

The Road to Strengthening 2-year Hispanic-Serving Institution Participation in the NSF ATE Funding Program

Abstract

HSI ATE Hub is a three-year collaborative research project funded by the National Science Foundation (NSF) that joins two successful programs. Mentor-Connect mentors 2-year college faculty to develop competitive proposals for the NSF Advanced Technological Education (ATE) Program, and KickStarter facilitates strategic STEM assessment and planning to drive competitive STEM proposal development at 2-year Hispanic Serving Institutions (HSIs).

The goal of HSI ATE Hub is to build capacity and leadership at 2-year HSIs for developing competitive ATE proposals to elevate 2-year HSIs as drivers of their community's economic success via technician education.

Data sets from three annual HSI ATE Hub Cohorts, four prior KickStarter Cohorts, and nine Mentor-Connect Cohorts have been aggregated to assess the following research questions about 2-year HSIs:

1. Are there unique opportunities/barriers/challenges related to STEM program development and grant-writing endeavors for advanced technological education?
2. How do we build capacity to pursue the opportunities and address the barriers/challenges?
3. How do mentoring efforts/styles related to STEM program development and grant-writing need to differ for HSI faculty?
4. What types of resources are relevant to the HSI ATE Community?

This third paper in a series will report new data and incremental results from Year 3 of the HSI ATE Hub and a summary of results from the prior two years [1] [2]. These results include interactions with the HSI ATE community through intentional, expanded engagement to enhance learning from Latinx Advisory Council members and training webinars to develop educators' acumen of culturally responsive instruction and high impact practices. Feedback from interviews and surveys with faculty at 2-year HSIs in HSI ATE Hub Cohorts 1-3 will be discussed to address research questions 1, 2, and 3. Evolved staging of resources relevant to the HSI ATE Community and related research directions for extending the project will address research question 4.

Introduction

In 2017, two successful NSF programs decided to collaborate with the aim of joining the strengths of each other's approaches. The primary goals of the collaborative, HSI ATE Hub, were to build capacity and leadership at 2-year Hispanic Serving Institutions (HSIs) for developing competitive ATE proposals and to elevate 2-year HSIs as drivers of their community's economic success via technician education. One program, Mentor-Connect, established in 2012, had worked with annual cohorts of up to twenty-two 2-year technician colleges nationwide. Their strong mentoring approach provided a team of two faculty at each of these institutions with guidance from an experienced ATE grantee as the faculty developed an ATE proposal in the *Small Grants for Institutions New to the ATE Program* track. This ATE track increases the incentives and opportunities for community colleges that have little or no previous experience with the ATE program to undertake projects to improve science and engineering technician education programs or teacher preparation programs that focus on technological education. Although faculty were the direct participants in two Mentor-Connect face-to-face workshops with mentors, an expanded campus team that included the grant writer and administrative leaders contributed to ongoing proposal development conversations with the mentors between face-to-face workshops. These additional team members could join the workshops if funded by their institutions to travel. Through early conversations with KickStarter (introduced below) in 2016, Mentor-Connect and KickStarter began discussing submitting a joint proposal (prompting Mentor-Connect to seek out how many HSIs they had previously worked with. At this time differences in ATE proposal award rates began to be noticed among HSIs and non-HSIs in the annual M-C cohorts. Award rates were lower for HSIs compared to non-HSIs. Mentor-Connect began collecting more data about institutional and faculty characteristics to inform their mentoring processes.

Meanwhile, in 2014, the other NSF program, KickStarter, was funded outside of the ATE program to focus on improving competitive proposal development at 2-year Hispanic Serving Institutions (HSIs), and in 2016 the first two ATE grants were submitted and awarded. This was two years prior to the release of the initial NSF HSI program solicitation (NSF-18524) in early 2018. Cohort sizes for KickStarter were smaller, about 5-6 HSIs, and included teams of up to ten faculty (STEM, CTE, non-STEM), grant writers, administrative leaders, student support staff, and institutional research. Partners in K12, university and industry were also encouraged to join the team. The main goal for institutions in KickStarter cohorts was to strive for two proposal submissions to any NSF program with at least one award, and campus teams continued to receive technical assistance until this goal was met. Prior to proposal development, each KickStarter team performed a STEM-self assessment and developed a STEM plan, out of which research proposal concepts were identified and matched to the appropriate NSF program, e.g. S-STEM, ATE, and later HSI. In 2016, HSIs in KickStarter cohorts began to acquire grant awards, initially in S-STEM and ATE. When the HSI program solicitation was announced, HSIs in KickStarter began switching from pursuing the *Small Grants for Institutions New to the ATE Program* track to the equivalent track in the HSI program, quite successfully. A total of eleven HSI awards were earned by 2-year HSIs participating in KickStarter for an 85% award rate. In 2019 the KickStarter program ended and no new candidates to the pool of HSI ATE Hub Cohorts became available.

In the next two sections, this paper will describe the extent to which the collaborative, HSI ATE Hub, has met its original objectives and the responses to the research questions explored in the collaborative. Sections 3 and 4 will discuss how activities surrounding Community Building and Resource Utilization informed the research direction during the project and future endeavors. Section 5 presents data across the three HSI ATE Hub cohorts and the overall pool of HSIs served by Mentor-Connect and KickStarter. The paper finishes with overall Lessons Learned in Section 6, the Conclusion in Section 7, and Implications for Future Research in Section 8.

