Post-Baccalaureate Research Experiences for Students at Two Hispanic-Serving Institutions (Experience)

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Abstract

This study examines the implementation of a new one-year program at two large Hispanic-serving institutions offering post-baccalaureate research experiences to a cohort of recent STEM graduates, who might have not participated in research during the COVID-19 pandemic. Both institutions are current collaborators on a wider program dedicated to enhancing the academic experience of historically underrepresented minorities. Applicants for the post-baccalaureate research experiences either applied directly or faculty nominated or endorsed scholars to participate in the program. Following an expedited application process, program leaders selected and matched selected participants to research faculty. Faculty and post-baccalaureates and committed to engage in a research project for at least one semester and up to one academic year.

At the end of the post-baccalaureate research experience, the evaluation team conducted a focus group and a survey with a subset of participants to assess their experience. Program staff asked participants to provide feedback and insight on the program's on-boarding activities, research experience, mentor experience, program interactions, and reflect on the gains from program participation. This study did not include survey data on participants perceptions of the program due to the limited number of participant responses. Based on the focus groups conducted, participants reported that this experience was highly valued and significantly increased their motivation for pursuing future research and careers. Participants also reported that the program allowed them to develop and refine their professional and research skills, enabling them to apply concepts learned during their undergraduate studies to their research projects. Additionally, participants described faculty mentors as supportive, understanding, and actively involved in guiding them throughout their research journeys and future academic plans. However, participants also articulated a need for incorporating more professional development activities in this program, especially in preparation for graduate or professional school.

In terms of program implementation, the program's staff experienced administrative challenges when compensating participants and with low levels of involvement from faculty mentors in the mentorship workshops facilitated by the program staff. Despite these challenges, participants remained enthusiastic and reported minimal disruptions in their research experiences as they also expressed appreciation for the transparency of the program's staff in addressing and mitigating compensation issues. While the program faced implementation hurdles, it offered participants valuable research experiences and skill development opportunities.

This study underscores the critical role that post-baccalaureate research programs can play in participants' success as it prepares them for further educational and professional pursuits. The

program gained valuable insights through the implementation phase of the program; for example, there were differences in the administrative procedures of the two participating institutions that impacted the timely implementation of the project. While both institutions had resources to offer workshops, one streamlined compensation processes successfully and provided professional development workshops, while the other faced regulatory conflicts that hindered its ability to fulfill the professional development plan. Also, program staff conducted the program evaluation post-award, limiting its depth. In conclusion, the post-baccalaureate program successfully addressed the need of recent STEM graduates aiming to get/have research experience, particularly those negatively affected by the COVID-19 pandemic.

Introduction

Persistent structural inequities and systems of oppression consistently hinder the advancement of certain demographic groups in achieving success within higher education, particularly in the fields of science, technology, engineering, and mathematics (STEM) [1], [2] and [3]. For instance, White Non-Hispanic students attain more graduate degrees and are more likely to transition into the STEM workforce compared to Black and Latino students [4]. Research consistently underscores the lack of resources and opportunities in higher education institutions for underrepresented minorities to successfully navigate STEM careers and STEM graduate studies [6].

Researchers recognize the value of diversity; it is evident that a diverse STEM workforce increases innovation by leveraging diverse backgrounds, viewpoints, and experiences [5]. One strategy in increasing the diversity of the STEM workforce is to implement interventions to support the academic and career aspirations of historically underrepresented minority (URMs) individuals. Among these interventions are postbaccalaureate programs targeting URMs. Research has shown that post-baccalaureate programs provide participants knowledge on the graduate school and employment application process and keys to success in STEM careers or graduate studies [7].

The project's goal was to provide an enriching experience to students unable to participate in research due to the restrictions imposed during the COVID-19 pandemic or academic schedules. This just-in-time experiential educational opportunity aimed to provide post-baccalaureates to: (1) acquire another professional credential to make them more marketable in the STEM workforce, (2) gain laboratory knowledge should they decide to pursue an advanced certificate or degree as part of their long-term goals, and (3) attend professional development workshops on graduate studies and careers. The current study will discuss the proposed post-baccalaureate program, the implementation process, and lessons learned.

