institution than faculty at four-year schools (10.5%) with a weak effect size ($p = .035$, phi = -.152). The final question in this group asked about faculty use of the curriculum development assistance using a five-point rating scale. There was no significant difference between reports from CC and 4YR personnel, mean ranks were within 2.5 points of each other, and the median response was "Neither Agree or Disagree" with 31.6% agreeing while 25.4% of respondents disagreed. A comparison of responses from faculty, staff, and administrators did not indicate significant difference in their responses.



Grant Seeking

Colleges and universities are among the most common recipients of grant funding. As this is the case and the research activity was funded by award #1764268 from the National Science Foundation, a final topic on the survey was grant-seeking activity. A two-part question was exclusively devoted to this topic, but others asked about ideas relevant to it.

Summary: grant-seeking.

Please note: this summary includes information that was discussed in other sections of the report.

"Many faculty members who have grant funding" being present at their college or university was selected by 51.2% of the respondents. Faculty at four-year institutions and faculty in STEM departments were more frequently reported to face the expectation of seeking grant funding than faculty at CCs and in non-STEM departments. Personnel in four-year institutions and STEM departments were most frequently reported to have reductions in teaching load available to facilitate grant-funded activities. There was a consistent and stronger emphasis on grant funding among STEM personnel than non-STEM informants and informants indicated STEM faculty were the most likely to be highly concerned about tenure and promotion. The results also demonstrate a greater emphasis on interdisciplinary collaboration for STEM personnel involved in grant applications and projects than for non-STEM personnel.

Nearly 80% of community college personnel reported grant-funded services at their institution while approximately 60% of employees at four-year schools did. Faculty were the parties most likely to respond that their institution was "dependent on grant-funding to start new [student support] initiatives." Grant-financed services provided, ranked from most to least frequently reported, were:

- Academic support (78.3%).
- Scholarships (64.3%).
- Advice for and direction provided to students (53.9%).
- STEM-specific services (51.3%).
- Services specific to Hispanics (36.5%).
- Support of a cohort or group (30.9%).
- Other (3.5%).

Informants were also asked about the types of grant-funded scholarships in STEM available at their institution. Rank order by response rate in the full informant pool was, from highest to lowest:

- Students studying STEM (35.3%).
- Minorities studying in STEM (22.3%).
- Hispanic students studying in STEM (21.3%).
- STEM students from low-SES families (20.1%).
- First-generation students studying in STEM (19.8%).
- Females studying in STEM fields (15.6%).

Only one significant difference was found between responses from CC and 4YR personnel in this set. CC employees were more likely to report institutional scholarships for "students studying STEM" with moderately weak effect.

Overall, 89.7% of respondents affirmed their institution had professionals to help with internal collaboration on grant applications and projects while 79.6% affirmed professionals to help with external collaborations. Grant collaboration was reported to be very common. Collaboration between departmental colleagues on grant applications or projects was noted by 73.1% of respondents. The remaining forms of collaboration, in decreasing order of frequency were, with other departments (67.6%), with other disciplines (61.1%), with another institution (60.9%), with a state or federal agency (58.3%), with a K-12 school district (48.9%), with a non-profit (44.4%), and least frequently, with a business entity (42.3%). At the institutional level, grant-seeking partnerships, ranked from most frequently to least frequently selected, were 83.9% for partnerships with another institution, 83.3% for a state or federal agency, 70.1% for non-profits, 68.3% for business entities, and 67.8% for K-12 school districts.

Approximately one-sixth of STEM personnel perceived limits on the use of grant funds to pay personnel costs as a restriction that impacted their institution's "ability to apply." "The types of qualifications expected for project leaders limit my institution's /organization's ability to apply for grants," was also viewed as a limitation although less than 20% of respondents felt this was the case. Less than 15% of respondents replied, "Our faculty...may not be credited for education, student support, and scholarship funding grants in tenure and promotion." And notably, only 25% of respondents indicated that their employers sustained grant-funded projects following the award period.

Details: grant-seeking.

Questions about grant-seeking were dispersed across the survey rather than clumped in one or two sets of questions. In the discussion of grant-related topics that follows, items that have been addressed above will be reviewed briefly and several additional items of information will be provided from other queries specific to grants.

A two-part question on the survey asked about grant-seeking assistance (Appendix 3, Table 44). The first half was "My institution has... professional personnel who aid in the acquisition of grants" and 40.2% of respondents affirmed this. The second had the same stem but the ending was "a partnership with another college/university that has personnel who aid in the acquisition of grants" with 7.2% of all respondents agreeing. Statistical analysis demonstrated no significant differences in responses received from community college personnel and employees at four-year institutions on either question. When considering raw percentages, CC personnel reported in both cases that their institution had these patterns more often than their peers at four-year schools (has professional personnel - CC 47.7%, 4YR 38.0%; has a partnership - CC 11.4%, 4YR 6.2%). These patterns held even when the response pools were subdivided by area of responsibility, faculty, staff, and administrators.

The expectation that faculty would seek grants was considered. Respondents indicated that faculty at four-year institutions (27.9%) and faculty in STEM departments (32.4%) were more likely to be expected to seek grant funding than faculty at CCs (6.8%) and in non-STEM departments (15.1%). Both comparisons had a moderate effect size and were statistically significant at the $p < .001$ level.

Representatives of four-year institutions in the sample were more likely than CC employees to report that many faculty at the institution had grant funding, 24.6% responded "Yes" at CCs versus 60.7% at four-year schools (52.0% at schools offering primarily bachelor's degrees and some master's degrees, and 80.0% at schools offering two or more doctoral degrees) (Appendix 3, Tables 13a and 13b). There was a moderately strong effect and high significance for this comparison ($p < .001$, Cramer's $V = .379$). Post hoc analysis excluding responses of "I don't know" confirmed significance with a moderately strong effect ($p < .001$, phi = -.438). Thus, there appears to be a stair-step pattern in grant funding with CCs at the lowest rung and doctorate-granting institutions at the highest. This is likely to be related to the level to which there is an expectation the faculty would seek grants and, in the case of CCs, faculty teaching loads.

Non-STEM personnel (58.3%) were more likely than STEM personnel (49.2%) to respond that many faculty at their institution have grant funding ($p < .001$, Cramer's $V = .332$) with a moderate effect (Appendix 3, Tables 13a and 13b). This result may be related to the way the query was worded. It asked whether the institution had many faculty members with grant funding rather than whether the department had funding. Post hoc analysis without the "I don't know" responses confirmed significant differences with moderate effect ($p < .001$, phi = -.267).

Employees of four-year institutions (39.5%) were more likely to report potential for reduction of a faculty person's teaching load to facilitate grant-funded research than the peers at CCs (21.7%) at significant levels with a moderately small effect size ($p < .001$, Cramer's $V = .225$) (Appendix 3, Tables 13a and 13b). Post hoc analysis excluding IDK responses confirmed significant differences with moderate effect ($p = .001$, phi = -.271) for personnel from 4YR institutions being more likely to report potential for reduction of faculty course load to facilitate grant-related activity.

STEM department personnel (42.2%) were more likely than non-STEM personnel (27.9%) to report the potential for reduced course loads for faculty to facilitate grant-funded research ($p < .001$, Cramer's $V = .342$) with moderate effect (Appendix 3, Tables 13a and 13b). Post hoc analysis found that significant differences in the distribution of answers within the non-STEM set but not for a difference in level of agreement between STEM and non-STEM personnel were the cause of the omnibus finding ($p = .526$, phi = - .051). Thus, no meaningful difference between STEM and non-STEM personnel for potential reduction in course load was found.

A question with the stem "In respect to student support..." was followed by the statement "we are dependent on grant-funding to start new initiatives" (Appendix 3, Table 26). The response pattern for this question was a five-point Likert scale and the median overall response was "Neither Agree or Disagree" as was the mode with 38.8% of respondents selecting that response. STEM personnel and faculty were more likely to report, with moderately weak effect ($r = -0.25$), that their institution was dependent on grants to start new student support initiatives. The STEM personal mean rank was 208.6 while that for non-STEM employees was 158.3 ($p < .001$). A pairwise analysis completed with the faculty, staff, and administrator responses showed a significant difference ($p = .010$) between faculty responses, with an MR of 188.4, and staff responses, which had an MR of 154.8. Faculty respondents had a median score of "Agree," 33.9% selected this answer, and a mode of "Neither Agree or Disagree" submitted by 39.0% of faculty respondents. It is possible that the pattern may be related to faculty being the most informed parties as the persons who would function as the principal investigators on grant-funded projects that finance student support programming.

Three survey questions addressed grant-funded services provided to students. Findings from them are as follows. Regarding the provision of "grant-funded services for students," there were differences in responses between CCs and 4YR schools (Appendix 3, Table 27). Over two-thirds of CC personnel, 78.3%, answered "Yes" while 59.8% of their colleagues at four-year institutions did. While this appears to be a large difference hypothesis testing was not possible as only four CC employees replied "No." A separate matrix question asked, "What kind(s) of grant-funded services are provided for students?" (Appendix 3, Table 27). The response patterns are below in a reproduction of Table P.

Table P (reproduced here)

Grant-Funded Services Provided for Students at HSIs

Kinds of grant-funded services…	Overall	CC	4YR
Academic Support	78.3%	80.0%	77.6%
Advice and direction	53.9%	64.6%	49.7%
A cohort or group	30.9%	29.2%	31.5%
Scholarships	64.3%	66.2%	63.6%
STEM specific services	51.3%	58.5%	48.5%
Services specific to Hispanic students	36.5%	30.8%	38.8%

Note: denotes statistical significance (p =.041, phi = -.135). Another option, "Other (please specify)," was available but only eight answers were submitted which prohibited meaningful disaggregation.

A rank ordering from most to least common, is as follows.

- Academic support (78.3%).
- Scholarships (64.3%).
- Advice for and direction provided to students (53.9%).
- STEM-specific services (51.3%).
- Services specific to Hispanics (36.5%).
- Support of a cohort or group (30.9%).
- Other (3.5%).

Questions were also asked about the types of grant-funded scholarships available in STEM fields (Appendix 3, Tables 42a, 42b, 42c). The rank order, from most frequent to least frequent for grant-funded scholarships was:

- Students studying STEM (35.3%).
- Minorities studying in STEM (22.3%).
- Hispanic students studying in STEM (21.3%).
- STEM students from low-SES families (20.1%).
- First-generation students studying in STEM (19.8%).
- Females studying in STEM fields (15.6%).

CCs respondents reported more grant-funded scholarships than 4YR institutions in all six area (Table Q). Post hoc analysis indicated that the significance was coming, for five of the six analyses, from comparisons in the "No" and "I don't know" categories rather than the level of agreement at CCs and 4YR schools. The one exception was for institutional scholarships for "students studying STEM." For that comparison, there was a significant finding (p = .002) with a moderately weak effect (phi = -.244) with CC personnel being more likely to state these were present. An overall summary of the findings in this area is more CC personnel reported that

scholarships of each type were available at their institution but nearly all the differences were not significant. The significant finding was for institutional scholarships for "students studying STEM" with CC personnel reporting these more than their peers at four-year institutions.

A three-by-two matrix question in the survey ask about the presence of professionals at the respondents' institutions who have responsibility to facilitate collaboration "within the university" and "with external parties" (Appendix 3, Table 43). Consideration of possible forms of collaboration has been limited to "on a grant application or project" for this section of the report (Table S). For the purpose of this investigation, research collaboration was viewed as part of grant-funded projects, although not all research collaboration is grant funded and some grants do not fund research. There was no significant difference between CC and 4YR reports of facilitators for internal and external collaboration on grant applications and projects. Overall, 89.7% affirmed institutional professionals to help with internal collaboration on grant applications and projects while 79.6% affirmed professionals to help with external collaborations.

A separate but related question that was also structured as a matrix asked about collaborations (Appendix 3, Tables 45a and 45b). The stem for this set of inquiries was "My departmental colleagues and/or I have collaborated..." and this was followed by eight statements about different areas in which collaboration might take place "on a grant application or project" (Table T). None of the grant-specific comparisons showed significant differences by institutional type. Grant collaboration was reported to be very common and to have occurred between departmental colleagues most frequently (73.1%), with other departments (67.6%), with other disciplines (61.1%), with another institution (60.9%), with a state or federal agency (58.3%), with a K-12 school district (48.9%), with a non-profit (44.4%), and least frequently, with a business entity (42.3%).

Table V (partially reproduced here)

My institution/organization partners with...

	Overall	CC	4YR
To seek grants			
With another institution.	83.9%	86.8%	82.9%
With a non-profit entity.	70.1%	60.5%	74.2%
With a business entity.	68.3%	64.7%	69.8%
With a state/federal entity.	83.3%	81.6%	84.0%
With a K-12 school district.	67.8%	64.9%	69.1%

The purposes for HSIs' partnerships with other institutions or organizations were probed with a matrix question (Appendix 3, Table 46). The stem was "My institution/organization partners with…" and this was followed by five different categories of partnership (Table V). Respondents were asked to "select all that apply" from the five categories in respect to two primary purposes but only responses for "to seek grant funding" will be considered here. This query differs from

the one above as it addresses institutional activity while the preceding discussion was about personal and departmental experience. There were no statistically significant findings in the comparison of responses from CCs to those from 4YR institutions for this question. Ranked from the most frequently selected form of grant-seeking partnerships to least, they are 83.9% for partnerships with another institution, 83.3% for a state or federal agency, 70.1% for non-profits, 68.3% for business entities, and 67.8% for K-12 school districts.

Six of eight forms of grant-seeking collaboration reported for "My departmental colleagues and/or I have collaborated…" demonstrated significant differences between responses from STEM department personnel and non-STEM employees (Tables U and V; Table 45b in Appendix 3). These have been combined in Table W.

Table W

Significant Findings for STEM to Non-STEM Comparisons Regarding Grant Collaboration

My department colleagues and/or I have collaborated...	STEM %	Non-STEM %	p value	Phi	Effect size
Grant application or project subset					
Among ourselves on a grant appl./project	81.9%	60.0%	.001	.243	Mdrt
With other departments on a grant appl./project	77.5%	52.2%	.001	.264	Mdrt
With other disciplines on a grant appl./project	71.6%	43.3%	<.001	.282	Mdrt
With another institution on a grant appl./project	74.2%	39.3%	<.001	.348	Mdrt
With a business entity on a grant appl./project	52.7%	25.9%	.002	.268	Mdrt
With a state/fed. entity on a grant appl./project	68.4%	44.4%	.004	.240	Mdrt

Note: denotes statistical significance; Mdrt = moderate; see Appendix 3, Table 45b.

There was a consistent and stronger emphasis on grant funding reported among STEM personnel than for non-STEM personnel. The results also demonstrate a greater emphasis on interdisciplinary collaboration for STEM personnel involved in grant applications and projects in comparison to non-STEM personnel. This aligns with information in the literature (Cooke & Hilton, 2015: Vermeulen, Parker & Penders, 2013) and emphases in conferences like the Science of Team Science annual gathering which is in its 11th year (International Network of the Science of Team Science, 2018).

A query was made regarding tenure and promotion. It was included in the survey based on the experience of members of the research team and statements made by informants during the initial qualitative phase of the investigation. It was "Our faculty...may not be credited for education, student support, and scholarship funding grants in tenure and promotion." No significant differences were found when comparing by institution type and between STEM and non-STEM

faculty with less the 15% of respondents stating this was the case in any subset of informants (STEM vs. non-STEM, CC to 4YR, Hispanic vs. Non-Hispanic, and comparison between faculty, staff, and administrators).

Personnel cost limitations set by grant-making entities and the required qualifications for project leaders on grant-funded undertakings were addressed as possible limitations in the pursuit of grants (details in Appendix 3, Table 25). While not a majority, approximately one-sixth of STEM personnel perceived limits on the use of grant funds to pay personnel costs as a restriction that impacted their "ability to apply." "The types of qualifications expected for project leaders limit my institution's /organization's ability to apply for grants," was included in the survey in response to statements by community college personnel that requirements for a terminal degree, a publication record, and research outcomes limited the ability of their faculty to apply for some grants. Community college personnel (17.0%) were much more likely to agree with this statement than their peers at four-year institutions (6.2%) at highly significant levels with a weak effect size ($p = .001$, phi = -.160). Yet, less than 20% of respondents felt this was the case. STEM personnel were more likely to agree as well, 11.7% versus 6.1% for non-STEM, although the statistical significance calculation falls exactly on the line between a significant and non-significant finding and the effect size is weak ($p = .050$, phi = -.099). These findings denote the existence of a minority opinion in the sample supporting the notion that the "qualifications expected for project leaders" act as a practical limit on an organization's ability to apply for grants.

Sustaining grant-funded projects following funding was also addressed in the survey. Only 38.6% of CC respondents and 20.9% of respondents employed at four-year institutions said their employer "retains services established with grant dollars once the grant expires" (Appendix 3, Table 27). This was found to be a significant difference with a small effect size ($p = .001$, Cramer's V = .202) but post hoc analysis confirmed proportion differences between IDK, "Yes," and "No" responses within institution type caused the significant finding rather than a difference in affirmation by institution type ($p = .470$, phi = .067) making the overall response rate the noteworthy value. Overall 25.0% of respondents indicated that their employers sustained grant-funded projects following the award period.

Conclusions

The material described in this report represents findings from an exploratory investigation. Considering what existed, where, and to how great an extent rather than why patterns occurred was the focus of the research. This focus was made necessary by the very limited volume of information available in the literature about Hispanic-Serving Institutions, including their staffing, their practices, competence in Hispanic culture among employees, and understanding of the backgrounds and characteristics of their students. The exploratory nature of the work also impacts ability to draw conclusions based on the research findings. Absent a known set of characteristics to which the findings from this investigation can be compared for validation, the areas in which conclusions can be reached are limited. They must be restricted to concepts for which a significant volume of information was gathered or for which related sources of information can be used for verification. Because of this, general conclusions will be presented in six topic areas. The reader should not interpret this as meaning the remainder of the information in this report does not have value. There are many constructs addressed that can have immediate and important application within given contexts. There was, however, less material gathered about these topics so general conclusions in those areas would not have as much support as for the following concepts.

Staffing at the HSIs in the sample follows national trends. Recent reports confirm that women remain substantially underrepresented in engineering, computer, and physical science fields in the United States (Graf, Fry & Funk, 2018) and that very few STEM faculty are female (Beeler, Jagsi & Solomon, 2019). These patterns align with the research findings as females were less likely than males to work in STEM, to hold a STEM degree, and to possess a doctorate in a STEM field. The same patterns existed for Hispanics at the HSIs. Latinos/as represented 17.7% of all faculty respondents at the HSIs and 13.4% of faculty, 24.1% of staff, and 14.3% of administrative respondents in STEM departments. While these figures are above the national

averages for the presence of Hispanic faculty (Ponjuan, 2011; Taylor & Santiago, 2017), they are, with the exception of staff, below the percentage of persons in the population that identify as Hispanic in the United States and are especially low for New Mexico and Texas where 47% and 38% of residents identify as Hispanic. Even among employees of the HSIs in the sample, females and Hispanics were underrepresented in the STEM.