1. Goals and Objectives

The primary program goals for HSI ATE Hub were to build capacity and leadership at 2-year HSIs for developing competitive ATE proposals and to elevate 2-year HSIs as drivers of their community’s economic success via technician education. Table 1 lists the program objectives under these goals and the program’s performance to those objectives:

Program Objective and Research Questions (RQ)	Performance to Objective
1. Identify and engage four KickStarter HSIs per year to participate in Mentor-Connect to prepare ATE proposals.	Two KickStarter HSIs participated in each of Cohorts 1 and 2, and one participated in Cohort 3 for a total of five. See also Section 5 and Appendix.
2. Aggregate and disseminate HSI-relevant resources to complement the existing Mentor-Connect resource repository. (maps to RQ 4 in Table 2)	Over 35 HSI-relevant resources were added to the existing Mentor-Connect Resource Library website and disseminated at conferences, articles, in webinars and email communications. See Sections 3 and 4.
3. All 2-year HSIs explore and/or utilize HSI ATE Hub HSI-relevant resources during their proposal preparation process. (maps to RQ 4 in Table 2)	The Resource Library is featured on page 49 of the Mentor-Connect Workshop Guide distributed to all participating HSIs and their mentors at the face-to-face (2019 and 2020) and the virtual Mentor-Connect workshops (2020 and 2021).
4. Identify the unique barriers and challenges for 2-year HSIs related to STEM Program Development and Grant Writing, e.g. capacity, culture, and differences from Universities. (maps to RQ 1, 2, 3 in Table 2)	2-year HSIs that are smaller and rural often lack grant writing and institutional data and research capacity. Two-year HSIs in large districts have grant writers and infrastructure for institutional research but faculty are not incentivized to do research as university faculty are. The 2-year institutional culture is not a research culture. Intensive coaching is needed throughout the competitive grant development process. Faculty and staff do not necessarily understand what it means or how to engage with and serve underrepresented (UR) students although HSIs enroll significantly more students from UR groups. See also Section 6.

5. Convene representatives in the HSI ATE Community to stimulate network building and alliances that support more HSI proposals (RQ 4)	Years 1 and 2 were more successful than Year 3, where dissemination at conferences was impacted by the Covid 19 pandemic. See also Section 3.
6. Create knowledge that leads to diversification of other projects and centers as they are engaging HSIs and generate recommendations for educators, other ATE Centers and mentoring initiatives, and NSF. (maps to RQ 4 in Table 2)	The HSI ATE Hub project was featured February 2021 in the ATE Central Connection which disseminates information to and about ATE Centers and Projects on the first Tuesday of each month. See also Sections 3 and 4.
7. Collect data across KickStarter, Mentor-Connect for study of the HSI ATE Hub Cohorts.	See also Sections 2 and 5.

2. Responses to Research Questions

Table 2: Responses to Research Questions
RQ 1. Are there unique opportunities/barriers/challenges related to STEM program development and grant-writing endeavors for advanced technological education at 2-year HSIs?
<p>Each institution has its own unique opportunities and challenges based on the following factors:</p> <ul style="list-style-type: none"> ● <u>Size</u>: Smaller institutions may not have centralized grant writing departments or infrastructure and resources for institutional data collection and analysis. ● <u>Location</u>: Remote rural locations may not have pervasive reliable high speed network connectivity or a variety of local business and industry resources to drive economic mobility in the community. Depending upon their location, urban HSIs may or may not have access to thriving businesses and industries that are sources of economic prosperity. ● <u>Institutional culture</u>: Typically 2-year institutions of higher education are not research institutions, faculty are there to teach and they have overloaded schedules. It is difficult to obtain faculty release time to perform research, let alone write research proposals. ● <u>New to HSI Status</u>: To achieve HSI status, the DOE requires 25% FTE Hispanic undergraduate full-time enrollment. The number of HSIs has grown 93% in the past decade. Educators at Institutions with newly acquired HSI status do not necessarily have explicit goals nor do they know how to serve students from underrepresented minority groups beyond enrollment. ● <u>Faculty Representation</u>: Existing faculty have limited awareness or experience in culturally responsive pedagogy and applying it to other methods, such as project based learning, that are proven to successfully engage and retain students of color. Compounding this gap, faculty, staff and administrator demographics do not match in proportion the demographics of the student population, which contributes to a sense of isolation and self-doubt for whether the student belongs in the training program and/or the career trajectory. ● <u>Demographics of Student Population</u>: HSIs enroll 67% of Hispanic undergraduates, 39% of all Asian American and Pacific Islanders, 21% of all African Americans, and 18% of all Native Americans, making them an important player in broadening participation in higher education and middle skills jobs.
RQ 2. How do we build capacity to pursue the opportunities and address the barriers/challenges?
Strategies for building capacity to address the above gap areas include:

- Provide Grant writing technical assistance plus targeted mentoring to address broadening participation challenges by including explicit goals, evidence, interventions and desired impacts for educating advanced technicians from underrepresented minorities.
- Post grant award, NSF allows faculty overload time if needed, although they prefer faculty using release time. If faculty normally works overload at the college, and college policy/procedures allow for overload pay in general, then it can be used in the budget. You must cite the college policy and any limits on overload amounts.
- Train HSI educators to collect, analyze, and use disaggregated Institutional data during proposal writing, strategic planning, and for continuous improvement.
- Increase HSI faculty knowledge and practice of culturally responsive pedagogy and other high impact practices through professional development with follow-up
- Facilitate STEM Self-Assessment and Strategic Planning with an eye towards shifting organizational culture beyond enrolling to serving
- Provide intensive coaching and technical assistance using mentors with knowledge about advanced technological education, HSIs, serving underrepresented students, and grant writing
- Host All Cohort Meetings to stimulate interaction and sharing among Faculty and Staff at HSIs who have recently attained NSF grants and those who are pursuing *Small Grants for Institutions New to the ATE Program*.