Hispanics were also underrepresented in the overall employee pool at most of the HSIs in the sample. In the seven-state region, Hispanics were more strongly represented in the employee pool at the less competitive institutions, community colleges, than at four-year institutions. The CC employee pool reported was bi-polar with 44.4% of respondents reporting 20% or fewer of faculty, staff, and administrators were Hispanic while 31.7% reported 41% or more were. At 4YR institutions, the median and mode response was less than 10% of employees were Hispanic, 41.8% of the informants selected this answer. Response rates decreased in a linear pattern from there with 73.4% of informants from 4YR institutions reporting 20% or fewer of the faculty, staff, and administrators at their institution were Latinos/as. Only 3.4% of 4YR personnel reported working at a college or university with 41% or more Hispanic representation. That is one-tenth of the number of community college personnel (31.7%) reporting the same characteristic. It appears that, for at least the south-central United States, Hispanic students who are interested in encountering and interacting with Hispanic faculty, staff, and administrators will increase the potential of doing so by attending a community college and even a specific subset within that group. While there were persons at four-year institutions reporting that 41% or more of the employees were Hispanic, they were a very small minority.

Commonly held understandings of the differences between community colleges and four-year colleges and universities were upheld for the HSIs in the data set. Faculty at the community colleges in the sample were reported to be less likely to hold a terminal degree, more likely to have been recruited with teaching as their primary area of responsibility, and less likely to face the expectation that they would seek grants or generate scholarly products. Their employers were also reported to offer more types of student support and support specific to Hispanic students than four-year institutions including offering more technology-based forms of instruction and support and being likely to offer more institutional scholarships in STEM fields, albeit for two-year degrees. Should Hispanic students be interested in attending a school that emphasizes instruction as its primary purpose and offers a variety of student supports, attending a community college represented in the regional sample rather than a four-year institution would increase the likelihood. However, that is a general description rather than a universally applicable statement. Faculty are allowed a great deal of freedom in the way that they approach their teaching responsibilities. The data gathered does not suggest that four-year institutions are without faculty who emphasize instruction as a major purpose in their role rather, that the respondents from CCs were more likely to state that teaching was viewed as the primary role of their faculty. This characteristic should not be confused with the quality of instruction offered. Addressing that topic was outside the scope of the investigation and no comment can be made regarding the quality of instruction offered at the HSIs in the sample. In addition, the presence of more types of support services and STEM scholarships at CCs cannot be said to be the case at every 2YR institution or a comment on the quality of service provided in these areas.

The level of training regarding Hispanic culture being offered to the employees of the HSIs was low and the level of competence in Hispanic culture among non-Hispanic faculty, staff, and administrators at the HSIs in the sample was, at best, suspect. Less than 20% of respondents at the HSIs reported their employer distributed information to employees about Hispanic culture and the needs and concerns of Hispanic students. Even fewer reported professional development offerings designed to improve competence in Hispanic culture, 12.5% at CCs and 5.6% at 4YR institutions. When the regular and strong disagreement between Latino/a respondents and non-Hispanic respondents regarding the availability of information about Hispanic culture, the understanding of Hispanic culture in higher education, the particulars of Hispanic culture, and the backgrounds, characteristics, and preferences of Latinx/a/os students are considered, it is clear that there is divide in conception along ethnic lines and that the general conception held by non-Hispanics is different than that held by Hispanics. As the topics in question were descriptions of the culture and community of the Hispanic informants, their responses should be accorded more weight than those of persons outside that culture and community, Thus, non-Hispanic employees of the HSIs in the sample appear, in general, to have inaccurate understandings regarding Hispanic cultural values and Hispanic students verifying patterns discussed in the LatCrit literature.

The survey responses regarding Hispanic culture, specifically values in Mexican-American culture, identify a set of cultural commitments generally accepted by Hispanic adults working in a variety of roles at HSIs in the region. This is valuable information because, as Chun and Evans (2016) note, cultural values are malleable but they are also part of individual identity and the sociocultural environment of higher education. As such, they contribute to forming students' experience of higher education. This recently confirmed set of values can act as the basis for other research and be used as a platform for employee professional development offerings at HSIs in, at a minimum, the seven-state region in which the survey was conducted.

Approximately 50% of the respondents reported the leaders at the HSIs in the sample place emphasis on providing services for Hispanic students but the report of actual services provided fall well below this level. This is especially true in respect to programming intended to support Hispanic students studying in STEM fields and for programming specifically for Latinas studying STEM. There appears to be, at a minimum, a disconnect between values advocated and programming implemented to support Latinx/a/os students at the HSIs in the sample.

The practice of intra- and inter-institutional collaboration is commonplace at the HSIs in the sample with some forms of intra-institutional collaboration being reported by over 90% of respondents. Inter-institutional collaboration for instruction purposes was reported by over 80% of CC respondents and nearly all of the 24 forms of collaboration included in the survey were reported by 50% or more of respondents.

Grant seeking was a commonly reported activity, as was internal and external collaboration on grant applications and projects, but there were some notable differences by institution type and departmental affiliation. Approximately 40% of respondents reported that their institution had professional personnel who aid in the acquisition of grants while over 80% reported employees who worked to facilitate collaboration on grant funded projects with internal and external

partners. Just over 51% of all respondents noted the presence of many faculty with grant funding at their institution. But, faculty at four-year institutions (27.9%) and faculty in STEM departments (32.4%) were reported to be more likely to face the expectation of seeking grant funding than faculty at CCs (6.8%) and in non-STEM departments (15.1%). In fact, a stair-step pattern in grant funding was found with CCs at the lowest rung, master's degree granting institutions on the middle rung, and doctorate-granting institutions at the highest. This appears to be related to the extent to which there was an expectation the faculty would seek grants and the relative emphasis on teaching reported at the institutions. In addition to the consistent and stronger emphasis on grant funding among STEM personnel than non-STEM informants, the results also demonstrate a greater emphasis on interdisciplinary collaboration for STEM personnel involved in grant applications and projects than for non-STEM personnel yet the services and scholarships funded by grants showed only limited differences by institution type. Notably, only 25% of respondents reported that grant-funded initiatives were sustained following the funding period. While much more can be learned about grant-funded activity at HSIs, the survey findings indicate the type of institution and the academic department are important factors for understanding institutional patterns and practices related to grants and that many grant-funded initiatives do not persist past the award period.

As HSIs educate the majority of Hispanic students attending college in the United States (Revilla-Garcia, 2018), understanding them, their staffing, programming, and practices is critical. In addition, the need for Hispanic students to be successful in college has never been greater. They are essential to the economic health of the country as the second fastest growing but largest minority group (Colby & Ortman, 2015; Flores & Park, 2015). The need for college-educated workers has never been more pronounced and it cannot be met without full rather than under-representation of degreed Hispanics (Arellano, Jaime-Acuna, Graeve, & Madsen, 2018; Bayer Corporation, 2012; Graf, Fry & Funk, 2018; Linley & George-Jackson, 2013). It is the hope of the authors that the substantial conclusions which could be reached and the many other topics about which first-of-its-kind data is made available in this report will encourage reflection about what it means to be a Hispanic-Serving Institution, provoke further investigation, and support institutional change that will benefit Latinos/as in higher education across the United States.

Appendix 1a: Consejos Colectivos Committee

Angelo State University

◊ William Kitch
◊ Katie Plum
◊ Andrea Robledo

West Texas A&M University

◊ Michael Preuss
◊ Eric Sosa
◊ Elsa Diego-Medrano

Texas A&M Engineering Experiment Station

◊ Cindy Lawley
◊ Melissa Walden
◊ Cindy Wall

TAMU – Kingsville

◊ Kim Jones
◊ Robert Diersing
◊ Lee Clapp

El Centro College

◊ Devon Kodzis
◊ Don Martin
◊ Greg Morris
◊ Brian Reese
◊ Kevin Stewart

Texas A&M University

◊ KrisAnn Everett
◊ Amy Klinkovsky
◊ Nicole Solecki

Del Mar College

◊ Marie Herrera-Sloan
◊ Shannon Ydoyaga

Texas Woman's University

◊ Claire Sahlin

Texas Tech University

◊ Jaclyn Canas-Carrell
◊ Dominick Casadonte

Tarleton State University

◊ Denise Martinez

Appendix 1b: Conference Flyer

Appendix 2: Research Description and Instruments

Research Methodology

The research was completed as a direct response to NSF's request for conferences that identify critical challenges for and important opportunities in STEM education at two- and four-year HSIs. That request was communicated in the Dear Colleague Letter NSF 17-092. Dr. Preuss of WTAMU designed the research plan that was submitted as part of the Consejos Colectivos conference team's application. When NSF award 17-64268 was made, he operated as a member of the conference planning team and as the lead researcher. He was aided in this process by five persons (the other authors of this report).

The research objective of the project was to produce original and timely information about the challenges and opportunities in STEM education at HSIs focusing on (1) improving Latinx STEM education, (2) building capacity for STEM research, and (3) implementing appropriate institutional change. A sequential, mixed-methods investigation of these challenges and opportunities was conducted beginning with focus group data gathered from conference participants and continuing with targeted interviews and survey research following the conference. A sequential exploratory pattern was deemed appropriate as there was little extant information about the topics under investigation, which made qualitative investigation and triangulation between data sources then validation with a larger sample the preferable approach. The survey that was deployed to yield the data described in this report was created based on information from the literature and outcomes from analysis of conference focus groups and subsequent stakeholder interviews. The population from which conference attendees were drawn was HSI students, faculty, staff, and administrators plus representatives of advocacy groups and funders of STEM initiatives. This inclusive set allowed for the greatest variety of perspectives regarding each topic.

Data collection for the research activity included: (1) topic-specific focus groups conducted during each concurrent session of the conference, (2) semi-structured interviews with students and representative stakeholders from groups that had been underrepresented in the focus groups, and (3) surveys of students at and employees of HSIs in a seven-state region. Persons working for non-profit groups that supported or advocated for Hispanic students were also welcomed as informants. These activities were completed within the funding period specified by the National Science Foundation which meant that the research team had three months to complete all the investigative activity. This included submitting all research methods, participant solicitation materials, informed consent patterns and documents, and question sets for review by the Institutional Review Board at West Texas A&M University.

Focus groups with faculty, staff, and administrators from HSIs were conducted at the Consejos Colectivos conference in Dallas at the end of February 2018. The discussion prompts for these conversations were developed based on information from the literature, input from TACHE representatives, suggestions offered by members of the conference organizing committee, and the experience of members of the research team. There were three general focus group topics and

a set of questions specific to each. The question sets are included in the instruments section of this report.

The focus group participants were selected at random from the list of conference registrants. The parties selected were contacted by e-mail and asked to participate in a designated focus group during one of the concurrent sessions of the conference. Thirty-seven persons were asked to participate in three focus groups. Twenty-six of them agreed to participate. They represented seven four-year institutions in Texas and New Mexico and five community colleges in Texas. The same party, Dr. Michael Preuss, facilitated all three focus groups. The focus groups were recorded, and transcripts were produced.

Student participants were purposefully excluded from the focus groups. This decision was made for two reasons. First, students might have been intimidated by the faculty, staff, and administrators in the focus groups impacting their willingness to speak and the content of their responses. Second, the higher education professionals in the focus groups might have altered the topics addressed in their responses with students present. It was felt that these were sufficient reasons to exclude students. This, however, meant that to have student input in the initial stage of the research another form of data gathering was necessary. Short, semi-structured interviews were planned to fill this gap. Similar interviews were also planned as a means of filling any gaps in representation left by random selection of focus group participants. With several faculty members, staff persons, and administrators participating in each of the focus groups, the only informant gap was in respect to advocates. Even though this was the case, a small number of interviews were conducted with female administrators from HSIs as the count of female administrators in the focus groups was lower than that of male administrators.

Immediately following the conference, student, advocate, and female administrator interviewees were sought. In all cases, a convenience sampling pattern was enacted. Interviewees were sought through the personal networks of members of the research team. This decision was made due to severe time constraints. To be able to deploy the survey, which was based on the focus group and interview data, the qualitative data had to be collected, transcribed, coded, and the codebooks reconciled in a 30-day window. That left another 20 days for the survey to be developed so that it could be deployed before the end of the spring semester in 2018. Eight students were interviewed, a male and two females who were students at regional, comprehensive state universities that were HSIs with the remaining students attending community colleges that were also HSIs. Four of the CC students were male, and one was a female. Two advocates were interviewed. One was a male and one was a female. Both served in leadership roles for non-profit organizations. The male was a full-time employee of a non-profit in a metropolitan region of Texas. The female was a volunteer leader of a state-wide non-profit whose full-time role was as an administrator at an emerging HSI. Two female administrators were also interviewed. One worked at a regional, comprehensive state university and the other at a community college. The interviews were recorded and transcribed.

The qualitative data, focus group and interview transcripts, were divided into two groups, input from students and material supplied by faculty, staff, administrators, and advocates. All members of the research team completed open coding of each transcript (Kolb, 2012). Four worked

independently while two others, Dr. Preuss and Jason Rodin, collaborated to produce a combined set of codes. The student interviews, the smaller set, were coded first. When each team member had completed coding the student interview transcripts, meetings were held in which line-by-line discussion of codes was completed and a common codebook negotiated. The same process was completed subsequently for the focus group transcripts and for the administrator and advocate interviews. In this process, it became apparent that splitting the qualitative data into student and professional input had been appropriate as the codebooks derived had substantial differences. The result was two corporate codebooks, one representing themes from faculty, staff, administrator, and advocate data and a second representing themes from the student data.

The codebooks were used to develop the surveys in conjunction with the Psychosociocultural Model of College Success for Latinx students (Castellanos & Gloria, 2007) and the work of Santiago, Taylor, and Calderon (2015). Castellanos and Gloria's theory suggests five factors contribute to college persistence among Latinx students: (1) psychological, social, and cultural strengths and supports, (2) the degree to which the student struggles with cultural congruity, (3) the level of acculturative stress, (4) sense of belonging, and (5) self-efficacy. *Finding Your Workforce: Latinos in STEM* (Santiago, Taylor, & Calderón, 2015) informed the structure the surveys and some of the questions through its evidence-based institutional characteristics with the potential to improve Latinx success in STEM. The following concepts were included in the surveys: (1) conducting targeted outreach to Latinx students, (2) fostering an environment of institutional commitment to student success, (3) establishing institutional partnerships, (4) improving advising, (5) establishing peer mentoring programs, (6) supporting faculty development, (7) enhancing relevant academic support programs, (8) providing research and fellowship opportunities for students, and (9) securing industry cooperation to ease transitions into the workplace.

The survey development process was completed in approximately 20 days in meetings held by the research team. Sample questions were written primarily by Dr. Preuss and discussed by the group with alternative questions suggested by team members. The questions were refined through corporate discussion across more than a dozen multi-hour meetings. A survey was developed for distribution to students at Hispanic-Serving Institutions in a seven-state region (AR, CO, KS, LA, NM, OK, TX). A second survey for faculty, staff, and administrators at the same institutions and in the same region was also developed. The intention for the student survey was to identify student experience and opinion. The intention for the faculty, staff and administrative survey was to identify institutional commitments and characteristics, the background, responsibilities and experience level of HSI employees, and to understand the perspectives of the employees.

Both surveys were subjected to piloting and assessment of face validity. The student survey was piloted with a group of ten student volunteers from West Texas A&M University and the faculty, staff, and administration survey (FSA) was piloted with a small number of faculty and staff at WTAMU. The surveys were reviewed for face validity by representatives of the Texas Association of Chicanos in Higher Education. Both surveys were administered through the Qualtrics survey platform and each included some logic limitations. For example, if a respondent

stated s/he was less than 18 years of age or replied s/he did not understand or agree to the conditions of the survey, survey logic took them to a thank you page and prevented engagement with the survey instrument. Another commonly applied logic pattern made follow-on questions available only to individuals who provided specific responses (e.g., if a respondent indicated standing as a faculty person, several follow-on questions about the nature of the individual's faculty appointment were subsequently presented).

While the two surveys were deployed simultaneously in the spring of 2018, the means by which participation was solicited diverged. As this report addresses the faculty, staff, and administrative survey, the means of soliciting student participation will not be discussed. The link to the FSA survey was distributed in several ways. A broadcast e-mail was sent to over 1,500 employees at 119 HSIs in the seven-state region. This contact list had been developed by the research team using the US Department of Education and HACU listings of HSIs for the year 2016. One team member accessed the website of each of the HSIs and searched for STEM, student support, and administrative contacts. These were compiled as the list of potential institutional contacts at the 119 HSIs. Thirty-one persons who attended the Consejos Colectivos conference had agreed to act as "Research Champions." These persons were contacted via e-mail and provided an IRB approved e-mail for use in soliciting survey participation from their institutional colleagues. A third means of distributing the FSA survey link was provided by the Texas Association of Chicanos in Higher Education. TACHE's leadership distributed the survey link to their membership via e-mail. Finally, the research team asked faculty, staff, and administrators they knew at HSIs to complete the survey. The survey remained open for a three-week period at the end of the spring semester in 2018. Once the survey was closed, the responses were downloaded to an Excel spreadsheet.

Four hundred and ninety-four faculty, staff, and administrators accessed the survey. The research team completed an initial review of the responses and excluded 91 response sets that were incomplete. The remaining 403 were subjected to statistical analysis. They represent at least 44 distinct institutions in three states, CO, NM, and TX. A minimum number of institutions represented is known as the FSA survey did not request the name of the respondent's employer. This decision was taken to prevent the possibility of identifying informants should only one party respond at an institution. IP address were separated from the other data and traced to identify the server from which the survey was accessed. Many of the responses, 304 in total, were found to come from servers associated with HSIs. There were, however, individuals who completed the survey accessing the internet from a server that was not associated with an institution of higher education. There were 99 individuals in this group and all respondents from Kansas were in this category. IP addresses, latitude, and longitude placed most of these persons in communities in which HSIs existed or near those communities. It was assumed the respondents completed the survey from home or while traveling. The three individuals who completed the survey from a location outside the designated service area where assumed to be traveling. As approximately 25% of the institutional affiliations for respondents could not be identified, the minimum number of institutions represented has been reported.

Statistical analyses were completed with SPSS software. Responses were disaggregated by gender, ethnicity, institution type, role at the institution, and affiliation with a STEM department, as applicable, during statistical analysis. The process, as noted above and in the Limitations and Delimitations section of the report, was exploratory. As this was the case, the analyses were less hypothesis-driven than a general search for meaningful differences in responses. Logical limits were imposed based on the intent of the question, the nature of institutions of higher education, and the professional experience of members of the research team. The results of the analyses are presented in this report.

Instrumentation

a. Focus group question sets

Three focus groups were completed at the *Consejos Colectivos* conference. Each had a different focus. The IRB approved question sets employed were as follows.

Focus Group 1: Institutional challenges and opportunities related to STEM instruction and research at HSIs.

- What do you see as the main challenges Latinx students face when entering your institution and completing STEM degrees there?
- What meaningful opportunities do you see for your institution in STEM instruction and research?
- In what way can institutions best engage Latinx students in institutional offerings related to STEM instruction and/or research?
- Are there challenges your institution faces in enabling research conducted by faculty or students that may not have been mentioned already?
    - Follow-on question: Do you think different types of institutions, say community colleges and state universities or even private universities, might face different challenges? If so, what and why?
- Does institutional climate impact research activity or programs? If so, what is its level of importance in relation to the other factors that have been discussed?

Focus Group 2: Institutional challenges and opportunities related to collaboration with other HSIs and advocacy organizations to improve STEM instruction and research.

- What do you see as the main challenges Latinx students face when entering your institution and completing STEM degrees there?
- What kinds of collaborations, at the institutional level, at the department level or at the faculty/staff level, has your institution attempted to promote and improve STEM education for Latinx students?
- What kinds of collaborations, at the institutional level, at the department level or at the faculty/staff level, would you advocate for to promote and improve STEM education for Latinx students and what led you to favor it/them?
    - Follow-on question: Where would you like to see more opportunities for collaboration with other HSIs/ advocacy organizations?