RQ 3. How do mentoring efforts/styles related to STEM program development and grant-writing need to differ for HSI faculty?

An intensive coaching style is more important to successful proposal submission and award than mentor ethnicity.

RQ 4. What types of resources are relevant to the HSI ATE Community?

The HSI ATE Community likes to hear from people like themselves and from people who are like the students that they reach. Types of resources most asked for in live conference sessions include: translation services, pronunciation guides, and listings of agencies/resources that address basic life needs of students, e.g. housing, transportation, food. Types of HSI-relevant resources that were most frequently viewed from the repository are culturally responsive practices that are either research based and/or include examples from other HSI practitioners with NSF grants and proposal development aids.

3. Community Building

Community building in year 3 of the project was conducted entirely virtually. This contrasts with years 1 and 2, where conferences were the primary mechanism for engaging with the community of educators from 2-year HSIs with advanced technological education programs. These live conference sessions in years 1 and 2 provided excellent feedback and indicators of engaged participation, whereas the virtual technologies used by conference hosts did not track the number of visits to pre-recorded materials for the HSI ATE Hub program which might have served as proxies for attendance and participation during live events.

A spring 2020 virtual webinar hosted by the HSI ATE Hub project was highly successful: *Culturally Responsive Instruction in HSIs: Specific Instructional Strategies that Work*. As reported in last year's paper, this webinar had strong attendance, participation, and excellent

post-webinar views of the content. The team sought to replicate that success with a second webinar in the Spring of 2021. The Spring 2021 webinar topic was *Building Equitable Learning Environments in Career and Technical Education (CTE) and STEM*. The April 7, 2021 webinar focused on successful strategies from Action Research for Equity projects that were completed by participants engaged in the NSF ATE-funded EESTEM II project (DUE # 1601548) implemented by the National Alliance for Partnerships in Equity (NAPE). Educators from New Mexico State University Dona Ana Community College Campus and North Idaho College provided helpful guidance, strategies, and interventions for faculty and administrators in CTE and STEM to foster an equitable learning environment. Practical examples included sending personalized Kudo Cards to praise students for their achievements, critical reflection journaling and collaborative inquiry to improve teaching practice, and formation of a cross-institutional affinity group among EESTEM II participants to magnify equity-mindedness by developing equity agents. A total of 72 people attended the webinar out of the 128 registered. Seventeen of twenty responses to the post-webinar survey indicated that the webinar exceeded or mostly met their expectations for learning how to build equitable learning environments in CTE and STEM. Fifteen agreed that their confidence level for implementing strategies to foster an equitable STEM/CTE learning environment improved. All participants agreed that some or many of their questions were answered. The Chat commentary was highly engaged, with several comments and additional questions about the Kudo Cards and Journaling. The webinar recording was uploaded to the HSI ATE Hub Resource Repository.

The project also has an active web presence via a microsite provided by ATE Central. The HSI ATE Hub microsite is linked to the Mentor-Connect website and vice-versa. Both websites guide 2-year college HSIs and others to HSI ATE Hub project activities and the HSI ATE Hub Resource Library which is a designated subset of HSI-specific resources within the Mentor-Connect Resource Library. Additional virtual communications and community engagement occurred through a July 20, 2020 article in the Community College Daily, a news publication of the American Association of Community Colleges. The article urged a more proactive approach to meeting Latinx students' STEM needs. The authors recommended embedding culturally responsive practices into ATE proposals to engage and retain Latinx students and to make those projects more competitive with NSF reviewers. They also made the case that introducing culturally responsive practices into innovative STEM initiatives has the potential to inform practices throughout the college.

In February of 2021, HSI ATE Hub was the featured project in the ATE Central Connection, a communication channel that disseminates information to and about ATE Centers and Projects on the first Tuesday of each month. The article also included a resource from the project, *Culturally Responsive Instruction in HSIs: Specific Instructional Strategies that Work*, that created an uptick in resource views.