- What can interfere with you or your institution's intention to collaborate with other educational institutions and community organizations to promote STEM education?
- Does the institutional climate on your campus create opportunities and challenges related to STEM instruction and research?
- Are there any topics you feel should be mentioned that have not come up in our conversation?

Focus Group 3: Institutional challenges and opportunities related to securing external support for improving Latinx STEM education, building capacity, and implementing institutional change.

- What do you see as the main challenges Latinx students face when entering your institution and completing STEM degrees there?
- What grant-funded programs that support Latinx success in STEM have you/your institution participated in in the past?
- Are there any factors that complicate your institution's and its students' ability to participate in NSF or other grant-funded programs?
- What is your institutional climate as it relates to support for seeking grant funding and conducting research?
- How has participation or lack of participation in externally funded programs impacted your institutional culture and capacity?

b. Interview question sets

Informants who were students at HSIs and who were faculty, staff, or administrators at HSIs were sought. Persons working for organizations that advocate for Hispanic students were also approached as informants. The questions used with each group were as follows.

<u>Student Interview Questions Set</u>

1. How many semesters of college/university have you attended to date?
2. How strongly do you identify with Hispanic culture? Please state a number from 1 *Not at All* to 5 *Very Strongly* as your rating.
3. How do you feel about your abilities to succeed in the university/college setting as a Hispanic student?

   If answer is short or provides limited detail, the follow-on prompt is: Please elaborate.
4. How strongly do you feel a sense of belonging at your university/college?
   a. Please state a number from 1 *Not at All* to 5 *Very Strongly* as your rating.
   b. Please elaborate about why you gave a [*number provided*] rating.
5. How supportive is your family of your choice to attend college/university?

   If answer is short or provides limited detail, the follow-on prompt is: Please elaborate.

6. In what ways does your university or college provide assistance to you as a Hispanic student?
7. In what ways do finances play a role in your success as a Hispanic student?
8. What role do you feel your culture plays in your success as a student?
9. Tell me about role models at your college/university that you can relate to as a Hispanic student?
10. In what ways do you feel that university/college culture differs from what you have experienced in Hispanic culture?
11. What, if any, specific barriers have you faced as a Hispanic student?
12. Are there ways you feel your university/college could better serve you as a Hispanic student?
13. What are the biggest challenges you feel you face in completing a STEM degree as a Hispanic student?

c. Faculty, staff, administrator, and advocate interview question set

1. How directly involved are you with Hispanic students at your institution/organization? Please state a number from 1 *Not at All* to 5 *Very Strongly* as your rating.
2. How many years have you worked in higher education?
3. What is your primary academic discipline or area of professional responsibility?
4. How strongly do you identify with Hispanic culture? Please state a number from 1 *Not at All* to 5 *Very Strongly* as your rating.
5. What do you feel are some challenges facing Hispanic students in higher education?
6. What ways do you feel Hispanic culture impacts success for Hispanic students?
7. In what ways does your institution/organization offer specific assistance for Hispanic students?

    If answer is short or provides limited detail, the follow-on asks: Please elaborate.

8. In what ways do you feel that finances play a role in Hispanic student success?
9. In what ways does your institution/organization provide Hispanic students assistance in navigating academic services?
10. Tell me about ways that your institution/organization collaborates with other Hispanic-Serving Institutions regarding Hispanic student success?
11. Tell me about ways that your institution/organization collaborates with community or nonprofit groups for Hispanic student success?
12. What research-based practices intended to support Hispanic student success has your institution/organization implemented?

Follow-on question: Is a process in place to assess the impact of the program(s)?

13. Does your institution/organization offer specific research opportunities to Hispanic students in STEM fields?
14. What do you feel would improve Hispanic student success in STEM at your institution (*alternative question ending for use with advocates* - …through your organization)?

d. Faculty, staff, administrator, and advocate survey question set

Survey Codes

SD = Strongly Disagree	N = Neither Agree nor Disagree	SA = Strongly Agree
D = Disagree	A = Agree	IDK = I Don't Know

HSI STEM FSA

Start of Block: Informed Consent

Q1.1 CONSENT FORM: **Stakeholder Perspective on Challenges and Opportunities for Improving Undergraduate STEM Education at HSIs Online Survey Entry Screen**

You are being asked to complete this survey to help a team funded by the National Science Foundation (NSF) gather information related to critical challenges and opportunities regarding undergraduate science, technology, engineering, and mathematics (STEM) education at HSIs, and potential actionable solutions that fall within NSF's mission, policies, and practices. The party conducting the survey is the West Texas Office of Evaluation and Research (WTER) from West Texas A&M University (WTAMU).

The survey was developed by WTER in collaboration with members of the faculty and staff of Texas Woman's University*. Information collected on this survey will be used to identify critical challenges and opportunities regarding undergraduate science, technology, engineering, and mathematics (STEM) education at HSIs, and potential actionable solutions that fall within the National Science Foundation's (NSF) mission, policies, and practices. As part of this purpose, derivatives of the material gathered will be employed in: 1) reports to the National Science Foundation, 2) reports to the project team, and 3) publications and presentations by members of the project team (individuals from Angelo State University, Delmar College, El Centro College, Texas A&M University, Texas A&M University-Kingsville, Texas Woman's University, and West Texas A&M University).

Participation in this survey is strictly voluntary. WTER reporting of the survey results will present outcomes in aggregate format without identifiers. It is important for all parties to know the following before participating in this survey.

- There are no more than minimal risks associated with your participation in this survey.
- There are no benefits for participation and no consequences for not participating.
- You may choose to answer or not answer any question or may stop participation at any time without adverse consequences.
- Your input will be valuable in gathering information relevant to improving STEM education at HSIs and for NSF activity to encourage that purpose.
- No information allowing identification of respondents will be gathered.
- The survey should take about 15 minutes to complete.

This survey is being conducted by the West Texas Office of Evaluation and Research. Questions about the survey or project may be directed to the Executive Director of WTER, Dr. Michael Preuss at 806-651-8775 or mpreuss@wtamu.edu. The survey has been reviewed by the WTAMU Institutional Review Board. For questions or concerns about your rights related to participation in this survey, contact WTAMU's IRB Director at 806-651-2732 or ar-ehs@wtamu.edu.

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**Collaboration with Texas Woman's University did not occur – survey developed by WTER & WT staff*

Q1.2 Do you understand the information provided above and wish to participate in this survey?

- Yes
- No

Q1.3 Are you at least 18 years of age?

- Yes
- No

End of Block: Informed Consent

Start of Block: Demographics Block

Q2.1 I am...

- Female
- Male
- Non-binary
- Non-specified

Q2.2 I identify as...

- Hispanic
- Not Hispanic

Q2.3 I think of myself as... <select all that apply>

- Asian
- Black/African American
- Hispanic/Latinx
- Hawaiian/Pacific Islander
- Native American/Alaskan Native
- White
- Other _____

Q2.4 I work for an institution that offers...

- Primarily certificates and associate degrees
- Primarily baccalaureate degrees and some master's degrees
- Baccalaureate and master's degrees, and 2 or more STEM doctoral degrees
- I do not work for an institution of higher education

Q2.5 My work is connected to Hispanic students in higher education because...

- It is not
- I work for a grant-funded or non-profit group focused on serving Hispanics
- I represent a community-based organization that serves Hispanics
- I work for a STEM organization that has an interest in Hispanic students
- In some other way

Q2.6 I have worked in or with higher education for...

- Less than 2 years
- 2 or more years, but less than 5 years
- 5 or more years, but less than 10 years
- 10 or more years, but less than 15 years
- 15 or more years, but less than 20 years
- 20 or more years

Q2.7 I work within a STEM department or discipline.

- Yes
- No

Q2.8 Which of the following describes your educational background in Science, Technology, Engineering, or Mathematics (STEM)? <Select all that apply>

- I do not have a STEM degree
- Associate's degree
- Bachelor's degree
- Master's degree
- Doctoral degree

Q2.9 My primary area of responsibility is...

- Faculty member
- Staff person
- Administrator
- Other

Q2.10 My faculty assignment can be described as...

- Adjunct faculty at a community college
- Adjunct faculty at a 4-year institution
- Full-time community college instruction
- Full-time non-tenure track
- Full-time tenure track
- Tenured faculty

End of Block: Demographics Block

Start of Block: Hispanic Culture and Students Block

Q3.1 Hispanic cultural values...	SD	D	N	A	SA
Are understood by higher ed.					
Emphasize hard work.					
Are diverse.					
Include confidence in one's ability to succeed.					
Include accepting uncertainty in life.					
Include taking each day as it comes.					
Hold that events are predetermined.					
Esteem, patience and politeness.					
Prioritize strong family relationships.					
Reinforce deferring to authority.					
Prioritize earning income over attending college.					
Reinforce gender norms in family roles.					
Hold a common set of beliefs.					
Q3.2 Actionable information is available...	SD	D	N	A	SA
About challenges Hispanics face in higher ed.					
Comparing Hispanic culture to higher ed culture.					
Q3.3 Hispanic Students have...	SD	D	N	A	SA
Parents who influence their decisions.					
Families who demand time/resources.					
Difficulty w/ college culture.					
Language barriers hindering academic success.					
Limited personal history with STEM professionals.					
Preference for majors leading to local employment.					
Q3.4 Hispanic Students are...	SD	D	N	A	SA
Under-prepared for college math.					
Under-prepared to navigate college processes.					
Primarily 1st gen students.					
From low SES backgrounds.					
Working to attend college.					
Routinely involved w/ family members.					
Unlikely to seek help.					
Under-represented in upper-level STEM classes.					
Unaware of STEM opportunities.					
Intimidated by STEM.					
Not identifying w/ STEM.					
Arriving with inaccurate information about college.					
Going to college in or near their home towns.					

Q3.5 Hispanic Students tend to go to college in or near their hometowns for the following reasons <select all that apply>

- Personal preference
- Family influence
- Familiarity
- Finances
- Community connections
- Other _____

End of Block: Hispanic Culture and Students Block

Start of Block: STEM Student Info Block

Q4.1 Hispanic STEM students' ability to participate in student organizations or extra-curricular activity is impacted by...	SD	D	N	A	SA
Living off campus.					
Heavy course loads.					
Family commitments.					
Work commitments.					
Language barriers.					

Q4.2 Regarding Hispanic students and STEM, my institution...	SD	D	N	A	SA
Identifies their early interest using institutional records.					
Emphasizes STEM identity development.					
Uses predictive analytics to monitor activity.					

Q4.3 Regarding Hispanic students and STEM, my institution...	Yes	No	IDK
Has no means of identifying early STEM interest.			
Sends announcements about support services.			
Proactively sends personalized guidance.			
Has an Early Alert system.			

Q4.4 My institution/organization has personnel whose primary responsibility is interacting with and supporting Hispanic STEM students.

- Yes
- No
- IDK

Q4.5 We have activities designed to inspire STEM interest among students.

- Yes
- No
- IDK

Q4.6 These events are well attended.

- Yes
- No
- IDK

Q4.7 We have data demonstrating the effectiveness of these events.

- Yes
- No
- IDK

Q4.8 We target Hispanic students with these events.

- Yes
- No
- IDK

End of Block: STEM Student Info Block

Start of Block: Career Awareness and Development Block

Q5.1 Which of the following describes your professional experience? <Select all that apply>

- Hispanics who have completed STEM degrees are desired by employers.
- Hispanics who speak English and Spanish have an advantage when seeking a job in STEM.
- I help Hispanic students identify potential employers.
- I help Hispanic students pursue potential employment.
- My institution/organization sponsors career planning activities for STEM students.
- My institution/organization sponsors career planning activities targeted to Hispanic STEM students.
- My institution/organization collaborates with businesses in job training/placement for Hispanic students.

End of Block: Career Awareness and Development Block

Start of Block: Institutional Student Support Block

Q6.1 In respect to student support...	SD	D	N	A	SA
We are dependent on grant-funding to start new initiatives.					
Our programming for Hispanic students is based on published research or strong institutional data.					
Services for Hispanic students take a holistic approach (academic, psychological, social, and cultural needs).					

Q6.2 DACA/Dreamer students attend my institution.

- Yes
- No
- IDK

Q6.3 Our administration has taken steps to protect DACA/Dreamer students.

- Yes
- No
- IDK

Q6.4 Representatives from all of the Hispanic student organizations meet regularly to coordinate activities.

- Yes
- No
- IDK

Q6.5 Regarding student support programming, our institution/organization...	Yes	No	IDK
Leaders emphasize providing services to Hispanic students.			
Leaders regularly fund efforts to serve Hispanic students.			
Provides soft skills training (research presentation, professional dress/etiquette, etc.).			
Retains services established with grant dollars once the grant expires.			
Provides grant-funded services to students.			

Q6.6 What kind(s) of grant-funded services are provided for students? <select all that apply>

- Academic support
- Advice and direction
- A cohort or group
- Scholarships
- STEM specific services
- Services specific to Hispanic students
- Other _____

Q6.7 In respect to specific student groups, we have... <select all that apply>	STEM	+ Hispanic	+ Female
Departmental support that operates separately from other efforts on campus.			
Collaboration with other departments to provide support.			
Student organizations.			
Assistance in college process navigation.			
Leadership training for students.			
Activities to increase interaction between faculty and Hispanic students.			
Faculty mentors.			
Peer mentors.			
Associations with professional networks.			

Q6.8 Please tell us which of the following exist at your institution/organization.	We have institutional scholarships for...			We have grant-funded scholarships for...		
Students studying in STEM.	Yes	No	IDK	Yes	No	IDK
1st gen students studying in STEM.						
Minorities studying in STEM.						
Hispanic students studying in STEM.						
STEM students from low-SES families.						
Females studying in STEM fields.						

Q6.9 Faculty/staff sponsors of Hispanic student organizations at our institution are... <select all that apply>

- Male Hispanic (Latino)
- Female
- Female Hispanic (Latina)
- Minorities
- White
- We don't have faculty/staff sponsors for student organizations

Q6.10 A low student to teacher ratio is important for facilitating faculty/student rapport.

- Yes
- No
- IDK

Q6.11 Low student to teacher ratio is important... <select all that apply>

- In STEM instruction
- For Hispanic students
- For 1st gen students
- For students from low SES backgrounds
- For female STEM students
- To facilitate faculty/student rapport

Q6.12 We use institutional data to evaluate the effectiveness of... <select all that apply>

- Academic support programming targeted for STEM students.
- Co-curricular programming targeted for STEM students.
- Curricular changes made in STEM courses (post-implementation).

Q6.13 We also consider effectiveness for the following groups... <select all that apply>

- Minorities
- 1st gen
- Low SES

Q6.14 Based on effectiveness data, we have adapted or rejected... <select all that apply>

- Academic support programming targeted for STEM students.
- Co-curricular programming targeted for STEM students.
- Curricular changes made in STEM courses.

End of Block: Institutional Student Support Block

Start of Block: Institutional Services Block

Q7.1 Regarding practices, programs, and services at my institution...	My department has implemented this			All our STEM departments implement this		
Course podcasts	Yes	No	IDK	Yes	No	IDK
Course video-casts						
Dual credit courses (HS + college)						
Early College programming						
Emphasis within courses on Hispanic contributions.						
Experiential or project-based learning						
Faculty formally mentoring students						
Field trips						
Freshman seminars						
Guest lecturers						
Guided pathways						
Holistic approach to student support (academic, psychological, social, cultural)						
Hybrid classes (combining online and face-to-face elements)						
Instructional labs						
Internships						
Inverted classrooms (online video instruction + classroom application time)						
Interdisciplinary instruction						
Leadership training for students						
Online courses						
Students mentoring other students						
Regular updating of course curriculum						
Supplemental Instruction						
Tutoring						
Undergraduate research						
University classes taught at a community college						

Q7.2 My institution...	SD	D	N	A	SA
Targets Hispanics with the practices I selected.					
Gathers effectiveness data on these practices.					
Has professional staff specifically to help with these practices.					

End of Block: Institutional Services Block

Start of Block: Institutional Collaboration Block

Q8.1 My institution has professionals to help collaborate... <select all that apply>	For instructional purposes			To provide students with real-world experiences			On a grant application or project		
Within the university	Yes	No	IDK	Yes	No	IDK	Yes	No	IDK
With external parties									

Q8.2 My departmental colleagues and/or I have collaborated... <select all that apply>	For instructional purposes			To provide students with real-world experiences			On a grant application or project		
Among ourselves	Yes	No	IDK	Yes	No	IDK	Yes	No	IDK
With other departments									
With other disciplines									
With another institution									
With a non-profit entity									
With a business entity									
With a state/federal entity									
With a K-12 school district									

Q8.3 My institution/organization partners with ... <select all that apply>	To seek grant funding			For undertakings that serve Hispanic students		
Another institution	Yes	No	IDK	Yes	No	IDK
A non-profit entity						
A business entity						
A state/federal entity						
A K-12 school district						

End of Block: Institutional Collaboration Block

Start of Block: Institutional Research and Requirements Block

Q9.1 Regarding labs/facilities and researchers, my institution...	Yes	No	IDK
Has teaching labs, but not research labs.			
Has both teaching and dedicated research labs.			
Has PhD-holding faculty whose job includes conducting research.			
Employs full-time research faculty.			
Has many faculty members who have grant funding.			
Reduces teaching loads for conducting grant-funded research.			

Q9.2 Our faculty... <select all that apply>

- Typically hold terminal degrees.
- Are recruited to teach which represents the majority of their work.
- Are expected to seek grants.
- Are expected to produce publications and other scholarly works.
- Are encouraged to serve on external review panels and boards.
- Are highly concerned with tenure and promotion standards.
- May not be credited for education, student support, and scholarship-funding grants in tenure and promotion.

Q9.3 Regarding STEM programs and instruction... <select all that apply>

- Accrediting agency requirements can limit the amount of change possible within degree programs.
- Accrediting agency requirements can limit the degree of change possible in course content.
- Accrediting agency requirements can limit the innovation possible when planning instructional patterns.
- Articulation agreements can limit the amount of change possible within STEM degree programs.
- Articulation agreements can limit the degree of change possible in STEM course content.
- Limits on personnel cost imposed by funders in STEM grants impact institutions' ability to apply.
- The types of qualifications expected for project leaders limit my institution's/organization's ability to apply for grants.

End of Block: Institutional Research and Requirements Block

Start of Block: Institutional Info Block

Q10.1 We have Hispanics working in our department/organization.

- Yes
- No
- IDK

Q10.2 Hispanic representation in our department/organization is...

- 10% or less
- 11% to 20%
- 21% to 30%
- 31% to 40%
- 41% or more

Q10.3 My institution has an orientation process for parents of Hispanic and/or 1st gen students.

- Yes
- No
- IDK

Q10.4 I would favor the implementation of an orientation process for the parents of Hispanic and/or 1st gen students.

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree

Q10.5 My institution...	SD	D	N	A	SA
Prioritizes low student to teacher ratios.					
Organizes course trips to local businesses, labs, and facilities.					
Has personnel w/ advanced degrees in Education who monitor instructional practice in STEM courses.					
Has personnel with advanced degrees in curriculum development who aid faculty in preparing or revising courses.					
Has many faculty who utilize curriculum development services.					

Q10.6 Regarding transfer credits and course equivalents, my institution...	SD	D	N	A	SA
Has articulation agreements that maximize hours.					
Determines these individually.					
Accepts students at the same course level/year.					