4. Resource Types and Usage

The resource library includes webinar recordings, peer-reviewed publications, videos, presentations, and success stories covering topics such as:

- How to develop competitive ATE proposals at your HSI

- Professional development to improve Cultural Awareness and Sensitivity
- Curriculum enhancement and development to improve Latinx student success
- Data, Theories, and Research Models to inform your ATE research project
- Professional development for Culturally Relevant Pedagogy and Inclusion
- Examples of technician training modules in Spanish

Four categories of HSI-relevant resources were initially defined in year 1 to structure resource curation and tagging:

1. Research papers and scholarly articles with data, theory, challenges, practices about HSIs and/or Hispanic/Latinx in STEM (R)
2. Success stories and/or examples of ATE programs involving HSI, Hispanic/Latinx, or underrepresented groups and institutions (S)
3. Aids for ATE Proposal Development and Award Management (P)
4. HSI Faculty Professional Development to enhance their cultural competence and leadership (F)

Based on feedback from HSI ATE community stakeholders and a seminal resource [3] in year 2, refinements to improve ease of use, searchability, and access to resources included critical focus areas for STEM education in HSIs: advising, mentoring and nonacademic support systems; STEM academic structure and related support systems (STEM A&S); evidence-based pedagogies (EBP); equity, diversity and culturally responsive practices (CRP); research experiences and high impact practices (HIP); or All. The resources in Table 3 are itemized by these categories and critical focus areas, along with the total views per resource.

The metrics for HSI ATE Hub resource usage shown in Table 4 tells us that Faculty Professional Development Research Papers (Category 4 = F) are on average viewed more than the other categories of resources (Category 1 = R, Category 2 = P, Category 3 = S).

Table 4 also shows that resources that focus on culturally responsive practices are receiving the highest total views while the other critical focus areas are receiving significantly less traffic. These data reinforce the recommendations of our advisory council and the research direction that we are pursuing moving forward.

A bibliography of resources in the HSI ATE Hub resource library is included in the references [3] to [41].

Table 3: Views of HSI-relevant Resources by Category and STEM Critical Focus Areas

HSI-relevant Resources	Total Views	Category	Critical Focus Area
Transforming academia and theorizing spaces for Latinx in higher education	1	R	HIP
Creating a Sense of Community and Belonging for Latinx Students	3	R	CRP
Anchoring comunidad: how first- and continuing-generation Latinx students in STEM engage community cultural wealth	3	R	CRP
Webinar: Building Equitable Learning Environments in CTE and STEM	12	F	CRP
Interventions Supporting Baccalaureate Achievement of Latinx STEM Students Matriculating at 2-year Institutions: A S	9	R	HIP
Preparing Teachers to Engage Rural Students in Computational Thinking Through Robotics, Game Design, and Culturall	12	R	CRP
Minority Serving Institutions as Engines of Upward Mobility	19	P	STEM A&S
Hispanics & STEM	26	R	STEM A&S
Maricopa Community Colleges District: Example Webpage for Basic Needs and Community Resources	24	S	CRP
Hope Center: Nationwide Basic Needs Research, Projects, and Resources	9	S	CRP
HSI Kickstarter	11	P	ALL
Webinar: Culturally Responsive Instruction at HSIs - Strategies that Work	274	F	CRP
LA RED TIG Week: Beyond the zero-impact result: Have you checked the spillover effects? By Maria Fernanda Rodrigo	11	P	
Toward a Multidimensional Conceptual Framework for Understanding "Servings" in Hispanic Serving Institutions.	31	R	CRP
Promoting Employability Skills	34	F	HIP
Financial Aid, Scholarships, and Resources for Hispanic and Latino Students	27	P	EBP
ASEE Webinar Series: Engineering Inclusive Classrooms	38	F	CRP
Panel: How ATE PIs at Hispanic Serving Institutions Engage Hispanic Students in Technician Programs	72	S	CRP
Realizing the PROMISE of Success for Latinx STEM Students	23	F	ALL
NSF National Resource Hub for STEM Education at Hispanic Serving Institutions	57	R	ALL
ATE TV Multicultural Video Series	47	S	CRP
Inclusion: Diversity, The New Workplace & The Will to Change	51	R	CRP
Institutional Agents at a Hispanic Serving Institution: Using Social Capital to Empower Students	61	R	CRP
Decolonizing Hispanic Serving Institutions: A Framework for Organizing	57	R	CRP
Defined by Outcomes or Culture? Constructing an Organizational Identity for Hispanic-Serving Institutions	43	R	CRP
KickStarter All Cohort Meeting Nov 2018 with HACU Guest Speaker John Aguilar	42	P	ALL
Casa de Esperanza National Latin@ Network: Building Evidence Toolkit for Strengthening Capacity	51	P	CRP
HSI ATE Hub Synergy Session	20	S	
Transforming STEM Education in Hispanic Serving Institutions in the United States	115	R	ALL
LA RED TIG Week: Evaluar Con Confianza es mejorar/Evaluation with trust is improvement by Susana Morales	53	P	CRP
Applying Design Thinking in Evaluation by Asma M. Ali and Isabel P. Cuervo	55	P	CRP
Women's interest development and motivations to persist as college students in STEM: a mixed methods analysis	55	R	CRP
Latino Faculty in Hispanic-Serving Institutions: Where is the Diversity?	66	R	STEM A&S, CRP
HSI ATE HUB Logic Model	34	P	
Active learning increases student performance in science, engineering, and mathematics	69	R	EBP
Excelencia in Education	63	R	ALL
ESCALA	49	F	HIP
NCCHC Leadership Fellows Program	50	F	ALL
National Community College Hispanic Council	48	F	ALL

Table 4: Average and Total Resource Views by Categories and STEM Critical Focus Areas

	Average Views	Total Views	Total Resources
Resource Categories	44	1725	39
1. Research Papers	58	722	17
2. Proposal Development Aids	34	303	9
3. Success Stories	34	172	5
4. Faculty Professional Development	66	528	8
Critical Focus Areas of Resources			
Culturally Responsive Practices	51	1066	20
Evidence-Based Practices	48	96	2
High Impact Practices	23	93	4
STEM Academic Structure & Support	37	111	3
All Critical Focus Areas	51	409	8

5. Comparison of Data from HSIs Served

Table 5 compares the characteristics of the HSIs that applied to HSI ATE Hub Cohorts 1, 2, and 3 based on data collected in their application to Mentor-Connect, assessment of their applications, assigned mentors, the mentoring relationship, ATE proposal submission, and award status.

Table 5: Comparison across HSI ATE Hub Cohorts 1-3 during the Collaborative

HSI ATE Hub	KS HSI	State	KS Due Diligence	KS Engage Level	M-C Appl Ranking	Primary Author(s) of M-C Appl	Mentor Gender	Mentor Ethnicity	Coaching Intensity	Faculty Gender	Faculty Ethnicity	Proposal Submit?	Award?
Cohort 1 2019													
	HSI 1	NM	July - Oct	Medium	1	Grant Writer; 1 Sr. Faculty	Female	Hispanic	Expected Level	1 Female 1 Female	Afr. Amer Caucasian	No	NA
	HSI 2	CA	Sep - Oct	Low-Med	mid-range of 32	Faculty; Grant Office	Female	Caucasian	Intensive Level	1 Male 1 Male	Afr. Amer Caucasian	Yes	Yes
Cohort 2 2020													
	HSI 3	CA	June - Oct	Med-High	2	Faculty; Grant Writer	Female	Caucasian	Expected Level	2 Female	Hispanic	Yes	No
	HSI 4	CA	Apr - Oct	High	mid-range of 30	Faculty team	Female	Hispanic	Expected Level	2 Males	Caucasian	Yes	No
	HSI 5	NM	June - Oct	High	disqualified	Faculty team	NA	NA	NA	1 Female 1 Male	Caucasian Hispanic	NA	NA
Cohort 3 2021													
	HSI 6	CA	June - Oct	Med - High	lower third	Faculty; Grant Office	Female	Hispanic	tbd	Male Female	Hispanic Asian	tbd	tbd

Figure 1 shows the total numbers of 2-year HSIs pursuing ATE proposals that were served by both programs together and individually over eight years. Figure 1 also helps explain the ebbs and flows in recruiting 2-year HSIs to Mentor-Connect prior to establishing HSI ATE Hub and after HSI ATE Hub was established in 2018. Note also that the first NSF HSI program solicitation was released in early 2018 which attracted 2-year HSIs away from ATE submittals. Before HSI ATE Hub, KickStarter was recruiting 2-year HSIs into its own program and mentoring them to develop a range of proposals, including the NSF ATE and HSI programs. In 2019, KickStarter ended, and this was also the first year that a HSI ATE Hub Cohort submitted ATE proposals in the three year HSI ATE Hub project lifecycle.

The ATE success rates in Figure 2 represent the percentage of awards for proposals submitted. There are three lines of data. The blue line shows the overall success rate for *Small Grants for Institutions New to the ATE Program* by 2-year colleges with technician programs in Mentor-Connect annual cohorts. The orange line represents the ATE success rates for 2-year HSIs in Mentor-Connect. The green line shows the success rate for KickStarter ATE submittals by 2-year HSIs. The final data point on the graph is the total success rate, which is 80% for KickStarter (all HSIs), 74% for Mentor-Connect overall, and 70% for Mentor-Connect HSIs. There was at least one ATE award in KickStarter in 2019 where the HSI was not part of the HSI ATE Hub Cohort mentored by Mentor-Connect.