Q10.7 We have on-campus activities intended to inspire STEM interest among current students.

- Yes
- No
- IDK

Q10.8 These events are well attended.

- Yes
- No
- IDK

Q10.9 We have data demonstrating the effectiveness of these events.

- Yes
- No
- IDK

Q10.10 We target Hispanic students with these events.

- Yes
- No
- IDK

Q10.11 My institution leaves planning for improvement of courses with low completion and success rates in the hands of departmental faculty.

- Yes
- No
- IDK

Q10.12 Our state/system directs college credit transfer including recognized course equivalents.

- Yes
- No
- IDK

Q10.13 State mandates impact our mathematics offerings.

- Yes
- No
- IDK

Q10.14 We offer developmental mathematics courses.

- Yes
- No

Q10.15 Outreach activities at my institution/organization include... <select all that apply>

- Campus visits to our STEM facilities by high school groups
- STEM demonstrations in the community
- STEM demonstrations in K-12 settings
- Our STEM students serving as representatives of the institution/organization
- Non-residential summer STEM camps/programs
- Residential summer STEM camps/programs
- STEM demonstrations or content as web pages, videos, audio files, or tweets
- Social, cultural, historic STEM content and profiles

Q10.16 My institution uses data to... <select all that apply>

- Identify courses with low completion/success rates.
- Identify courses in which minority students have low completion/success rates.
- Regularly monitor short-term student outcomes in courses with low completion/success rates.

Q10.17 Who monitors instructional practice in STEM courses at your institution? <select all that apply>

- Department Dean/Chair
- Specialists w/ advanced degrees in education
- No one

Q10.18 My institution has... <select all that apply>

- Professional personnel who aid in the acquisition of grants.
- A partnership with another college/university that has personnel who aid in the acquisition of grants.
- Support personnel with advanced degrees in curriculum development who aid faculty in preparing or revising courses.

Q10.19 My institution/organization provides persons in my role with... <select all that apply>

- Information about Hispanic culture.
- Information about the needs and concerns of 1st gen students.
- Information about the needs and concerns of Hispanic students.
- Information about the needs and concerns of low-income students.
- Professional development regarding Hispanic cultural competency.
- "How to" guidance regarding curriculum development.

Q10.20 Please select all that apply from the following list:

- I have used these services
- I find these services helpful/valuable
- I have made changes to my course curriculum I believe to be advantageous for Hispanic students in response to information from a professional development session

End of Block: Institutional Info Block

End of Survey

Appendix 3: Faculty, Staff, Administrator, and Advocate Survey Data Tables

Data Table Codes

Aa	Grey background indicates statistical significance
n	Count
%	Percentage
"	Same as above
⊗	Hypothesis test not conducted – usually due to insufficient cell size or non-significance
♀	Female
♂	Male
(SO)	Filtered to report only the responses of employees working in STEM departments
2Y	Two-year institutions (AKA Community Colleges)
4Y	Four-year institutions (AKA Universities with Bachelor's degrees and above)
Ad	Administrators
CV	Statistical Cramer's V test value for effect size
df	Statistical degrees of freedom
E	Comparison across Ethnicity
Fa	Faculty
G	Comparison across Gender
H	Hispanic
H	Statistical Kruskal-Wallace test value
I	Comparison across Institution Type (2Y, 4Y, or 4+Y)
MR	Statistical Mean Rank
NH	Non-Hispanic
NS	Non-STEM Employee
p	Statistical p-value
phi	Statistical phi-value for effect size
R	Comparison across Responsibility (Faculty, Staff, or Administrator)
S	Comparison across those who work / do not work in STEM departments / disciplines
St	Staff
U	Statistical Mann-Whitney U test value
χ^2	Statistical Chi-square test value
Z	Statistical Z-score for effect size

Please Note:

The percentages reported are all within category (within column). The first column labeled with a % sign is the percentage from the total sample, while other percentage columns report within their respective categorical column. For example in Table 1, 58.3% of the entire sample surveyed was Female while 67.0% of the sample that identified as Hispanic was Female.

Table 1

Participant Demographics

Q2.1	Gender (All respondents included)	n	%	% H	% NH	E p	E χ^2
	Female	235	58.3	67.0	55.8	.087	4.87
	Male	166	41.2	31.9	43.9		
	Non-Specified	2	0.5	1.1	0.3		
	Totals	403	100	100	100	"	"
	Gender (w/o Advocates)	n	%	% H	% NH	E p	E χ^2
	Female	228	58.3	68.3	55.7	.039	4.25
	Male	163	41.7	31.7	44.3		
Q2.2	Ethnicity						
	Hispanic	91	22.6				
	Not Hispanic	312	77.4				
Q2.3	Race (not mutually exclusive)						
	Asian	11	2.7				
	Black / African-American	13	3.2				
	Hispanic / Latinx	75	18.6				
	Native American / Alaskan Native	12	3.0				
	White	300	74.4				
	Other	16	4.0				

Note: Q2.1 df = 2

Advocates' responses excluded from statistical analyses as they were not HSI employees.

Table 2

Participants' Connection to Higher Education

Q2.4	I work for an institution that offers…	%	% H	% NH	E p	E χ^2
	Primarily certificates and associates degrees	21.8	33.0	18.6	<.001	30.69
	Bachelor's and some master's degrees	50.4	36.3	54.5		
	Bach., mast., & 2+ STEM doctoral degrees	25.3	22.0	26.3		
	I do not work for an institution of higher education*	2.5	8.8	0.6		
Q2.5	**Advocates-only:* My work is connected to Hispanic students in higher ed. because…					
	I represent a community-based organization that serves Hispanics	30.0	25.0	50.0	.659	0.83
	I work for a STEM organization that has an interest in Hispanic students	20.0	25.0	0.0		
	In some other way	50.0	50.0	50.0		

Note: Q2.4 df= 3; Q2.5 df = 2

Advocates' responses excluded from statistical analyses as they were not HSI employees.

Table 3

Participants' Time Working in / with Higher Education

Q2.6	I have worked in/with higher ed. for…	%	% H	% NH			
	Less than 2 years	6.6	9.6	5.8			
	2 to less than 5 years	12.2	10.8	12.6			
	5 to less than 10 years	18.4	24.1	16.8			
	10 to less than 15 years	18.1	19.3	17.8			
	15 to less than 20 years	14.8	15.7	14.6			
	20 or more years	29.8	20.5	32.4			
			MRH	MRNH	E p	E *r*	E *U*
			175.1	202.1	.052	0.10	14566.0
			MR ♀	MR ♂	G p	G *r*	G *U*
			178.2	219.6	<.001	0.18	22421.5

Note:

Table 4

Participants' Connection to STEM

Q2.7	I work within a STEM dept. or discipline.	%	% H	% NH	E p	E phi	E χ^2
	Yes	45.8	34.9	48.7	.026	–.113	4.99
			% ♀	% ♂	G p	G phi	G χ^2
			37.4	57.4	<.001	–.198	15.18
Q2.8	Which of the following describes your educational background in STEM?	%	% H	% NH	E p	E phi	E χ^2
	I do not have a STEM degree	41.0	50.6	38.4	.044	-.101	4.04
	Associate's Degree	2.8	2.4	2.9	1.000	.012	0.06
	Bachelor's Degree	18.4	14.5	19.4	.300	.052	1.07
	Master's Degree	23.7	16.9	25.6	.098	.084	2.74
	Doctoral degree	28.3	19.3	30.7	.040	.104	4.24
			% ♀	% ♂	G p	G phi	G χ^2
	I do not have a STEM degree		49.1	30.1	<.001	–.191	14.26
	Associate's Degree		3.5	1.8	.372	-.050	0.98
	Bachelor's Degree		18.1	18.4	.931	.004	0.01
	Master's Degree		23.8	22.7	.802	–.013	0.06
	Doctoral degree		18.5	42.3	<.001	.260	26.46
		% Fa	% St	% Ad	R p	R CV	R χ^2
	I do not have a STEM degree	22.9	65.6	42.9	<.001	.390	58.32
	Associate's Degree	2.1	3.1	3.2	⊗	⊗	⊗
	Bachelor's Degree	14.1	25.8	15.9	.025	.139	7.35
	Master's Degree	29.2	16.4	23.8	.032	.134	6.85
	Doctoral degree	47.4	1.6	28.6	<.001	.452	78.39

Note: All df = 1 except FSA (R) df = 2
Advocates excluded and Associates' responses not included in analyses due to low cell count.

Table 5

Participants' Role at Their Institution of Higher Learning

Q2.9	My primary area of responsibility is…	%	% H	% NH	E p	E CV	E χ^2
	Faculty member	50.1	43.0	52.0	.179	.095	3.45
	Staff person	33.4	34.2	33.2			
	Administrator	16.4	22.8	14.8			
			% ♂	% ♀	G p	G CV	G χ^2
	Faculty member		57.2	45.0	<.001	.206	16.18
	Staff person		22.0	41.4			
	Administrator		20.8	13.5			
			% 2Y	% 4Y	I p	I CV	I χ^2
	Faculty member		57.6	48.0	.009	.157	9.43
	Staff person		20.0	37.2			
	Administrator		22.4	14.8			
Q2.10	My faculty assignment is described as…	%	E p	G p	I p	R p	S p
	Adjunct faculty at a comm. college	2.6	⊗	⊗	⊗	⊗	⊗
	Adjunct faculty at a 4-year institution	7.3	"	"	"	"	"
	Full-time comm. college instruction	10.9	"	"	"	"	"
	Full-time non-tenure track	13.0	"	"	"	"	"
	Full-time tenure track	21.9	"	"	"	"	"
	Tenured faculty	44.3	"	"	"	"	"

Note: Q2.9 df = 2

Table 6

Institutional / Organizational Characteristics: Presence of Hispanic Coworkers

Q10.1	We have Hispanics working in our department / organization	%	% H	% NH	% 2Y	% 4Y
	Yes	87.5	90.5	86.6	93.1	85.6
	No	8.4	4.8	9.4	4.2	9.8
	IDK	4.2	4.8	4.0	2.8	4.7
		% Fa	% St	% Ad	% S	% NS
	Yes	85.7	88.9	93.9	84.8	89.5
	No	10.0	6.7	6.1	9.8	7.2
	IDK	4.3	4.4	0.0	5.3	3.3

Note:

Table 7

Institutional / Organizational Characteristics: Hispanic Representation

Q10.2	Hispanic representation in our department / organization is…	%	MRH	MRNH	E p	E *r*	E *U*
	10% or less	36.6	131.57	117.13	.156	–0.09	4532.0
	11% to 20%	28.9					
	21% to 30%	13.4					
	31% to 40%	9.3					
	41% or more	11.8					
			MR2Y	MR4Y	I p	I *r*	I *U*
			154.78	108.30	<.001	–0.31	3416.0
					R p	R df	R *H*
					.251	2	+2.77
			MRS	MRNS	S p	S *r*	S *U*
			123.6	116.1	.383	–0.06	6577.0

Note:

Table 8a

Institutional Characteristics: Expectations of Faculty

Q9.2	Our faculty… (not mutually exclusive)	%	% H	% NH	E p	E phi	E χ^2
_1	Typically hold terminal degrees	46.7	43.4	49.0	.359	.046	0.84
_2	Are recruited to mostly teach	43.4	39.8	45.8	.325	.050	0.97
_3	Are expected to seek grants	22.6	21.7	23.5	.721	.018	0.13
_4	Are expected to publish scholarly works	31.8	21.7	35.5	.017	.120	5.68
_5	Are encouraged to serve on panels/boards	28.5	27.7	29.7	.727	.018	0.12
_6	Are concerned with tenure and promotion	37.2	36.1	37.4	.831	.011	0.05
_7	May not be credited for education, student support, and scholarship-funding grants in tenure and promotion	10.2	10.8	10.3	.890	-.007	0.02
			% 2Y	% 4Y	I p	I phi	I χ^2
_1	Typically hold terminal degrees		36.4	51.1	.014	.123	5.98
_2	Are recruited to mostly teach		58.0	40.7	.004	–.145	8.27
_3	Are expected to seek grants		6.8	27.9	<.001	.208	17.01
_4	Are expected to publish scholarly works		2.3	41.3	<.001	.347	47.39
_5	Are encouraged to serve on panels/boards		22.7	31.1	.126	.077	2.34
_6	Are concerned with tenure and promotion		28.4	39.7	.054	.097	3.71
_7	May not be credited for education, student support, and scholarship-funding grants in tenure and promotion		13.6	9.5	.264	–.056	1.25

Note: All df = 1

Table 8b

Institutional Characteristics: Expectations of Faculty

		% Fa	% St	% Ad	R p	R CV	R χ^2
Q9.2	Our faculty… (not mutually exclusive)						
_1	Typically hold terminal degrees	55.2	33.6	54.0	<.001	.201	15.54
_2	Are recruited to mostly teach	50.5	30.5	57.1	<.001	.211	17.04
_3	Are expected to seek grants	25.0	18.8	27.0	.321	.077	2.28
_4	Are expected to publish scholarly works	35.4	25.8	39.7	.091	.112	4.08
_5	Are encouraged to serve on panels/boards	29.7	22.7	39.7	.049	.126	6.04
_6	Are concerned with tenure and promotion	43.8	25.8	42.9	.003	.173	11.46
_7	May not be credited for education, student support, and scholarship-funding grants in tenure and promotion	13.5	6.2	9.5	.109	.108	4.43
			% S	% NS	S p	S phi	S χ^2
_1	Typically hold terminal degrees		55.9	40.6	.003	–.153	9.11
_2	Are recruited to mostly teach		52.0	37.7	.005	–.143	7.96
_3	Are expected to seek grants		32.4	15.1	<.001	–.205	16.41
_4	Are expected to publish scholarly works		35.8	29.7	.204	–.064	1.61
_5	Are encouraged to serve on panels/boards		34.6	24.5	.028	–.111	4.80
_6	Are concerned with tenure and promotion		43.6	32.1	.019	–.118	5.49
_7	May not be credited for education, student support, and scholarship-funding grants in tenure and promotion		13.4	8.0	.083	–.088	3.00

Note: FSA (R) df = 2, STEM df = 1

Table 9

Institutional Characteristics: Articulation Agreements, Transfer Credits & Course Equivalents

			MR2Y	MR4Y	I p	I *Z*	I *U*
Q10.6	My Institution…						
_1	Has articulation agreements that max. hours		127.31	120.72	.488	–0.69	5556.5
_2	Determines these individually		114.84	121.22	.494	0.68	5866.5
_3	Accepts students at the same course level/year		115.09	119.09	.661	0.44	5658.5
Q10.12	Our state/system directs college credit transfer including course equivalents	%	% 2Y	% 4Y	I p	I CV	I χ^2
	Yes	63.6	78.8	58.0	<.001	.265	17.40
	No	4.9	9.1	3.3			
	IDK	31.6	12.1	38.7			

Note: Q10.12 df = 2

Table 10

Institutional Characteristics: Offerings in Mathematics

Q10.13	State mandates impact our math offerings	%	% 2Y	% 4Y	I p	I CV	I χ^2
	Yes	40.6	66.2	31.3	<.001	.332	26.93
	No	9.8	10.8	9.5			
	IDK	49.6	23.1	59.2			
Q10.14	We offer developmental math courses						
	Yes	78.8	89.6	74.7	.032	.168	6.90
	No	6.1	1.5	7.9			
	IDK	15.1	9.0	17.4			

Note: All df = 2

Table 11

Institutional Characteristics: Orientation for Parents of Hispanic/First-Generation Students

Q10.3	We have an orientation for parents of Hispanic and/or 1st gen students	%	2Y%	4Y%	I p	I CV	I χ^2
	Yes	30.6	31.3	30.3	.011	.180	9.03
	No	20.9	32.8	17.1			
	I don't know	48.6	35.8	52.6			
Q10.4	I would favor the implementation of an orientation for these parents		MRH	MRNH	E p	E *r*	E *U*
			107.4	80.9	.002	–0.24	1845.0
			MR♀	MR♂	G p	G *r*	S *U*
			93.3	80.5	.072	–0.14	3183.5
			MR2Y	MR4Y	I p	I *r*	I *U*
			87.5	86.8	.930	-0.01	2814.5
					R p	R df	R *H*
					.435	2	1.67
			MRS	MRNS	S p	S *r*	S U
			87.0	86.0	.893	0.01	3731.0

Note: Q10.3 df = 2

Table 12

Institutional Characteristics: DACA / Dreamer Students

Q6.2	DACA/Dreamers attend my institution	%	% 2Y	% 4Y	I p	I CV	I χ^2
	Yes	57.3	72.6	52.8	.001	.168	10.39
	IDK	42.7	27.4	47.2			
Q6.3	Our admin takes steps to protect them						
	Yes	30.1	33.3	28.9	.441	.089	1.64
	No	16.7	11.7	18.8			
	IDK	53.1	55.0	52.3			

Note: Q6.2 df = 1, Q6.3 df = 2

Table 13a

Institutional Characteristics: Labs, Facilities & Researchers

Q9.1	My institution…					
_1	Has teaching labs, but not research labs	%	% 2Y	% 4Y	I p	I χ^2
	Yes	27.5	67.6	12.3	<.001	77.19
	No	50.6	17.6	63.1		
	IDK	21.9	14.7	24.6		
_2	Has both teaching and dedicated research labs					
	Yes	62.5	31.9	73.7	<.001	71.98
	No	17.0	49.3	5.3		
	IDK	20.5	18.2	21.1		
_3	Has PhD faculty whose job includes research					
	Yes	62.8	18.8	78.6	<.001	115.19
	No	18.4	59.4	3.6		
	IDK	18.8	21.7	17.7		
_4	Employs full-time research faculty					
	Yes	26.4	5.8	33.9	<.001	33.28
	No	44.6	72.5	34.4		
	IDK	29.1	21.7	31.7		
_5	Has faculty members who have grant funding					
	Yes	51.2	24.6	60.7	<.001	37.31
	No	24.2	49.3	15.2		
	IDK	24.6	26.1	24.1		
_6	Reduces teaching loads for grant research					
	Yes	34.7	21.7	39.5	<.001	13.12
	No	30.1	46.4	24.2		
	IDK	35.1	31.9	36.3		

Note: All df = 2

Table 13b

Institutional Characteristics: Labs, Facilities & Researchers

Q9.1	My institution…					
_1	Has teaching labs, but not research labs	% S	% NS	S p	S *CV*	S χ^2
	Yes	32.2	22.6	<.001	0.28	19.44
	No	57.9	44.4			
	IDK	9.9	33.1			
_2	Has both teaching and dedicated research labs					
	Yes	69.5	56.6	<.001	0.25	16.46
	No	20.3	13.2			
	IDK	10.2	30.2			
_3	Has PhD faculty whose job includes research					
	Yes	68.0	58.0	<.001	0.29	21.13
	No	24.2	13.0			
	IDK	7.8	29.0			
_4	Employs full-time research faculty					
	Yes	29.9	23.3	<.001	0.38	37.23
	No	58.3	31.0			
	IDK	11.8	45.7			
_5	Has faculty members who have grant funding					
	Yes	49.2	53.8	<.001	0.33	28.44
	No	36.7	11.5			
	IDK	14.1	34.6			
_6	Reduces teaching loads for grant research					
	Yes	42.2	27.9	<.001	0.34	30.07
	No	39.1	20.9			
	IDK	18.8	51.2			