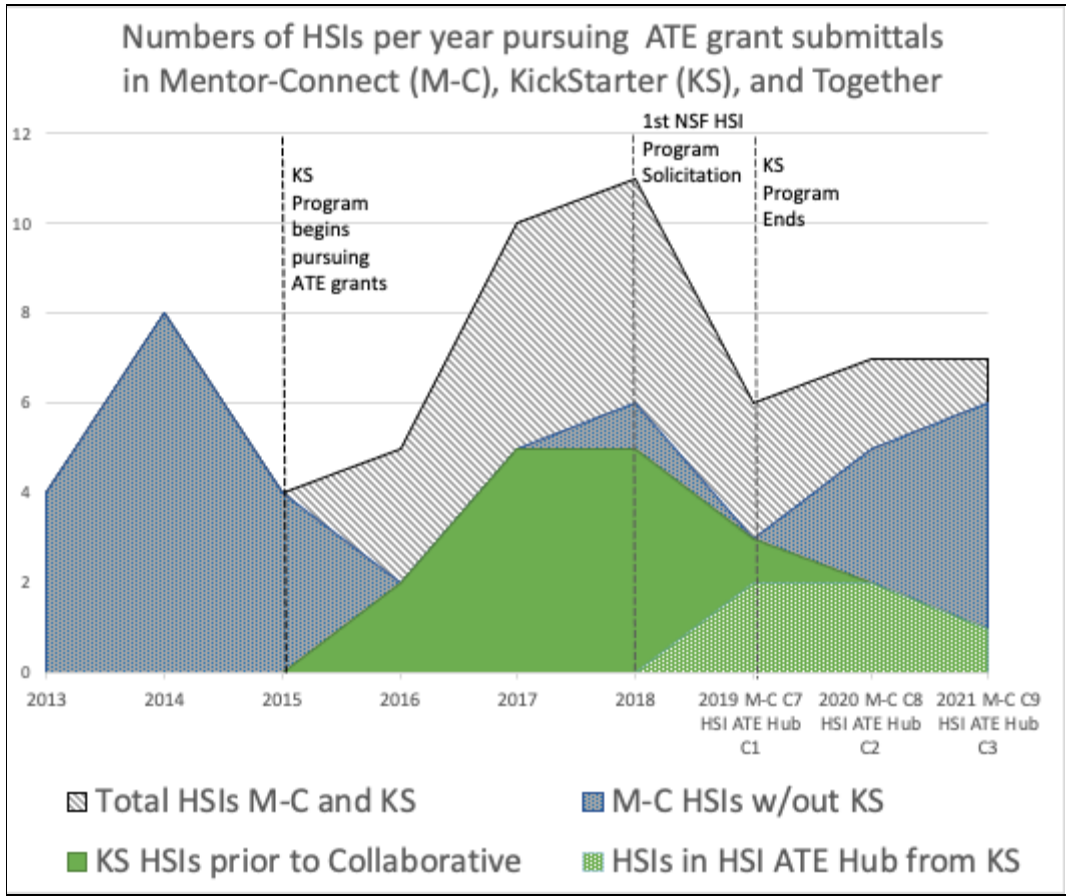


Figure 1: Hispanic Serving Institutions mentored by both Programs to pursue ATE grants

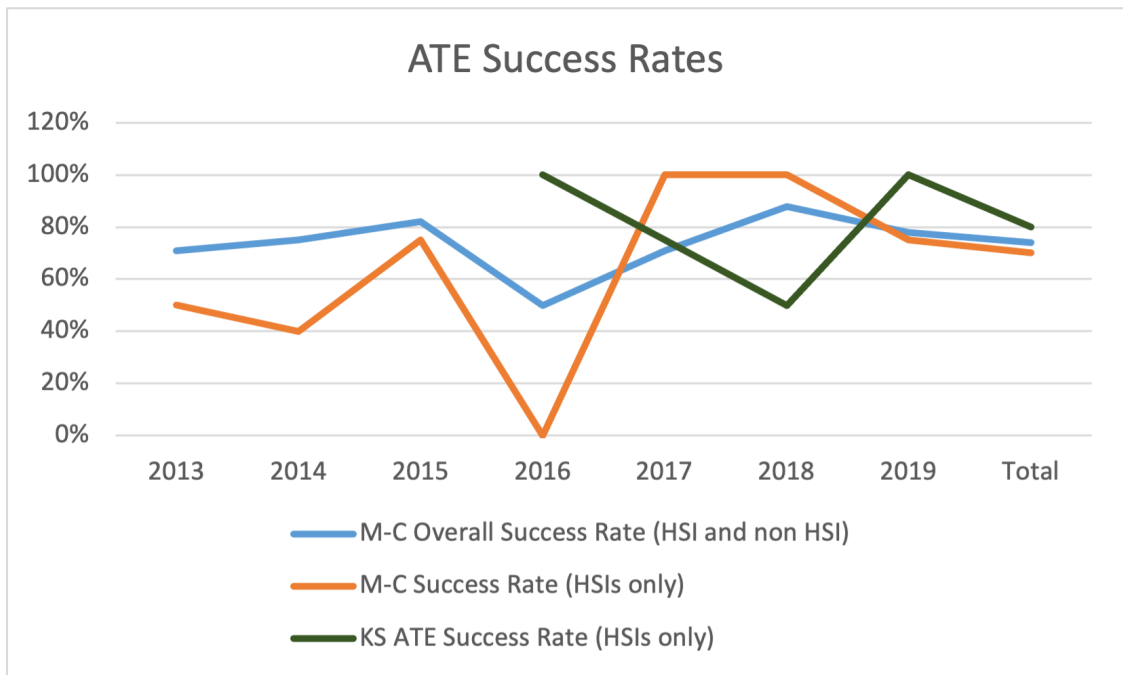


Figure 2: ATE Success Rates

The Mentor-Connect and KickStarter programs operated under different approaches as summarized in Table 6. Primary differences included 1) cohort sizes (Mentor-Connect \geq 20 2-year colleges, both non-HSIs and some HSIs and KickStarter 5-6 HSIs); 2) one annual submittal cycle (Mentor-Connect) vs. try until you succeed over multiple years (KickStarter); 3) Focus on mentoring for ATE proposal writing and developing faculty leadership (Mentor-Connect) versus focus on mentoring competitive proposal writing across multiple NSF programs and developing institutional leadership through strategic STEM assessment and planning.

	Mentor-Connect	KickStarter
Cohort Sizes	Twenty-twenty two 2-year institutions	Five-six 2-year HSIs
Cohort Institutional Make-up	non-HSIs, HSIs	HSIs only
Cohort Team Characteristics	Two faculty (required) grant writer, administrator (encouraged)	Team of up to ten: faculty, student support, administrators, institutional research, grant writer, students
Proposal Submittal cycles	Submit once in the one year cycle	Multiple submissions until grant award achieved
NSF Program Focus	ATE	ATE, HSI, S-STEM, etc.
Mentorship Model	One experienced ATE grantee (most often a PI) assigned to two mentees per year. Mentors prepared via a one-year Mentor Fellows training program. Two annual workshops arranged by Mentor-Connect. Other meetings set up by mentees to work with mentors monthly or as needed.	Mentors with experience in working with HSIs. Intensive coaching during frequent meetings with each HSI and monthly forums convening all HSIs. All meetings arranged by KickStarter mentors. Proposal review by 3rd party experts 1 month prior to NSF due date.
Leadership and Capacity Building	ATE proposal development and leadership that can carry over to other types of NSF grants; Presenters at Conferences and in Webinars; promotion within the college; college and external recognition; selected as Mentor Fellows and subsequent service as Mentors.	Team-wide strategic STEM Assessment and Planning; College President endorsement of STEM plan; Partnership building; Equity and Inclusion Professional Development; Research Proposal Development; Collaboration; Publications and Presentations at Conferences and Webinars

Figure 3 overlays data about ATE submissions, declinations and awards for Mentor-Connect and KickStarter from 2013 to 2019. Data for other NSF programs are shown for KickStarter HSIs, to illustrate the contribution to building capacity at 2-year HSIs for competitive grant development and to support some of the responses to the research questions in Section 2.

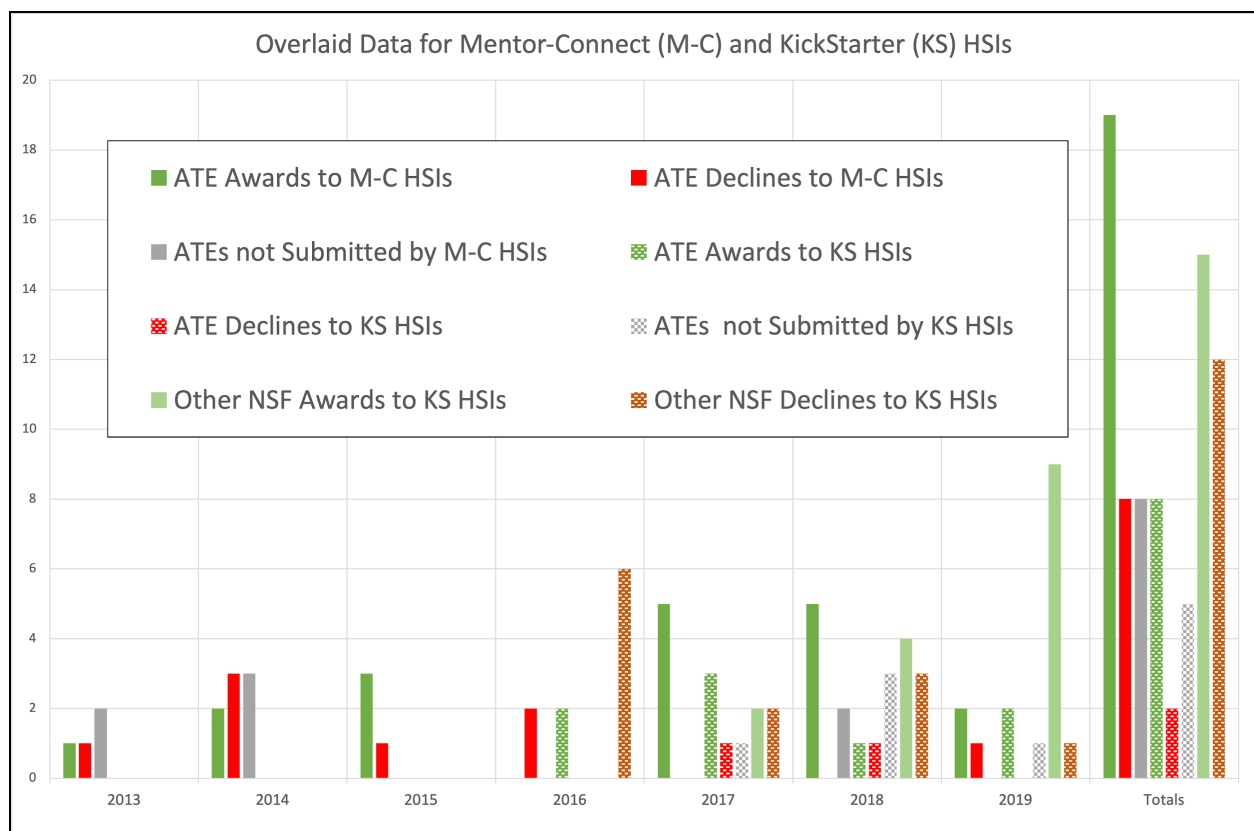


Figure 3: HSI mentored by both programs to pursue ATE and other NSF grants

6. Lessons Learned

Although the resources about culturally responsive practices are widely viewed by the public, it is not clear that they are being effectively absorbed into the proposal development processes. For example, one of the proposals from Cohort 2 was criticized by a reviewer because there were no “culturally responsive recruitment techniques” in the plan for recruiting high school students. This comment could serve as a reminder for PIs and Mentors that there is a need to address this issue.