Note: All df = 2

Table 14

Cultural Competence: Hispanic Cultural Values

Q3.1	Hispanic Cultural Values…	MRH	MRNH	E p	E *r*	E *U*
_1	Are understood by higher ed.	167.7	204.9	.006	0.14	15294.5
_2	Emphasize hard work	256.7	181.0	<.001	–0.29	7912.0
_3	Are diverse	236.6	185.2	<.001	–0.20	9339.5
_4	Include confidence in own ability to succeed	237.4	184.4	<.001	–0.20	9194.5
_5	Include accepting uncertainty in life	216.9	190.4	.040	–0.10	11050.5
_6	Include taking each day as it comes	213.2	190.7	.081	–0.09	11269.0
_7	Hold that events are predetermined	209.0	191.9	.179	–0.07	11522.0
_8	Esteem patience and politeness	236.4	183.8	<.001	–0.21	9267.0
_9	Prioritize strong family relationships	223.0	187.5	.003	–0.15	10293.5
_10	Reinforce deferring to authority	233.1	184.7	<.001	–0.19	9539.0
_11	Prioritize earning income over college	221.7	188.4	.011	–0.13	10568.5
_12	Reinforce gender norms in family roles	224.5	188.3	.005	–0.14	10421.0
_13	Hold a common set of beliefs	232.4	185.7	<.001	–0.18	9604.0

Note:

Table 15a

Cultural Competence: Hispanic Student Have…

Q3.3		MRH	MRNH	E p	E *r*	E *U*
_1	Parents who influence their decisions	212.4	188.5	.051	–0.10	10825.5
_2	Families who demand time/resources	221.1	186.5	.006	–0.14	10111.5
_3	Difficulty w/ college culture	265.3	173.0	<.001	–0.36	6371.5
_4	Language barriers hinder academic success	242.3	180.6	<.001	–0.24	8402.0
_5	Limited history w/STEM professionals	242.7	180.0	<.001	–0.24	8221.0
_6	Prefer majors leading to local employment	223.9	186.1	.004	–0.15	9967.5
		MR♀	MR♂	G p	G *r*	G *U*
_1	Parents who influence their decisions	201.4	180.4	.037	–0.11	16015.5
_2	Families who demand time/resources	204.7	175.8	.006	–0.14	15270.0
_3	Difficulty w/ college culture	194.1	187.9	.567	–0.03	17214.5
_4	Language barriers hinder academic success	201.7	179.9	.045	–0.10	15935.5
_5	Limited history w/STEM professionals	194.5	188.6	.578	–0.03	17341.5
_6	Prefer majors leading to local employment	188.1	199.7	.283	0.05	19147.5

Note:

Table 15b

Cultural Competence: Hispanic Student Have…

Q3.3		MR2Y	MR4Y	I p	I *r*	I *U*
_1	Parents who influence their decisions	206.9	189.7	.150	–0.07	11750.0
_2	Families who demand time/resources	211.3	188.4	.068	–0.09	11371.5
_3	Difficulty w/ college culture	209.2	187.7	.093	–0.09	11374.0
_4	Language barriers hinder academic success	212.1	188.2	.065	–0.09	11299.0
_5	Limited history w/STEM professionals	210.0	188.2	.089	–0.09	11304.0
_6	Prefer majors leading to local employment	224.9	185.1	.002	–0.16	10365.5
				R p	R df	R *H*
_1	Parents who influence their decisions			.059	2	5.66
_2	Families who demand time/resources			.273	2	2.60
_3	Difficulty w/ college culture			.007	2	9.86
_4	Language barriers hinder academic success			.055	2	5.80
_5	Limited history w/STEM professionals			.001	2	13.6
_6	Prefer majors leading to local employment			<.001	2	17.4
		MRS	MRNS	S p	S *r*	S *U*
_1	Parents who influence their decisions	189.1	195.3	.538	0.03	18836.0
_2	Families who demand time/resources	205.2	182.1	.027	-0.11	16053.5
_3	Difficulty w/ college culture	190.2	193.1	.784	–0.01	17782.0
_4	Language barriers hinder academic success	189.7	195.9	.567	–0.03	17662.5
_5	Limited history w/STEM professionals	176.7	210.8	.001	–0.16	14918.5
_6	Prefer majors leading to local employment	183.4	204.7	.047	–0.10	16328.5

Note:

Table 16a

Cultural Competence: Characteristics of Hispanic Students

Q3.4	Pre-Enrollment, Hispanic Students Are…	MRH	MRNH	E p	E *r*	E *U*
_1	Under-prepared for college math	231.4	184.5	<.001	–0.19	9597.5
_2	Under-prepared to navigate college processes	258.0	177.9	<.001	–0.31	7471.5
_3	Primarily 1st gen students	225.5	186.7	.002	–0.16	10168.5
_4	From low SES backgrounds	224.3	183.9	.001	–0.16	9777.0
_5	Working to attend college	239.1	183.7	<.001	–0.22	9121.5
_6	Routinely involved w/ family members	224.3	187.7	.004	–0.15	10348.5
_7	Unlikely to seek help	256.8	178.9	<.001	–0.30	7653.5
_12	Arriving with inaccurate info about college.	244.9	182.1	<.001	–0.25	8640.5
_13	Going to college in or near their hometowns.	233.4	183.3	<.001	–0.20	9346.5

Note:

Table 16b

Cultural Competence: Characteristics of Hispanic Students

Q3.4	Pre-Enrollment, Hispanic Students Are…	MR♀	MR♂	G p	G *r*	G *U*
_1	Under-prepared for college math	189.0	199.7	.308	0.06	19154.5
_2	Under-prepared to navigate college processes	197.5	189.2	.442	-0.04	17443.0
_3	Primarily 1st gen students	195.0	192.5	.810	-0.01	17958.5
_4	From low SES backgrounds	185.9	199.4	.193	0.07	18981.5
_5	Working to attend college	189.3	201.7	.239	0.06	19478.5
_6	Routinely involved w/ family members	201.8	184.4	.095	-0.08	16667.5
_7	Unlikely to seek help	190.8	199.7	.420	0.04	19141.0
_12	Arriving with inaccurate info about college.	198.5	189.0	.372	-0.05	17407.0
_13	Going to college in or near their hometowns.	200.0	183.2	.105	-0.08	16431.0
		MR2Y	MR4Y	I p	I *r*	I *U*
_1	Under-prepared for college math	215.5	188.4	.031	–0.11	11270.5
_2	Under-prepared to navigate college processes	211.7	190.2	.093	–0.09	11682.5
_3	Primarily 1st gen students	192.6	195.7	.797	0.01	13458.5
_4	From low SES backgrounds	208.1	188.0	.101	–0.08	11470.5
_5	Working to attend college	206.2	192.4	.268	–0.06	12347.5
_6	Routinely involved w/ family members	205.8	192.5	.279	–0.05	12379.0
_7	Unlikely to seek help	207.4	192.0	.236	–0.06	12240.0
_12	Arriving with inaccurate info about college.	222.9	187.5	.005	–0.14	10879.5
_13	Going to college in or near their hometowns.	233.2	182.5	<.001	–0.21	9709.0
				R p	R df	R *H*
_1	Under-prepared for college math			.004	2	11.0
_2	Under-prepared to navigate college processes			.004	2	10.9
_3	Primarily 1st gen students			.021	2	7.73
_4	From low SES backgrounds			.008	2	9.68
_5	Working to attend college			.014	2	8.58
_6	Routinely involved w/ family members			.486	2	1.44
_7	Unlikely to seek help			.005	2	10.7
_12	Arriving with inaccurate info about college.			.024	2	7.47
_13	Going to college in or near their hometowns.			.144	2	3.87
		MRS	MRNS	S p	S *r*	S *U*
_1	Under-prepared for college math	189.8	200.1	.044	–0.10	16442.5
_2	Under-prepared to navigate college processes	182.6	207.7	.019	–0.12	16165.5
_3	Primarily 1st gen students	183.6	206.6	.026	–0.11	16353.5
_4	From low SES backgrounds	186.1	198.1	.241	–0.06	16923.0
_5	Working to attend college	189.8	200.1	.324	–0.05	17666.0
_6	Routinely involved w/ family members	190.9	198.9	.438	–0.04	17887.0
_7	Unlikely to seek help	192.0	197.5	.613	–0.03	18126.0
_12	Arriving with inaccurate info about college.	186.0	204.8	.075	–0.09	16842.5
_13	Going to college in or near their hometowns.	187.5	199.6	.240	–0.06	17227.0

Note:

Table 17

Hispanic Students: Tendency to Attend Local Colleges

Q3.5	For the following reasons:	%	% H	% NH	E p	E phi	E χ^2
	Personal Preference	37.9	32.4	39.7	=.263	+.065	1.25
	Family Influence	92.8	87.8	94.5	=.054	+.113	3.71
	Familiarity	64.2	67.6	63.0	=.480	–.041	0.50
	Finances	86.3	85.1	86.8	=.725	+.021	0.12
	Community Connections	45.4	36.5	48.4	=.075	+.104	3.17
	Other	4.1	5.4	3.7	=.511	–.038	0.43
			% ♀	% ♂	G p	G phi	G χ^2
	Personal Preference		35.8	40.7	=.403	+.049	0.70
	Family Influence		90.8	95.8	=.105	+.095	2.63
	Familiarity		68.2	57.6	=.065	–.108	3.41
	Finances		85.0	88.1	=.441	+.045	0.59
	Community Connections		43.9	47.5	=.553	+.035	0.35
	Other		4.6	3.4	=.603	–.030	0.27
			% 2Y	% 4Y	I p	I phi	I χ^2
	Personal Preference		32.5	39.8	=.254	+.067	1.30
	Family Influence		85.7	95.4	=.005	+.165	7.96
	Familiarity		62.3	64.8	=.697	+.023	0.15
	Finances		87.0	86.1	=.843	–.012	0.04
	Community Connections		48.1	44.4	=.585	–.032	0.30
	Other		7.8	2.8	=.057	–.111	3.63
		% Fa	% St	% Ad	R p	R CV	R χ^2
	Personal Preference	37.0	41.8	35.3	=.683	+.051	0.76
	Family Influence	89.7	94.5	98.0	=.105	+.125	4.50
	Familiarity	63.0	61.5	72.5	=.383	+.082	1.92
	Finances	87.0	84.6	90.2	=.639	+.056	0.90
	Community Connections	47.9	37.4	52.9	=.141	+.117	3.92
	Other	4.8	3.3	0.0	=.272	+.095	2.61
			% S	% NS	S p	S phi	S χ^2
	Personal Preference		35.1	40.8	=.319	+.058	0.99
	Family Influence		93.3	92.4	=.761	–.018	0.09
	Familiarity		61.2	66.9	=.313	+.059	1.02
	Finances		87.3	86.0	=.741	–.019	0.11
	Community Connections		49.3	42.0	=.218	–.072	1.52
	Other		5.2	3.2	=.383	–.051	0.76

Note: E, G, I & S df = 1, R df = 2

Table 18

Hispanic Students: Relationship to STEM

Q3.4	STEM Hispanic Students Have/Are…	MRH	MRNH	E p	E *r*	E *U*
_8	Under-represented in upper STEM classes	263.2	177.2	<.001	–0.33	7125.5
_9	Unaware of STEM opportunities	258.1	178.6	<.001	–0.31	7545.0
_10	Intimidated by STEM	264.7	176.8	<.001	–0.34	6994.5
_11	Not identifying w/ STEM	257.3	178.8	<.001	–0.31	7615.5
		MR♀	MR♂	G p	G *r*	G *U*
_8	Under-represented in upper STEM classes	198.2	186.3	.419	–0.04	17469.5
_9	Unaware of STEM opportunities	197.6	190.2	.493	–0.03	17603.0
_10	Intimidated by STEM	207.5	176.3	.004	–0.15	15360.0
_11	Not identifying w/ STEM	201.0	185.4	.142	–0.07	16827.5
		MR2Y	MR4Y	I p	I *r*	I *U*
_8	Under-represented in upper STEM classes	210.8	191.1	.129	–0.08	11945.0
_9	Unaware of STEM opportunities	220.8	188.1	.011	–0.13	11062.0
_10	Intimidated by STEM	212.3	190.6	.090	–0.09	11810.0
_11	Not identifying w/ STEM	216.4	189.4	.032	–0.11	11446.5
				R p	R df	R *H*
_8	Under-represented in upper STEM classes			.001	2	13.65
_9	Unaware of STEM opportunities			.078	2	5.11
_10	Intimidated by STEM			.387	2	1.90
_11	Not identifying w/ STEM			.064	2	5.50
		MRS	MRNS	S p	S *r*	S *U*
_8	Under-represented in upper STEM classes	191.5	198.1	.546	–0.03	18024.5
_9	Unaware of STEM opportunities	185.8	204.9	.076	–0.09	16818.0
_10	Intimidated by STEM	191.4	198.3	.521	–0.03	17995.5
_11	Not identifying w/ STEM	190.7	199.1	.430	–0.04	17856.0

Note:

Table 19a

Hispanic Students: Participation in STEM Organizations ("Ability to Participate in…")

Q4.1	Student Organizations or Extra-Curricular Activities Is Impacted by…	MRH	MRNH	E p	E *r*	E *U*
_1	Living off campus	209.0	180.4	.025	–0.12	9795.5
_2	Heavy course loads	216.0	177.9	.003	–0.16	9164.5
_3	Family commitments	217.9	178.7	.002	–0.16	9169.5
_4	Work commitments	230.0	175.9	<.001	–0.22	8361.5
_5	Language barriers	198.0	182.7	.228	–0.06	10680.0

Note:

Table 19b

Hispanic Students: Participation in STEM Organizations ("Ability to Participate in…")

Q4.1	Student Organizations or Extra-Curricular Activities Is Impacted by…	MR♀	MR♂	G p	G *r*	G *U*
		195.0	173.6	.043	–0.11	14836.5
		193.1	175.1	.086	–0.09	15062.0
		200.4	167.3	.001	–0.17	13855.0
		197.8	172.0	.013	–0.13	14591.0
		192.3	176.0	.122	–0.08	15191.5
		MR2Y	MR4Y	I p	I *r*	I *U*
		183.0	187.6	.715	0.02	12597.0
		195.8	183.1	.302	–0.05	11318.5
		210.8	179.9	.010	–0.13	10291.0
		207.0	181.7	.037	–0.11	10710.5
		190.0	184.8	.679	–0.02	11818.0
				R p	R df	R *H*
				.111	2	4.40
				.176	2	3.48
				.001	2	13.28
				.022	2	7.60
				.470	2	1.51
		MRS	MRNS	S p	S *r*	S *U*
		183.5	187.9	.680	–0.02	16573.0
		192.2	176.3	.126	0.08	18322.5
		180.6	192.5	.247	–0.06	15963.5
		180.7	193.5	.208	–0.07	15967.5
		195.6	173.3	.042	0.11	18788.5

Note:

Table 20

Cultural Competence: Actionable Information is Available…

Q3.2		MRH	MRNH	E p	E *r*	E *U*
_1	About challenges Hispanics face in higher ed.	163.0	199.6	.009	0.14	8832.0
_2	Comparing Hispanic to higher ed. culture	157.3	199.6	.002	0.16	8439.0
		MR ♀	MR ♂	G p	G *r*	G *U*
		181.8	206.2	.025	0.11	20111.5
		181.8	203.9	.042	0.10	19660.0
		MR2Y	MR4Y	I p	I *r*	I *U*
		194.0	192.7	.923	0.00	12879.0
		193.7	191.5	.867	–0.01	12731.5

Note:

Table 21

Institutional Characteristics: My institution / organization provides…

Q10.19	Persons in my role with…	%	% 2Y	% 4Y	I p	I phi	I χ^2
_1	Information about Hispanic culture	10.4	12.5	9.8	.471	–.036	0.52
	Info about the needs and concerns of…						
_2	1st gen students	20.6	27.3	18.7	.079	–.088	3.08
_3	Hispanic students	14.0	19.3	12.5	.102	–.082	2.67
_4	Low-income students	17.0	27.3	14.1	.004	–.146	8.38
_5	Prof. dev. re: Hispanic culture	7.1	12.5	5.6	.026	–.112	4.95
_6	"How to" guidance regarding curriculum development	7.9	11.4	6.9	.170	–.069	1.89
		% Fa	% St	% Ad	R p	R CV	R χ^2
_6	"How to" guidance re: curr. dev.	10.4	2.3	9.5	.023	.141	7.56
Q	And…	%	% 2Y	% 4Y	I p	I phi	I χ^2
_1	I have used these services	10.9	42.9	37.8	=.617	–.048	0.25
_2	I find these services helpful/valuable	16.4	62.9	56.8	=.546	–.058	0.37
_3	In response, I have made changes to my curriculum I believe to be advantageous for Hispanic students	4.7	23.8	23.5	=.981	–.003	0.01

Note: I df = 1, R df = 2

Table 22a

Professional Experience Regarding Hispanics, STEM, and Careers

Q5.1	Which of the following describes your professional experience?	%	% H	% NH	E p	E phi	E χ^2
_1	Hispanics with STEM degrees are desired by employers	48.1	56.6	45.8	.080	–.088	3.07
_2	Those who speak English and Spanish have an advantage seeking a STEM job	60.6	63.9	59.7	.489	–.035	0.48
_3	I help Hispanic students identify potential employers	32.1	33.7	31.6	.713	–.019	0.14
_4	I help Hispanic students pursue potential employment	35.6	43.4	33.5	.097	–.084	2.76
	My institution/organization…						
_5	Sponsors career planning activities for STEM students	48.6	41.0	50.6	.117	.079	2.46
_6	Targets these activities to Hispanic STEM students	21.6	18.1	22.6	.376	.045	0.79
_7	Collaborates with businesses in job training/placement for Hispanic students	31.0	22.9	33.2	.071	.091	3.27

Note: All df = 1

Table 22b

Professional Experience Regarding Hispanics, STEM, and Careers

Q5.1	Which of the following describes your professional experience?	% ♀	% ♂	G p	G phi	G χ^2
_1	Hispanics with STEM degrees are desired by employers	44.3	54.0	.059	+.096	3.57
_2	Those who speak English and Spanish have an advantage seeking a STEM job	62.3	58.9	.499	–.034	0.46
_3	I help Hispanic students identify potential employers	24.6	42.9	<.001	+.194	14.71
_4	I help Hispanic students pursue potential employment	30.3	43.6	.007	+.137	7.31
	My institution/organization…					
_5	Sponsors career planning activities for STEM students	41.7	58.3	.001	+.164	10.51
_6	Targets these activities to Hispanic STEM students	16.7	28.8	.004	+.145	8.27
_7	Collaborates with businesses in job training/placement for Hispanic students	28.1	35.0	.146	+.074	2.12
Q5.1	Which of the following describes your professional experience?	% 2Y	% 4Y	I p	I phi	I χ^2
_1	Hispanics with STEM degrees are desired by employers	53.4	46.6	.257	–.057	1.28
_2	Those who speak English and Spanish have an advantage seeking a STEM job	65.9	59.0	.244	–.059	1.36
_3	I help Hispanic students identify potential employers	36.4	30.8	.326	–.050	0.96
_4	I help Hispanic students pursue potential employment	46.6	32.5	.015	–.123	5.95
	My institution/organization…					
_5	Sponsors career planning activities for STEM students	64.8	43.9	.001	–.174	11.87
_6	Targets these activities to Hispanic STEM students	34.1	18.0	.001	–.163	10.39
_7	Collaborates with businesses in job training/placement for Hispanic students	42.0	27.9	.011	–.128	6.41

Note: All df = 1

Table 22c

Professional Experience Regarding Hispanics, STEM, and Careers

Q5.1	Which of the following describes your professional experience?	% Fa	% St	% Ad	R p	R CV	R χ^2
_1	Hispanics with STEM degrees are desired by employers	51.6	34.4	61.9	<.001	.200	15.35
_2	Those who speak English and Spanish have an advantage seeking a STEM job	59.9	55.5	68.3	.238	.087	2.87
_3	I help Hispanic students identify potential employers	41.7	15.6	33.3	<.001	.251	24.21
_4	I help Hispanic students pursue potential employment	46.4	16.4	38.1	<.001	.283	30.60
	My institution/organization…						
_5	Sponsors career planning activities for STEM students	51.0	44.5	49.2	.518	.059	1.32
_6	Targets these activities to Hispanic STEM students	24.5	15.6	25.4	.125	.104	4.16
_7	Collaborates with businesses in job training/placement for Hispanic students	32.8	28.1	30.2	.668	.046	0.81

Q5.1	Which of the following describes your professional experience?	% S	% NS	S p	S phi	S χ^2
_1	Hispanics with STEM degrees are desired by employers	58.7	38.7	<.001	–.199	15.53
_2	Those who speak English and Spanish have an advantage seeking a STEM job	61.5	59.4	.684	–.021	0.17
_3	I help Hispanic students identify potential employers	45.3	20.8	<.001	–.262	26.78
_4	I help Hispanic students pursue potential employment	49.2	23.6	<.001	–.267	27.80
	My institution/organization…					
_5	Sponsors career planning activities for STEM students	57.0	42.0	.003	–.150	8.74
_6	Targets these activities to Hispanic STEM students	27.4	17.0	.013	–.126	6.16
_7	Collaborates with businesses in job training/placement for Hispanic students	31.8	30.7	.801	–.013	0.06

Note: R df = 2, S df = 1

Table 23

Academic Support: A Low Student to Teacher Ratio Is Important…

Q6.10	For facilitating faculty/student rapport.	%	% H	% NH	E p	E CV	E χ^2
	Yes	86.7	84.0	87.5	.677	.049	0.78
	No	2.7	2.7	2.7			
	IDK	10.6	13.3	9.8			
			% ♀	% ♂	G p	G CV	G χ^2
	Yes		86.2	87.9	.497	.065	1.40
	No		2.1	3.5			
	IDK		11.6	8.8			
			% 2Y	% 4Y	I p	I CV	I χ^2
	Yes		87.3	86.5	.645	.051	0.88
	No		1.3	3.2			
	IDK		11.4	10.3			
		% Fa	% St	% Ad	R p	R CV	R χ^2
	Yes	92.0	78.7	92.5	.001	.175	19.70
	No	1.9	1.9	5.7			
	IDK	6.2	19.4	1.9			
			% S	% NS	S p	S CV	S χ^2
	Yes		91.7	82.1	.008	.171	9.58
	No		3.2	2.3			
	IDK		5.1	15.6			

Note: E, G, I & S df = 2, R df = 4

Table 24

Academic Support: A Low Student to Teacher Ratio Is Important…

Q6.11		%	% H	% NH	E p	E phi	E χ^2
_1	In STEM instruction	81.9	79.4	82.6	.557	.035	0.35
_2	For Hispanic students	70.4	84.1	66.5	.007	–.160	7.31
_3	For 1st gen students	80.8	84.1	79.9	.453	–.044	0.56
_4	For students from low SES backgrounds	73.9	76.2	73.2	.635	–.028	0.23
_5	For female STEM students	62.7	71.4	60.3	.106	–.096	2.62
			% ♀	% ♂	G p	G phi	G χ^2
_1	In STEM instruction		78.5	86.3	.091	.100	2.86
_2	For Hispanic students		69.9	71.0	.850	.011	0.04
_3	For 1st gen students		78.5	83.9	.255	.067	1.30
_4	For students from low SES backgrounds		74.8	72.6	.665	–.026	0.19
_5	For female STEM students		63.2	62.1	.849	–.011	0.04
			% 2Y	% 4Y	I p	I phi	I χ^2
_1	In STEM instruction		76.8	83.5	.210	.074	1.57
_2	For Hispanic students		73.9	69.3	.461	–.043	0.54
_3	For 1st gen students		81.2	80.7	.938	–.005	0.01
_4	For students from low SES backgrounds		73.9	73.9	.992	–.001	0.00
_5	For female STEM students		66.7	61.5	.436	–.046	0.61
		% Fa	% St	% Ad	R p	R CV	R χ^2
_1	In STEM instruction	84.6	76.5	85.7	.234	.101	2.90
_2	For Hispanic students	67.1	70.6	81.6	.153	.115	3.75
_3	For 1st gen students	77.9	82.4	89.8	.170	.112	3.55
_4	For students from low SES backgrounds	69.8	77.6	81.6	.178	.110	3.45
_5	For female STEM students	59.7	61.2	77.6	.072	.136	5.26
			% S	% NS	S p	S phi	S χ^2
_1	In STEM instruction		90.2	73.2	<.001	–.220	13.76
_2	For Hispanic students		71.3	69.0	.669	–.025	0.18
_3	For 1st gen students		81.8	79.6	.632	–.028	0.23
_4	For students from low SES backgrounds		72.0	75.4	.524	.038	0.41
_5	For female STEM students		63.6	62.0	=.771	–.017	0.09

Note: E, G, I & S df = 1, R df = 2

Table 25

Factors that Limit Grant Applications and Innovation

Q9.3		%	% 2Y	% 4Y	I p	I phi	I χ^2
_1	Accrediting agency requirements can limit the change possible within degree programs	22.9	42.0	17.4	<.001	–.245	23.54
_2	Accrediting agency requirements can limit the degree of change possible in course content	18.6	34.1	14.1	<.001	–.214	18.05
_3	Accrediting agency requirements can limit the innovation possible in instr. pattern plans	13.0	20.5	10.8	.018	–.120	5.61
_4	Articulation agreements can limit the change possible within STEM degree programs	16.0	35.2	10.5	<.001	–.281	31.04
_5	Articulation agreements can limit the degree of change possible in STEM course content	14.2	31.8	9.2	<.001	–.270	28.64
_6	Limits on personnel cost imposed by funders in STEM grants impact our ability to apply	11.5	14.8	10.5	.267	–.056	1.23
_7	The types of qualifications expected for project leaders limit my institution's / organization's ability to apply for grants	8.7	17.0	6.2	.001	–.160	10.11
			% S	% NS	S p	S phi	S χ^2
_1	Accrediting agency requirements can limit the change possible within degree programs		32.4	14.6	<.001	–.211	17.45
_2	Accrediting agency requirements can limit the degree of change possible in course content		26.3	11.8	<.001	–.186	13.52
_3	Accrediting agency requirements can limit the innovation possible in instr. pattern plans		17.9	9.0	.009	–.132	6.80
_4	Articulation agreements can limit the change possible within STEM degree programs		24.6	9.0	<.001	–.212	17.52
_5	Articulation agreements can limit the degree of change possible in STEM course content		20.1	9.4	.003	–.152	9.02
_6	Limits on personnel cost imposed by funders in STEM grants impact our ability to apply		17.3	6.6	.001	–.167	10.94
_7	The types of qualifications expected for project leaders limit my institution's / organization's ability to apply for grants		11.7	6.1	.050	–.099	3.83

Note: All df = 1

Table 26

Grant-Funded and Hispanic-Specific Student Services and Programming

Q6.1_1	We are dependent on grant-funding to start new initiatives	MRH	MRNH	E p	E *r*	E U
		198.4	177.5	.100	–0.09	9832.5
		MR♀	MR♂	G p	G *r*	G U
		181.7	181.2	.958	0.00	15967.0
		MR2Y	MR4Y	I p	I *r*	I U
		199.3	176.7	.067	–0.10	10343.5
				R p	R df	R *H*
				.010	2	9.23
		MRS	MRNS	S p	S *r*	S U
		158.3	208.6	<.001	–0.25	11646.0
_2	Our programming for Hispanic students is based on published research or strong institutional data	MRH	MRNH	E p	E *r*	E U
		168.9	184.3	.189	0.07	11869.5
		MR♀	MR♂	G p	G *r*	G U
		188.3	170.0	.060	–0.10	14249.5
		MR2Y	MR4Y	I p	I *r*	I U
		199.2	175.5	.038	–0.11	10107.0
				R p	R df	R *H*
				.618	2	0.96
		MRS	MRNS	S p	S *r*	S U
		168.7	193.6	.010	–0.14	13765.5
_3	Services for Hispanic students take a holistic approach (academic, psychological, social, and cultural needs).	MRH	MRNH	E p	E *r*	E U
		168.2	184.5	.181	0.07	12035.0
		MR♀	MR♂	G p	G *r*	G U
		182.2	178.3	.702	–0.02	15493.5
		MR2Y	MR4Y	I p	I *r*	I U
		207.0	173.0	.004	–0.15	9521.0
				R p	R df	R *H*
				.902	2	0.21
		MRS	MRNS	S p	S *r*	S U
		171.9	189.8	.075	–0.09	14368.0

Note:

Table 27

Grant-Funded Student Services Retained and Provided

Q6.5_4	We retain services established with grant dollars once the grant expires	%	% 2Y	% 4Y	I p	I CV	I χ^2
	Yes	25.0	38.6	20.9	.001	.202	14.62
	No	15.3	19.3	14.1			
	IDK	59.7	42.2	65.0			
Q6.5_5	We provide grant-funded student services	%	% 2Y	% 4Y	I p	I CV	I χ^2
	Yes	64.1	78.3	59.8	.007	.167	10.01
	No	5.6	4.8	5.8			
	IDK	30.4	16.9	34.4			
Q6.6	Such as…	%	% 2Y	% 4Y	I p	I phi	I χ^2
_1	Academic support	78.3	80.0	77.6	.688	–.026	0.16
_2	Advice and direction	53.9	64.6	49.7	.041	–.135	4.18
_3	A cohort or group	30.9	29.2	31.5	.736	.022	0.11
_4	Scholarships	64.3	66.2	63.6	.720	–.024	0.13
_5	STEM specific services	51.3	58.5	48.5	.173	–.090	1.86
_6	Services specific to Hispanic students	36.5	30.8	38.8	.255	.075	1.29
_7	Other	3.5	4.6	3.0	.555	–.039	0.35

Note: Q6.5 df = 2, Q6.6 df = 1

Table 28a

Presence of Various Instructional and Student Support Practices: My Department

Q7.1a	My Department Has Implemented…	%	% 2Y	% 4Y	I p	I CV	I χ^2
_1	Course podcasts						
	Yes	6.3	9.0	5.4	.095	.132	4.72
	No	56.3	64.2	53.7			
	IDK	37.5	26.9	41.0			
_2	Course video-casts						
	Yes	21.6	27.9	19.5	.053	.147	5.89
	No	44.7	50.0	42.9			
	IDK	33.7	22.1	37.6			
_3	Dual credit courses (HS + college)						
	Yes	55.5	84.5	45.3	<.001	.346	32.73
	No	26.6	9.9	32.5			
	IDK	17.9	5.6	22.2			
_4	Early college programming						
	Yes	37.0	74.3	24.1	<.001	.455	56.40
	No	33.0	11.4	40.4			
	IDK	30.0	14.3	35.5			
_5	Emphasis within courses on Hispanic contributions						
	Yes	12.4	25.4	8.0	<.001	.240	15.32
	No	49.4	47.8	50.0			
	IDK	38.2	26.9	42.0			
_6	Experiential or project-based learning						
	Yes	62.0	73.9	58.0	.063	.142	5.54
	No	18.2	13.0	20.0			
	IDK	19.7	13.0	22.0			
_7	Field trips						
	Yes	53.3	58.8	51.5	.529	.069	1.27
	No	26.7	25.0	27.2			
	IDK	20.0	16.2	21.3			
_8	Freshman seminars						
	Yes	48.2	42.6	50.0	.089	.133	4.85
	No	32.1	42.6	28.6			
	IDK	19.7	14.7	21.4			
_9	Guest lecturers						
	Yes	63.9	66.2	63.1	.809	.039	0.43
	No	20.4	20.6	20.4			
	IDK	15.7	13.2	16.5			

Note: All df = 2

Table 28b

Presence of Various Instructional and Student Support Practices: My Department

		%	% 2Y	% 4Y	I p	I CV	I χ^2
_10	Guided pathways						
	Yes	36.9	75.7	23.4	<.001	.478	61.57
	No	27.7	14.3	32.3			
	IDK	35.4	10.0	44.3			
_11	Holistic approach to support (academic, psychological, social, cultural)						
	Yes	40.0	53.6	35.3	.018	.173	8.05
	No	30.7	27.5	31.8			
	IDK	29.3	18.8	32.8			
_12	Hybrid classes (combining online and face-to-face elements)						
	Yes	57.7	76.8	51.2	.001	.228	14.27
	No	25.2	15.9	28.3			
	IDK	17.2	7.2	20.5			
_13	Instructional labs						
	Yes	67.5	82.6	62.4	.007	.190	9.83
	No	18.8	8.7	22.3			
	IDK	13.7	8.7	15.3			
_14	Interdisciplinary instruction						
	Yes	40.2	44.1	38.8	.289	.097	2.48
	No	36.7	39.7	35.7			
	IDK	23.1	16.2	25.5			
_15	Internships						
	Yes	58.0	47.8	61.5	.139	.120	3.94
	No	25.5	31.9	23.4			
	IDK	16.4	20.3	15.1			
_16	Inverted classrooms (online video instruction + class application time)						
	Yes	35.4	48.6	30.8	.014	.179	8.58
	No	33.2	31.4	33.8			
	IDK	31.3	20.0	35.4			
_17	Leadership training for students						
	Yes	36.6	36.8	36.5	.915	.026	0.18
	No	36.6	38.2	36.0			
	IDK	26.8	25.0	27.4			
_18	Learning communities						
	Yes	44.9	50.7	42.9	.177	.114	3.47
	No	32.6	34.8	31.8			
	IDK	22.5	14.5	25.3			

Note: All df = 2

Table 28c

Presence of Various Instructional and Student Support Practices: My Department

		%	% 2Y	% 4Y	I p	I CV	I χ^2
_19	Faculty formally mentoring students						
	Yes	43.1	42.0	43.5	.886	.030	0.24
	No	35.3	37.7	34.5			
	IDK	21.6	20.3	22.0			
_20	Online courses						
	Yes	69.5	85.5	64.0	.003	.204	11.36
	No	20.6	8.7	24.6			
	IDK	9.9	5.8	11.3			
_21	Students mentoring other students						
	Yes	52.4	50.7	53.0	.921	.025	0.16
	No	24.4	26.1	23.8			
	IDK	23.2	23.2	23.3			
_22	Regular updating of course curriculum						
	Yes	70.0	81.2	66.2	.048	.151	6.07
	No	15.0	7.2	17.7			
	IDK	15.0	11.6	16.2			
_23	Supplemental Instruction						
	Yes	59.7	68.1	56.8	.114	.127	4.33
	No	23.5	14.5	26.6			
	IDK	16.8	17.4	16.6			
_24	Tutoring						
	Yes	68.8	84.3	63.3	.005	.200	10.73
	No	20.8	11.4	24.1			
	IDK	10.4	4.3	12.6			
_25	Undergraduate research						
	Yes	61.4	33.8	70.6	<.001	.329	29.37
	No	23.9	42.6	17.6			
	IDK	14.7	23.5	11.8			
_26	University classes taught at community college						
	Yes	20.2	36.8	14.6	<.001	.242	15.61
	No	51.7	42.6	54.8			
	IDK	28.1	20.6	30.7			

Note: All df = 2

Table 29

Institutional Support for Hispanic Students

Q6.5	Our Institution/Organization…						
_1	Leaders emphasize providing services to Hispanic students	%	% 2Y	% 4Y	I p	I CV	I χ^2
	Yes	52.4	58.3	50.5	.003	.181	11.87
	No	13.6	21.4	11.2			
	IDK	34.1	20.2	38.3			
_2	Leaders regularly fund efforts to serve Hispanic students						
	Yes	37.6	50.6	33.7	.002	.187	12.57
	No	12.8	16.9	11.6			
	IDK	49.6	32.5	54.7			
_3	Provides soft skills training (research presentation, pro dress/etiquette, etc.).						
	Yes	59.4	56.6	60.3	<.001	.207	15.47
	No	11.4	22.9	7.9			
	IDK	29.2	20.5	31.8			

Note: All df = 2

Table 30

Patterns Related to Hispanic Student Organizations

Q6.4	Representatives from all of the Hispanic student organizations meet regularly to coordinate activities	%	% 2Y	% 4Y	I p	I CV	I χ^2
	Yes	16.2	15.9	16.3	.001	.204	14.85
	No	13.1	25.9	9.4			
	IDK	70.7	58.8	74.3			
Q6.9	Faculty/staff sponsors of Hispanic student organizations at our institution are…	%	% 2Y	% 4Y	I p	I phi	I χ^2
_1	Male Hispanic (Latino)	36.4	35.2	36.7	.797	.013	0.07
_2	Female	21.6	25.0	20.7	.383	–.044	0.76
_3	Female Hispanic (Latina)	33.8	37.5	32.8	.410	–.042	0.68
_4	Minorities	22.9	26.1	22.0	.412	–.041	0.67
_5	White	25.4	30.7	23.9	.200	–.065	1.64
_6	Other	9.7	10.2	9.5	.841	–.010	0.04
_7	We don’t have faculty/staff student organization sponsors	4.3	8.0	3.3	.058	–.096	3.61

Note: Q6.4 df = 2, Q 6.9 df = 1

Table 31

Institutional STEM Outreach as Reported by STEM Personnel

Q10.15	STEM outreach at my institution/organization includes…	%	% 2Y	% 4Y	I p	I phi	I χ^2
_1	Campus visits to our STEM facilities by high school groups	45.3	47.1	44.5	.759	–.023	0.09
_2	STEM demonstrations in the community	39.7	35.3	41.4	.451	.056	0.57
_3	STEM demonstrations in K-12 settings	44.7	43.1	45.3	.792	.020	0.07
_4	Our STEM students serving as reps of the institution/organization	29.6	21.6	32.8	.137	.111	2.21
_5	Non-residential summer STEM camps/programs	34.1	35.3	33.6	.828	–.016	0.05
_6	Residential summer STEM camps/programs	19.6	17.6	20.3	.685	.030	0.17
_7	STEM demonstrations or content as web pages, videos, audio files, or tweets	24.6	25.5	24.2	.858	–.013	0.03
_8	Social, cultural, historic STEM content and profiles	15.1	9.8	17.2	.213	.093	1.55

Note: All df = 1

Table 32

Institutional Support for On-Campus STEM Events as Reported by STEM Personnel

Q4.5	We have on-campus activities intended to inspire STEM interest among students	%	% 2Y	% 4Y	I p	I CV	I χ^2
	Yes	55.1	68.2	50.3	=.002	+.224	12.43
	No	14.2	18.2	12.7	"	"	"
	IDK	30.8	13.6	37.0	"	"	"
Q4.6	These events are well attended						
	Yes	33.6	42.9	28.4	=.152	+.180	3.77
	No	21.6	23.8	20.3	"	"	"
	IDK	44.8	33.3	51.4	"	"	"
Q4.7	We have data demonstrating the effectiveness of these events						
	Yes	40.7	53.8	28.6	=.396	+.262	1.85
	No	22.2	15.4	28.6	"	"	"
	IDK	37.0	30.8	42.9	"	"	"
Q4.8	We target Hispanic students with these events						
	Yes	41.2	45.0	39.2	=.830	+.057	0.37
	No	24.6	22.5	25.7	"	"	"
	IDK	34.2	32.5	35.1	"	"	"