Transitioning a team of players from one proposal development program to another has its unexpected challenges. The first set of challenges occurred during recruitment to join the Mentor-Connect cohort for mentoring during proposal development. Among these initial challenges were inability to meet the two STEM faculty team requirement for Mentor-Connect instead of one faculty or dean and a grant writer, concern about switching to a different mentoring process and forming new relationships, and competing priorities to meet the deadline to apply for Mentor-Connect with other larger, and/or different grant programs, including the Department of Education. Other challenges occurred after absorption into Mentor-Connect. For example, the faculty from KickStarter HSI that participated in Mentor-Connect were not necessarily on the original KickStarter team that went through the strategic assessment and planning activities although their ATE proposal idea could be traced to the STEM plan for their HSI. Strong ties to the STEM team at their HSI were not always maintained. One KickStarter

HSI failed to submit their proposal. A second KickStarter HSI had a declination due to lack of industry letters of commitment and a third KickStarter HSI's declination showed wide discrepancy between the two very positive reviews and the two quite negative reviews and was not funded.

More HSIs were being served by the Mentor-Connect program before creating the HSI ATE Hub program than realized. Until the HSI ATE Hub program was conceived (which was coincident to the newly formed NSF HSI Program), there was little to no recognition of HSI as an identity or as a significant asset-based contributor to diversifying the STEM workforce. The HSI ATE Hub program learned as much about HSI participation in Mentor-Connect during the years prior to the HSI ATE Hub program as it did during the HSI ATE Hub program: these institutions offer a highly diverse student body, and yet the faculty representing these HSIs are primarily caucasian and do not reflect the demographics of the student population. In many cases, as college Latinx populations exceeded the threshold for HSI classification, faculty were unaware of the change or classification. There is little evidence that colleges are modifying infrastructure or support systems as a result of becoming increasingly Latinx-serving institutions.

7. Conclusion

The goal of this project has been to increase capacity to assist more CC-HSIs across the nation in developing competitive ATE proposals and to encourage and elevate HSI community colleges as the drivers of their community's economic success via technician education. Strategies to accomplish this goal included providing two-tiered mentoring of KickStarter participants to leverage the strength of the STEM planning completed through KickStarter with ATE proposal development mentoring provided by Mentor-Connect. This strategy, had it been successful, would have produced as many as 12 new 2-year college HSI ATE grantees, with a proposal success rate greater than that achieved by HSIs working with only one or the other mentoring initiative. Another strategy was community building that would connect HSI ATE grantees with one another for learning and sharing. The third major strategy was to identify or develop and make readily accessible resources specific to two-year college HSIs to support their work in meeting the needs of Latinx students and crafting competitive ATE proposals to advance technician education programs at their colleges.

While providing valuable insights for developing and implementing mentoring programs, the first strategy did not achieve desired outcomes. For a variety of unforeseen reasons, the anticipated number of KickStarter participant colleges did not choose to transfer to Mentor-Connect to develop ATE proposals. Few among those that transferred succeeded in submitting proposals and/or receiving grant awards. A number of contributing factors have been discussed throughout the paper. Teams were more successful when they followed through to proposal submission with their original mentoring initiative. The other two strategies have proven successful. Measurable positive impacts are resulting from curating HSI-specific resources and providing faculty development designed to guide use of the resources and broaden educator understanding to enable them to adjust to the changing demographics of their student population in positive ways. Community building activities initiated in years one and two of the project (reported in previous papers) quickly gained participants and momentum. This strategy

would have likely been even more successful in year 3 had activities not been interrupted by the COVID-19 pandemic.

8. Implications for Future Research

These conclusive observations led to the development of a follow-on proposal that builds on the success of the webinar on culturally-responsive instruction. The research proposal is titled, *HSI ATE Hub 2–Theory to Practice: Professional Development for Culturally Responsive Technician Education*, and was submitted to the NSF ATE program. With input from experts in Culturally Responsive Instructional (CRI) methods, community college technician educators, students, and industry, the HSI ATE Hub team and Westchester Community College (WCC) teamed up to propose a faculty professional development model designed to improve outcomes for Latinx students in technician education programs. WCC, the first HSI in the State University of New York (SUNY) 64 campus system, will pilot the model using virtual learning methods mastered through previous NSF ATE work and the COVID-19 context. Over 20 WCC technician educators will benefit directly from piloting the model and developing leadership skills in CRI methods, building capacity within its STEM technician programs to better support the diversity of students, industry demand for a diverse workforce, and WCC’s capacity for future development of technician education programs within NSF and other grant-supported programs. The tiered PD model features a series of educational modules to incrementally enrich the instructional practices and mindset of HSI STEM educators and strengthen their repertoire for engaging culturally diverse students. The tier to tier scaffolding starts with Tier 1: Tier 1, Bienvenidos, welcomes HSI STEM educators and support personnel who recognize the need to better serve their Latinx students, but are not sure how to do this. Tier 2, Transformation through Action, immerses HSI STEM Educators in activities that introduce CRI practices in their technician training and collect evidence about impacts and outcomes for students. Participants will also learn about and be encouraged to seek NSF ATE grant funding to expand the impact of their work. Tier 3, Engaging Community, builds STEM faculty leaders as they disseminate lessons learned and contributions completed in Tiers 1 and 2 via synergy sessions and spotlight presentations at conferences or similar virtual events that attract technician educators. These leadership activities contribute to achieving broader impacts in the ATE Community.

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