Note: All df = 2

Table 33a

Presence of Various Instructional and Student Support Practices: STEM Departments (as Reported by STEM Personnel)

Q7.1b	All Our STEM Departments Have Implemented…	%	% 2Y	% 4Y	I p	I CV	I χ^2
_1	Course podcasts						
	Yes	2.6	2.9	2.4	.321	.140	2.28
	No	39.7	50.0	35.4			
	IDK	57.8	47.1	62.2			
_2	Course video-casts						
	Yes	17.8	31.4	12.0	.015	.266	8.35
	No	30.5	34.3	28.9			
	IDK	51.7	34.3	59.0			
_3	Dual credit courses (HS + college)						
	Yes	41.7	73.0	27.7	<.001	.427	21.89
	No	17.5	10.8	20.5			
	IDK	40.8	16.2	51.8			
_4	Early College programming						
	Yes	29.4	58.3	16.9	<.001	.445	23.55
	No	18.5	19.4	18.1			
	IDK	52.1	22.2	65.1			
_5	Emphasis within courses on Hispanic contributions						
	Yes	6.8	11.1	4.9	.276	.148	2.57
	No	33.9	38.9	31.7			
	IDK	59.3	50.0	63.4			
_6	Experiential or project-based learning						
	Yes	42.0	52.8	37.3	.048	.226	6.06
	No	13.4	19.4	10.8			
	IDK	44.5	27.8	51.8			
_7	Field trips						
	Yes	29.9	38.9	25.9	.059	.220	5.66
	No	23.1	30.6	19.8			
	IDK	47.0	30.6	54.3			
_8	Freshman seminars						
	Yes	40.3	29.7	45.1	.026	.248	7.29
	No	18.5	32.4	12.2			
	IDK	41.2	37.8	42.7			
_9	Guest lecturers						
	Yes	40.3	40.5	40.2	.703	.077	0.70
	No	15.1	18.9	13.4			
	IDK	44.5	40.5	46.3			

Note: All df = 2

Table 33b

Presence of Various Instructional and Student Support Practices: STEM Departments (as Reported by STEM Personnel)

		%	% 2Y	% 4Y	I p	I CV	I χ^2
_10	Guided pathways						
	Yes	32.2	64.9	17.3	<.001	.483	27.51
	No	16.1	13.5	17.3			
	IDK	51.7	21.6	65.4			
_11	Holistic approach to student support (academic, psychological, social, cultural)						
	Yes	21.4	36.1	14.8	.004	.305	10.85
	No	26.5	33.3	23.5			
	IDK	52.1	30.6	61.7			
_12	Hybrid classes (combining online and face-to-face elements)						
	Yes	35.9	56.8	26.3	.003	.318	11.81
	No	15.4	16.2	15.0			
	IDK	48.7	27.0	58.8			
_13	Instructional labs						
	Yes	67.8	80.6	62.2	.140	.183	3.93
	No	5.9	2.8	7.3			
	IDK	26.3	16.7	30.5			
_14	Interdisciplinary instruction						
	Yes	26.5	38.9	21.0	.092	.202	4.78
	No	21.4	22.2	21.0			
	IDK	52.1	38.9	58.0			
_15	Internships						
	Yes	30.8	25.0	33.3	.055	.223	5.81
	No	22.2	36.1	16.0			
	IDK	47.0	38.9	50.6			
_16	Inverted classrooms (online video instruction + classroom application time)						
	Yes	23.1	27.8	21.0	.330	.138	2.22
	No	22.2	27.8	19.8			
	IDK	54.7	44.4	59.3			
_17	Leadership training for students						
	Yes	17.2	19.4	16.3	.513	.107	1.36
	No	25.0	30.6	22.5			
	IDK	57.8	50.0	61.3			
_18	Learning communities						
	Yes	35.3	44.4	31.3	.065	.217	5.46
	No	18.1	25.0	15.0			
	IDK	46.6	30.6	53.8			

Note: All df = 2

Table 33c

Presence of Various Instructional and Student Support Practices: STEM Departments (as Reported by STEM Personnel)

		%	% 2Y	% 4Y	I p	I CV	I χ^2
_19	Faculty formally mentoring students						
	Yes	33.6	36.1	32.5	.054	.224	5.83
	No	21.6	33.3	16.3			
	IDK	44.8	30.6	51.3			
_20	Online courses						
	Yes	51.3	83.3	37.0	<.001	.429	21.52
	No	12.8	2.8	17.3			
	IDK	35.9	13.9	45.7			
_21	Students mentoring other students						
	Yes	35.0	44.4	30.9	.117	.191	4.29
	No	14.5	19.4	12.3			
	IDK	50.4	36.1	56.8			
_22	Regular updating of course curriculum						
	Yes	56.4	72.2	49.4	.069	.214	5.35
	No	3.4	2.8	3.7			
	IDK	40.2	25.0	46.9			
_23	Supplemental Instruction						
	Yes	45.3	63.9	37.0	.026	.249	7.26
	No	12.0	8.3	13.6			
	IDK	42.7	27.8	49.4			
_24	Tutoring						
	Yes	59.0	83.3	48.1	.001	.336	13.24
	No	7.7	5.6	8.6			
	IDK	33.3	11.1	43.2			
_25	Undergraduate research						
	Yes	55.1	41.7	61.0	.004	.305	10.95
	No	9.3	22.2	3.7			
	IDK	35.6	36.1	35.4			
_26	University classes taught at a community college						
	Yes	18.1	31.4	12.3	.031	.245	6.96
	No	33.6	34.3	33.3			
	IDK	48.3	34.3	54.3			

Note: All df = 2

Table 34

Targeted Student Success Interventions and Their Assessment

Q7.2	My institution…	MR2Y	MR4Y	I p	I *r*	I *U*
_1	Targets Hispanics with the practices I selected	152.5	136.4	=.120	–0.09	6568.0
_2	Gathers effectiveness data on these practices	152.1	136.6	=.133	–0.09	6599.5
_3	Has professional staff specifically to help with these practices	147.5	137.4	=.335	–0.06	6850.5

Note:

Table 35

STEM Interest and Identity: Regarding Hispanic Students and STEM, …

Q4.2	My institution…	MRH	MRNH	E p	E *r*	E *U*
_1	Identifies interest w/ institutional records	152.5	193.1	.001	0.18	13804.5
_2	Emphasizes STEM identity development	149.4	194.7	<.001	0.19	14265.5
_3	Uses predictive analytics to monitor activity	149.2	194.8	<.001	0.20	14281.5
		MR♀	MR♂	G p	G *r*	G *U*
_1	Identifies interest w/ institutional records	183.5	184.7	.901	0.01	16540.5
_2	Emphasizes STEM identity development	178.1	193.3	.142	0.08	17866.5
_3	Uses predictive analytics to monitor activity	187.2	180.8	.523	–0.03	15937.5
		MR2Y	MR4Y	I p	I *r*	I *U*
_1	Identifies interest w/ institutional records	178.0	186.5	.466	0.04	12683.0
_2	Emphasizes STEM identity development	186.4	184.6	.882	–0.01	12050.5
_3	Uses predictive analytics to monitor activity	186.1	184.7	.898	–0.01	12071.0
				R p	R df	R *H*
_1	Identifies interest w/ institutional records			.104	2	4.53
_2	Emphasizes STEM identity development			.044	2	6.25
_3	Uses predictive analytics to monitor activity			.033	2	6.80
		MRS	MRNS	S p	S *r*	S *U*
_1	Identifies interest w/ institutional records	188.1	177.9	.298	0.05	17526.0
_2	Emphasizes STEM identity development	177.6	191.7	.167	–0.07	15413.0
_3	Uses predictive analytics to monitor activity	186.4	181.1	.593	0.03	17180.0

Note:

Table 36a

Institutional Characteristics: Regarding Hispanic Students and STEM, …

Q4.3	My institution…						
_1	Has no means to identify early STEM interest	%	% H	% NH	E p	E CV	E χ^2
	Yes	10.9	16.3	9.5	.175	.096	3.49
	No	35.5	30.0	36.9			
	IDK	53.6	53.8	53.6			
_2	Sends announcements about support services						
	Yes	57.2	46.3	60.2	.020	.144	7.81
	No	12.0	20.0	9.9			
	IDK	30.7	33.8	29.9			
_3	Proactively sends personalized guidance						
	Yes	29.3	20.0	31.9	.086	.114	4.90
	No	31.6	27.5	20.0			
	IDK	49.1	52.5	48.1			
_4	Has an Early Alert system						
	Yes	69.9	55.0	73.9	.003	.175	11.52
	No	8.5	15.0	6.8			
	IDK	21.6	30.0	19.3			
_1	Has no means to identify early STEM interest		% ♀	% ♂	G p	G CV	G χ^2
	Yes		9.3	13.3	.292	.081	2.46
	No		34.3	37.3			
	IDK		56.5	49.4			
_2	Sends announcements about support services						
	Yes		55.3	60.1	.653	.048	0.85
	No		12.6	11.4			
	IDK		32.1	28.5			
_3	Proactively sends personalized guidance						
	Yes		30.6	27.8	.141	.102	3.92
	No		18.1	26.6			
	IDK		51.4	45.6			
_4	Has an Early Alert system						
	Yes		69.4	70.3	.945	.017	0.11
	No		8.3	8.9			
	IDK		22.2	20.9			

Note: All df = 2

Table 36b

Institutional Characteristics: Regarding Hispanic Students and STEM, …

Q4.3	My institution…									
_1	Has no means to identify early STEM interest	% 2Y	% 4Y	I p	I CV	$I\chi^2$	% Fa	% St	% Ad	R p	R CV	$R\chi^2$
	Yes	19.8	8.3	<.001	.242	21.87	13.1	5.7	15.0	<.001	.191	26.57
	No	47.7	31.8				36.6	25.4	55.0			
	IDK	32.6	59.9				50.3	68.9	30.0			
_2	Sends announcements about support services											
	Yes	68.6	53.8	<.001	.221	18.25	59.0	51.6	66.1	.020	.128	11.63
	No	18.6	10.1				12.0	8.2	16.9			
	IDK	12.8	36.1				29.0	40.2	16.9			
_3	Proactively sends personalized guidance											
	Yes	38.4	26.6	.002	.180	12.19	30.6	27.0	31.7	.008	.137	13.76
	No	29.1	19.4				19.7	16.4	36.7			
	IDK	32.6	54.0				49.7	56.6	31.7			
_4	Has an Early Alert system											
	Yes	69.8	69.9	.196	.093	3.26	74.9	60.7	75.0	.003	.148	15.96
	No	12.8	7.3				7.7	6.6	13.3			
	IDK	17.4	22.8				17.5	32.8	11.7			

Note: I df = 2, R df = 4

Table 36c

Institutional Characteristics: Regarding Hispanic Students and STEM, …

Q4.3	My institution…					
_1	Has no means to identify early STEM interest	% S	% NS	S p	S CV	S χ^2
	Yes	18.8	4.4	<.001	.278	28.91
	No	40.0	31.0			
	IDK	41.2	64.5			
_2	Sends announcements about support services					
	Yes	68.8	47.5	<.001	.250	23.23
	No	12.9	11.4			
	IDK	18.2	41.1			
_3	Proactively sends personalized guidance					
	Yes	34.1	25.1	.003	.177	11.74
	No	26.5	17.7			
	IDK	39.4	57.1			
_4	Has an Early Alert system					
	Yes	79.4	61.6	.001	.199	14.70
	No	7.1	9.9			
	IDK	13.5	28.6			
Q10.5	My institution…	MR2Y	MR4Y	I p	I *r*	I *U*
_2	Organizes course trips to local businesses, labs, and facilities	113.2	125.8	.195	0.08	6358.5

Note: All df = 2

Table 37

STEM Outreach: Regarding Hispanic Students and STEM Activities, My Institution/Organization…

Q10.7	Has activities designed to inspire STEM interest among students	%	% H	% NH	E p	E CV	E χ^2
	Yes	57.2	50.0	59.1	=.017	+.147	8.10
	No	11.2	20.0	8.8	"	"	"
	IDK	31.6	30.0	32.1	"	"	"
Q10.10	Targets Hispanic students with these events						
	Yes	39.2	40.0	39.1	=.462	+.086	1.54
	No	14.4	20.0	13.0	"	"	"
	IDK	46.4	40.0	47.9	"	"	"

Note:

Table 38

STEM Outreach: Regarding Hispanic Students and STEM Activities, My Institution/Organization…

Q10.7	Has activities designed to inspire STEM interest among students	% 2Y	% 4Y	I p	I CV	I χ^2
	Yes	76.7	51.4	<.001	+.262	25.83
	No	14.0	10.3	"	"	"
	IDK	9.3	38.3	"	"	"
Q10.8	These events are well attended					
	Yes	37.9	25.7	=.020	+.192	7.87
	No	19.7	11.5	"	"	"
	IDK	42.4	62.8	"	"	"
Q10.9	Has data demonstrating their effectiveness					
	Yes	41.7	44.4	=.676	+.114	0.78
	No	12.5	19.4	"	"	"
	IDK	45.8	36.1	"	"	"
Q10.10	Targets Hispanic students with these events					
	Yes	42.4	37.8	=.323	+.104	2.26
	No	18.2	12.6	"	"	"
	IDK	39.4	49.7	"	"	"
Q10.7	Has activities designed to inspire STEM interest among students	% S	% NS	S p	S CV	S χ^2
	Yes	70.0	46.1	<.001	+.325	39.42
	No	14.7	8.3	"	"	"
	IDK	15.3	45.6	"	"	"
Q10.8	These events are well attended					
	Yes	40.7	14.9	<.001	+.344	25.08
	No	17.8	9.6	"	"	"
	IDK	41.5	75.5	"	"	"
Q10.9	Has data demonstrating their effectiveness					
	Yes	53.3	14.3	=.004	+.431	10.97
	No	17.8	7.1	"	"	"
	IDK	28.9	78.6	"	"	"
Q10.10	Targets Hispanic students with these events					
	Yes	46.5	31.2	<.001	+.280	16.19
	No	19.3	7.5	"	"	"
	IDK	34.2	61.3	"	"	"

Note: All df = 2

Table 39a

Institutional Support for STEM Students

Q6.7	In respect to specific student groups, we have…						
_1	Departmental support that operates separately from other efforts on campus	%	% 2Y	% 4Y	I p	I phi	I χ^2
	STEM	39.9	47.7	37.7	.091	–.085	2.86
	Hispanic STEM	9.9	15.9	8.2	.033	–.108	4.54
	Female Hispanic STEM	4.3	5.7	3.9	.551	–.036	0.50
_2	Collaboration w/ other depts. to provide support						
	STEM	35.1	40.9	33.4	.196	–.065	1.67
	Hispanic STEM	8.9	14.8	7.2	.028	–.111	4.81
	Female Hispanic STEM	2.8	5.7	2.0	.074	–.094	3.46
_3	Student Organizations						
	STEM	46.6	52.3	44.9	.223	–.061	1.49
	Hispanic STEM	14.0	18.2	12.8	.199	–.065	1.65
	Female Hispanic STEM	5.6	11.4	3.9	.015	–.135	7.13
_4	Assistance in college process navigation						
	STEM	34.6	32.5	42.0	.096	–.084	2.77
	Hispanic STEM	10.9	10.2	11.1	.808	.012	0.06
	Female Hispanic STEM	4.8	6.8	4.3	.325	–.050	0.97
_5	Leadership training for students						
	STEM	32.1	38.6	30.2	.134	–.076	2.25
	Hispanic STEM	10.2	13.6	9.2	.223	–.061	1.48
	Female Hispanic STEM	4.8	10.2	3.3	.019	–.135	7.17
_6	Activities to increase interactions between faculty and Hispanic students						
	STEM	25.2	33.0	23.0	.057	–.096	3.63
	Hispanic STEM	8.1	12.5	6.9	.090	–.086	2.88
	Female Hispanic STEM	2.5	5.7	1.6	.049	–.107	4.50
_7	Faculty mentors						
	STEM	36.1	42.0	34.4	.190	–.066	1.72
	Hispanic STEM	10.9	11.4	10.8	.885	–.007	0.02
	Female Hispanic STEM	5.1	9.1	3.9	.053	–.098	3.76
_8	Peer mentors						
	STEM	28.2	35.2	26.2	.099	–.083	2.73
	Hispanic STEM	8.9	13.6	7.5	.077	–.089	3.13
	Female Hispanic STEM	4.8	10.2	3.3	.019	–.135	7.17
_9	Associations with professional networks						
	STEM	36.6	33.0	37.7	.415	.041	0.66
	Hispanic STEM	11.5	15.9	10.2	.136	–.075	2.22
	Female Hispanic STEM	3.8	5.7	3.3	.342	–.052	1.07

Note: All df = 1

Table 39b

Institutional Support for STEM Students

Q6.7	In respect to specific student groups, we have…					
_1	Departmental support that operates separately from other efforts on campus	% S	% NS	S p	S phi	S χ^2
	STEM	50.8	30.2	<.001	–.210	17.30
	Hispanic STEM	14.5	6.1	.006	–.140	7.61
	Female Hispanic STEM	7.3	1.9	.009	–.131	6.74
_2	Collaboration w/ other depts. to provide support					
	STEM	43.0	28.3	.002	–.154	9.23
	Hispanic STEM	10.6	7.5	.290	–.054	1.12
	Female Hispanic STEM	4.5	1.4	.069	–.092	3.31
_3	Student Organizations					
	STEM	62.0	33.0	<.001	–.290	32.81
	Hispanic STEM	17.3	11.3	.089	–.086	2.89
	Female Hispanic STEM	7.8	3.8	.084	–.088	2.99
_4	Assistance in college process navigation					
	STEM	43.6	26.4	<.001	–.180	12.69
	Hispanic STEM	12.3	9.9	.453	–.038	0.56
	Female Hispanic STEM	6.7	3.3	.119	–.079	2.43
_5	Leadership training for students					
	STEM	36.9	27.4	.044	–.102	4.06
	Hispanic STEM	11.7	9.0	.368	–.046	0.81
	Female Hispanic STEM	6.1	3.8	.277	–.055	1.18
_6	Activities to increase interactions between faculty and Hispanic students					
	STEM	31.3	19.3	.006	–.138	7.42
	Hispanic STEM	11.2	5.7	.048	–.100	3.93
	Female Hispanic STEM	4.5	0.9	.049	–.111	4.84
_7	Faculty mentors					
	STEM	44.1	28.8	.002	–.160	9.96
	Hispanic STEM	12.8	9.4	.282	–.054	1.16
	Female Hispanic STEM	7.3	3.3	.077	–.090	3.14
_8	Peer mentors					
	STEM	35.2	22.2	.004	–.144	8.15
	Hispanic STEM	10.6	7.5	.290	–.054	1.12
	Female Hispanic STEM	6.7	3.3	.119	–.079	2.43
_9	Associations with professional networks					
	STEM	48.6	25.9	<.001	–.235	21.55
	Hispanic STEM	16.2	7.5	.008	–.135	7.14
	Female Hispanic STEM	5.0	2.8	.260	–.057	1.27

Note: All df = 1

Table 40

Institutional Support for STEM Students

Q4.4	Has personnel whose primary responsibility is interact w/ & support Hispanic STEM students	%	% 2Y	% 4Y	I p	I CV	I χ^2
	Yes (SO)	44.7	54.0	40.8	.232	.131	2.92
	No (SO)	22.9	22.0	23.3			
	IDK (SO)	32.4	24.0	35.8			
			% S	% NS	S p	S CV	S χ^2
	Yes		44.7	28.7	<.001	.232	19.96
	No		22.9	15.8			
	IDK		32.4	55.4			

Note: All df = 2

Table 41a

Institutional Scholarships in STEM

Q6.8a	We Have Institutional Scholarships for…						
_1	Students studying in STEM	%	% 2Y	% 4Y	I p	I CV	I χ^2
	Yes	51.6	61.0	48.6	<.001	.299	28.81
	No	5.6	15.6	2.4			
	IDK	42.9	23.4	49.0			
_2	1st gen students studying in STEM						
	Yes	32.0	41.6	28.9	.001	.212	14.28
	No	10.3	18.2	7.9			
	IDK	57.7	40.3	63.2			
_3	Minorities studying in STEM						
	Yes	30.7	43.4	26.7	<.001	.227	16.51
	No	11.3	18.4	9.1			
	IDK	58.0	38.2	64.2			
_4	Hispanic students studying in STEM						
	Yes	29.1	41.6	25.1	<.001	.255	20.53
	No	11.7	20.8	8.8			
	IDK	59.2	37.7	66.1			
_5	STEM students from low-SES families						
	Yes	30.9	43.4	27.0	.001	.209	13.88
	No	10.1	15.8	8.3			
	IDK	59.0	40.8	64.7			
_6	Females studying in STEM fields						
	Yes	27.4	37.3	24.4	<.001	.276	24.13
	No	10.7	22.7	7.0			
	IDK	61.8	40.0	68.6			

Note: All df = 2

Table 41b

Institutional Scholarships in STEM

Q6.8a	We Have Institutional Scholarships for…						
_1	Students studying in STEM	% Fa	% St	% Ad	R p	R CV	R χ^2
	Yes	57.2	38.2	60.4	.016	.139	12.22
	No	5.0	5.9	7.5			
	IDK	37.7	55.9	32.1			
_2	1st gen students studying in STEM						
	Yes	36.3	22.5	38.5	.011	.144	12.97
	No	8.3	9.8	19.2			
	IDK	55.4	67.6	42.3			
_3	Minorities studying in STEM						
	Yes	32.9	24.5	37.3	.022	.136	11.46
	No	10.1	8.8	21.6			
	IDK	57.0	66.7	41.2			
_4	Hispanic students studying in STEM						
	Yes	33.3	21.6	32.0	.008	.150	13.84
	No	9.6	9.8	24.0			
	IDK	57.1	68.6	44.0			
_5	STEM students from low-SES families						
	Yes	35.7	20.0	40.4	.006	.154	14.58
	No	8.9	9.0	17.3			
	IDK	55.4	71.0	42.3			
_6	Females studying in STEM fields						
	Yes	32.7	17.8	30.8	.015	.141	12.35
	No	9.0	9.9	19.2			
	IDK	58.3	72.3	50.0			

Note: All df = 4

Table 41c

Institutional Scholarships in STEM

Q6.8a	We Have Institutional Scholarships for…					
_1	Students studying in STEM	% S	% NS	S p	S CV	S χ^2
	Yes	63.2	40.5	<.001	.292	27.20
	No	8.6	3.0			
	IDK	28.3	56.5			
_2	1st gen students studying in STEM					
	Yes	40.4	24.1	<.001	.248	19.44
	No	14.6	6.6			
	IDK	45.0	69.3			
_3	Minorities studying in STEM					
	Yes	38.2	24.2	<.001	.256	20.74
	No	16.4	6.1			
	IDK	45.4	69.7			
_4	Hispanic students studying in STEM					
	Yes	36.9	22.4	<.001	.256	20.59
	No	16.8	6.7			
	IDK	46.3	70.9			
_5	STEM students from low-SES families					
	Yes	36.7	26.1	.002	.199	12.45
	No	14.0	6.1			
	IDK	49.3	67.9			
_6	Females studying in STEM fields					
	Yes	34.2	21.5	.001	.214	14.42
	No	14.5	6.7			
	IDK	51.3	71.8			

Note: All df = 2

Table 42a

Grant-Funded Scholarships in STEM

Q6.8b	We Have Grant-Funded Scholarships for…						
_1	Students studying in STEM	%	% 2Y	% 4Y	I p	I CV	I χ^2
	Yes	35.3	47.9	31.5	.003	.197	11.70
	No	7.9	12.7	6.5			
	IDK	56.8	39.4	62.1			
_2	1st gen students studying in STEM						
	Yes	19.8	28.2	17.2	.007	.182	10.04
	No	11.6	18.3	9.5			
	IDK	68.6	53.5	73.3			
_3	Minorities studying in STEM						
	Yes	22.3	32.9	19.0	.001	.221	14.68
	No	10.6	18.6	8.2			
	IDK	67.1	48.6	72.7			
_4	Hispanic students studying in STEM						
	Yes	21.3	28.2	19.1	.005	.186	10.43
	No	11.6	19.7	9.1			
	IDK	67.1	52.1	71.7			
_5	STEM students from low-SES families						
	Yes	20.1	31.9	16.6	<.001	.237	16.77
	No	10.7	18.8	8.3			
	IDK	69.1	49.3	75.1			
_6	Females studying in STEM fields						
	Yes	15.6	20.0	14.3	.025	.157	7.38
	No	12.3	20.0	10.0			
	IDK	72.1	60.0	75.8			

Note: All df = 2

Table 42b

Grant-Funded Scholarships in STEM

Q6.8b	We Have Grant-Funded Scholarships for…						
_1	Students studying in STEM	% Fa	% St	% Ad	R p	R CV	R χ^2
	Yes	41.2	27.6	36.0	<.001	.186	20.49
	No	6.8	3.1	20.0			
	IDK	52.0	69.4	44.0			
_2	1st gen students studying in STEM						
	Yes	20.4	17.3	24.0	.002	.170	17.08
	No	10.9	5.1	26.0			
	IDK	68.7	77.6	50.0			
_3	Minorities studying in STEM						
	Yes	25.5	18.4	22.0	.001	.179	18.77
	No	9.0	5.1	26.0			
	IDK	65.5	76.5	52.0			
_4	Hispanic students studying in STEM						
	Yes	25.3	18.4	18.4	.001	.182	19.41
	No	9.6	6.1	28.6			
	IDK	65.1	75.5	53.1			
_5	STEM students from low-SES families						
	Yes	21.5	18.8	22.0	.008	.154	13.70
	No	9.7	5.2	24.0			
	IDK	68.8	76.0	54.0			
_6	Females studying in STEM fields						
	Yes	15.2	16.3	18.0	<.001	.188	20.71
	No	11.0	5.1	30.0			
	IDK	73.8	78.6	52.0			

Note: All df = 4

Table 42c

Grant-Funded Scholarships in STEM

Q6.8b	We Have Grant-Funded Scholarships for…					
_1	Students studying in STEM	% S	% NS	S p	S CV	S χ^2
	Yes	49.6	22.5	<.001	.360	38.94
	No	12.1	3.8			
	IDK	38.3	73.8			
_2	1st gen students studying in STEM					
	Yes	25.7	14.3	<.001	.247	18.33
	No	17.1	6.2			
	IDK	57.1	79.5			
_3	Minorities studying in STEM					
	Yes	33.1	13.1	<.001	.314	29.45
	No	15.1	5.6			
	IDK	51.8	81.3			
_4	Hispanic students studying in STEM					
	Yes	30.2	13.8	<.001	.286	24.45
	No	16.5	6.3			
	IDK	53.2	80.0			
_5	STEM students from low-SES families					
	Yes	25.5	15.7	<.001	.239	16.93
	No	16.1	5.0			
	IDK	58.4	79.2			
_6	Females studying in STEM fields					
	Yes	18.8	13.0	<.001	.235	16.45
	No	18.8	5.6			
	IDK	62.3	81.4			

Note: All df = 2

Table 43

Institutional Support of Collaboration

Q8.1	My Institution Has Professional Staff to Help with Collaboration…						
_1	For instructional purposes…	%	% 2Y	% 4Y	I p	I phi	I χ^2
	Within the university	84.2	75.5	87.4	.042	–.145	4.14
	With external parties	63.1	55.6	66.3	.263	–.101	1.25
_2	To provide students w/ real-world experience…						
	Within the university	82.8	65.2	88.6	<.001	–.267	13.26
	With external parties	77.9	57.9	84.7	.001	–.281	11.78
_3	On a grant application or project…						
	Within the university	89.7	83.7	92.0	.131	–.121	2.28
	With external parties	79.6	75.8	81.3	.510	–.062	0.44

Note: All df = 1

Table 44

Institutional Support of Grant Applications

Q10.18	My Institution Has Professional Staff to Help…						
	In the acquisition of grants…	%	% 2Y	% 4Y	I p	I phi	I χ^2
_1	Within the university	40.2	47.7	38.0	.102	–.082	2.67
_2	Through partnership w/ another institution that has personnel who aid in acquiring grants	7.4	11.4	6.2	.105	–.082	2.63

Note: All df = 1

Table 45a

Intra- and Inter-Institutional Collaborations

Q8.2	My Departmental Colleagues and/or I Have Collaborated…						
_1	For instructional purposes	%	% 2Y	% 4Y	I p	I phi	I χ^2
	Among ourselves	89.4	91.9	88.3	.435	.053	0.61
	With other departments	84.3	89.5	82.3	.207	.088	1.59
	With other disciplines	76.6	82.1	74.2	.242	.085	1.37
	With another institution	67.4	81.0	60.8	.007	.202	7.26
	With a non-profit entity	55.1	63.8	51.4	.149	.115	2.08
	With a business entity	56.0	60.4	53.9	.433	.061	0.62
	With a state/federal entity	59.2	66.7	56.1	.225	.098	1.47
	With a K-12 school district	69.8	81.0	64.9	.026	.162	4.98
_2	To provide students with real-world experiences						
	Among ourselves	84.7	89.1	83.0	.284	.075	1.15
	With other departments	70.2	77.6	67.4	.188	.099	1.74
	With other disciplines	64.1	68.1	62.5	.499	.052	0.46
	With another institution	49.7	54.2	47.7	.456	.060	0.56
	With a non-profit entity	56.2	61.4	54.1	.414	.066	0.67
	With a business entity	64.6	65.3	64.3	.906	.009	0.01
	With a state/federal entity	53.2	55.3	52.4	.765	.025	0.09
	With a K-12 school district	58.5	55.3	59.8	.596	–.041	0.28
_3	On a grant application or project						
	Among ourselves	73.1	70.6	74.0	.637	–.035	0.22
	With other departments	67.6	66.0	68.3	.774	–.022	0.08
	With other disciplines	61.1	62.8	60.5	.795	.021	0.07
	With another institution	60.9	68.9	57.7	.193	.104	1.70
	With a non-profit entity	44.4	45.7	43.9	.851	.016	0.04
	With a business entity	42.3	40.0	43.3	.723	–.031	0.13
	With a state/federal entity	58.3	56.8	58.9	.821	–.019	0.05
	With a K-12 school district	48.9	53.7	46.9	.467	.062	0.53

Note: All df = 1

Table 45b

Intra- and Inter-Institutional Collaborations

Q8.2	My Departmental Colleagues and/or I Have Collaborated…					
_1	For instructional purposes	% S	% NS	S p	S phi	S χ^2
	Among ourselves	94.1	83.5	.013	.170	6.22
	With other departments	87.4	80.4	.176	.095	1.83
	With other disciplines	81.0	70.7	.102	.120	2.67
	With another institution	73.0	59.7	.062	.140	3.47
	With a non-profit entity	52.4	58.9	.412	–.065	0.67
	With a business entity	59.8	50.7	.238	.091	1.39
	With a state/federal entity	61.0	57.1	.632	.039	0.23
	With a K-12 school district	76.4	61.0	.022	.167	5.22
_2	To provide students with real-world experiences					
	Among ourselves	89.5	78.9	.039	.146	4.26
	With other departments	67.4	72.4	.470	–.054	0.52
	With other disciplines	66.3	60.8	.462	.057	0.54
	With another institution	49.4	48.6	.927	.007	0.01
	With a non-profit entity	55.8	56.0	.985	–.002	0.00
	With a business entity	75.6	51.3	.001	.253	10.34
	With a state/federal entity	57.5	47.0	.213	.106	1.55
	With a K-12 school district	59.6	56.2	.664	.034	0.19
_3	On a grant application or project					
	Among ourselves	81.9	60.0	.001	.243	10.60
	With other departments	77.5	52.2	.001	.264	11.94
	With other disciplines	71.6	43.3	<.001	.282	12.29
	With another institution	74.2	39.3	<.001	.348	18.70
	With a non-profit entity	50.6	34.5	.066	.160	3.38
	With a business entity	52.7	25.9	.002	.268	9.23
	With a state/federal entity	68.4	44.4	.004	.240	8.21
	With a K-12 school district	55.1	39.7	.074	.153	3.19

Note: All df = 1

Table 46

Institutional Partnerships

Q8.3	My Institution/Organization Partners with…						
_1	To seek grant funding	%	% 2Y	% 4Y	I p	I phi	I χ^2
	Another institution	83.9	86.8	82.9	.567	.048	0.33
	A non-profit entity	70.1	60.5	74.2	.125	–.136	2.34
	A business entity	68.3	64.7	69.8	.591	–.049	0.29
	A state/federal entity	83.3	81.6	84.0	.731	–.030	0.12
	A K-12 school district	67.8	64.9	69.1	.645	–.042	0.21
_2	For undertakings that serve Hispanic students						
	Another institution	76.9	77.1	76.7	.960	.005	0.00
	A non-profit entity	58.6	57.6	59.3	.877	–.017	0.02
	A business entity	55.0	59.4	52.1	.521	.072	0.41
	A state/federal entity	73.3	69.7	75.0	.572	–.056	0.32
	A K-12 school district	66.3	63.6	67.8	.686	–.042	0.16

Note: All df = 1

Table 47

Evaluation of Effectiveness: Monitoring Instruction and Outcomes

Q10.16	My Institution Uses Data to…	%	% 2Y	% 4Y	I p	I phi	I χ^2
_1	Identify courses w/ low completion and/or success rates	39.9	59.1	34.4	<.001	–.210	17.32
_2	Identify courses that minority students have low completion/success rates	18.8	37.5	13.4	<.001	–.257	25.86
_3	Monitor short-term student outcomes in courses w/ low completion/success rates	20.4	35.2	16.1	<.001	–.198	15.47
Q10.17	Who monitors instructional practice in STEM courses at your institution?						
_1	Department Dean/Chair	35.1	52.3	30.2	<.001	–.193	14.65
_2	Specialists w/ adv. degrees in education	6.9	12.5	5.2	.018	–.120	5.62
_3	No one	6.9	12.5	5.2	.018	–.120	5.62
_4	Other	5.5	6.8	5.2	.600	–.029	0.32
Q10.5	We have personnel with advanced degrees in education monitor instructional practice in…		MR2Y	MR4Y	I p	I *r*	I U
_3	STEM courses		128.5	121.0	.444	–0.05	5547.0
Q10.11	My institution leaves planning for improvement of courses with low completion and success rates in the hands of departmental faculty		%	% 2Y	% 4Y	I p	I CV
	Yes		51.4	55.2	50.0	=.017	+.182
	No		11.7	19.4	8.9	"	"
	IDK		36.8	25.4	41.1	"	"

Note: Q10.16 & Q10.17 df = 1

Table 48

Support of Programming: Curriculum Development Assistance

Q10.18	My institution has/provides…	% 2Y	% 4Y	I p	I phi	I χ^2
_3	Support personnel with advanced degrees in curriculum development who aid faculty in preparing or revising courses	25.0	9.8	<.001	–.187	13.68
Q10.5		MR2Y	MR4Y	I p	I *r*	I *U*
_4	Personnel w/ advanced degrees in curr. dev. who aid in preparing / revising courses	126.7	120.9	=.553	–0.04	5594.5
_5	Many faculty who utilize curriculum development services	120.6	123.2	=.788	0.02	5941.5

Note:

Table 49

Evaluation of Effectiveness: STEM Programming

Q6.12	We use institutional data to evaluate the effectiveness of…	%	% 2Y	% 4Y	I p	I phi	I χ^2
_1	Academic programming targeted for STEM	38.4	50.0	35.1	.011	–.128	6.42
_2	Co-curricular targeted for STEM students	21.1	26.1	19.7	.191	–.066	1.71
_3	Curricular changes made in STEM courses	29.0	35.2	27.2	.144	–.074	2.13
		% Fa	% St	% Ad	R p	R CV	R χ^2
_1	Academic programming targeted for STEM	39.1	33.6	47.6	.171	.096	3.53
_2	Co-curricular targeted for STEM students	18.8	18.8	33.3	.035	.132	6.71
_3	Curricular changes made in STEM courses	27.6	23.4	44.4	.009	.157	9.41
			% S	% NS	S p	S phi	S χ^2
_1	Academic programming targeted for STEM		45.8	31.6	.004	–.146	8.31
_2	Co-curricular targeted for STEM students		20.1	21.7	.701	.019	0.15
_3	Curricular changes made in STEM courses		37.4	21.2	<.001	–.179	12.47

Note: I & S df = 1, R df = 2

Table 50

Evaluation of Effectiveness: Targeted Populations and Adaptation of Programming

Q6.13	We consider programming effectiveness for:	%	% 2Y	% 4Y	I p	I phi	I χ^2
_1	Minorities	72.1	76.9	70.1	=.354	–.069	0.86
_2	1st gen	74.9	75.0	74.8	=.978	–.002	0.00
_3	Low SES	58.1	61.5	56.7	=.551	–.045	0.36
		% Fa	% St	% Ad	R p	R CV	R χ^2
_1	Minorities	64.8	77.6	85.7	=.041	+.191	6.38
_2	1st gen	67.0	81.6	85.7	=.042	+.190	6.35
_3	Low SES	51.6	63.3	68.6	=.159	+.145	3.67
			% S	% NS	S p	S phi	S χ^2
_1	Minorities		63.7	84.0	=.003	+.224	8.87
_2	1st gen		65.7	88.0	=.001	+.255	11.52
_3	Low SES		44.1	77.3	<.001	+.333	19.60
Q6.14	Based on this data, we have adapted or rejected…	%	% 2Y	% 4Y	I p	I phi	I χ^2
_1	Academic support targeted for STEM students	56.6	60.0	55.0	=.574	–.047	0.32
_2	Co-curricular programming targeted for STEM	31.7	42.2	27.0	=.068	–.151	3.32
_3	Curricular changes made in STEM courses	46.9	53.3	44.0	=.297	–.087	1.09
		% Fa	% St	% Ad	R p	R CV	R χ^2
_1	Academic support targeted for STEM students	61.2	51.2	56.3	=.581	+.087	1.09
_2	Co-curricular programming targeted for STEM	35.8	27.9	28.1	=.606	+.084	1.00
_3	Curricular changes made in STEM courses	53.7	30.2	59.4	=.019	+.237	7.98
			% S	% NS	S p	S phi	S χ^2
_1	Academic support targeted for STEM students		60.0	53.6	=.440	–.064	0.60
_2	Co-curricular programming targeted for STEM		29.3	34.8	=.484	+.058	0.49
_3	Curricular changes made in STEM courses		53.3	40.6	=.126	–.128	2.35

Note: I & S df = 1, R df = 2

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