Description of Host Institutions

Given the program’s dedicated emphasis on fostering opportunities for underrepresented minorities, the program held its program at two leading Hispanic-Serving Institutions (HSIs) who are partners in the UT System Louis Stokes Alliance for Participation (LSAMP) program. This alliance has offered research experiences and mentorship to students for over 3 decades. In addition, both institutions serve predominately Hispanic student populations [7,8]. Each

institution has a strong culture of research with UTEP receiving Carnegie Research 1 designation and UTRGV receiving Carnegie Research 2 designation.

Overview of Proposed Post-Baccalaureate Research Experiences for LSAMP Scholars (PRELS) Program

The National Science Foundation (NSF) awarded funding to support post-baccalaureate scholars (n = 18) in conducting research under the supervision of a research active professor for up to one year either at the University of Texas at El Paso (UTEP) or at the University of Texas Rio Grande Valley (UTRGV). The goal was to provide an enriching experience for post-baccalaureate STEM graduates to engage in a one-year research experience who had limited research opportunities on-campus or off-campus because of the COVID-19 pandemic. Program staff proposed to identify and recruit faculty who would serve as mentors to the PRELS scholars through email, departmental listservs, institutional expertise pages, and their networks. Program staff from both institutions proposed to develop and share an online application process and, in some cases, proposed to conduct virtual interviews that allowed applicants to explain their professional goals and discuss their anticipated paths toward a graduate degree or the STEM workforce. PRELS scholar proposed eligibility included (1) United States citizenship or eligible non-citizen as determined by the National Science Foundation, (2) Bachelor of Science or Bachelor of Arts in a STEM discipline earned in the last 24 months prior to selection, (3) graduates from the UT System LSAMP, or New Mexico LSAMP, (4) Hispanic, Black/African American, Native American/Pacific Islander, persons with disabilities, women in STEM, United States military veterans, and (5) not currently enrolled in another undergraduate or graduate degree program.

Once selected, the program staff proposed to award PRELS fellowships to qualified individuals who agreed to engage in an intensive research project and a two-semester professional development program that included participation in a common set of activities: research compliance, mentor-protégé research planning, preparing a research poster and video workshop, research symposium, and versatility of STEM degrees panel sessions (see Table 1). While they received PRELS funding, program staff proposed scholars to enroll in a zero-credit undergraduate research course and or to choose to enroll in a graduate course for credit with graduate advisor approval. At the end of the first semester, if PRELS fellows expressed interest in pursuing a graduate degree, we would place them on a track to prepare for graduate school and seek funding opportunities (see Table 1). If PRELS scholars chose the path to join the STEM workforce, program staff would have placed scholars on the STEM Workforce track to prepare them for job interviews (see Table 1). In addition, program staff proposed faculty mentors were required to participate in mentorship workshops hosted by program staff. At the end of the academic year, all PRELS scholars and their faculty mentors were proposed to attend the UT System LSAMP Research Conference. At the conference, PRELS scholars would present their research and receive special recognition to celebrate their accomplishments.

Table 1: Post- Baccalaureate Program: Exploratory Tasks		
	Track 1: Graduate Studies	Track 2: STEM Workforce
First Semester	Research Guidance	
	Inclusive Mentoring for Faculty Workshop	

	Mentor-Protégé Research Planning	
	Preparing a Research Poster and Video Workshop	
	Research Symposium	
	Versatility of STEM degrees Panel Sessions	
Second Semester	Graduate School Application Workshop	STEM Workforce Options Seminar
	GEM Consortium Fellowship Workshop	Interviewing Skills Workshop
	NSF GRFP Workshop	Career Fair
Summer	UT System Research Conference	

Implementation Overview

Overall, the PRELS program recruited 25 PRELS scholars to participate in the program. UTRGV was more successful in the recruitment process and recruited 16 scholars compared to UTEP, with 9 (see Table 2). PRELS Scholars received $25,000 each in the form of a stipend and up to $5,000 for laboratory materials and supplies. PRELS faculty mentors received $5,000 each for their service to the PRELS program with an additional $1240.33 each in fringe benefits. Overall, the majority of PRELS Scholars (58.2%) selected the graduate studies track. Table 2 includes information on the characteristics of the PRELS scholars. Overall, implementation varied between the two institutions, which is described below.

Table 2: PRELS Scholar Characteristics	
Total Scholars	
Home Institution	
UT El Paso	9
UT Rio Grande Valley	16
Selected Tack*	
STEM Workforce	2%
Graduate Studies	58.2%
Scholar Satisfaction*	
Research Experience	100%
Faculty Mentor Guidance and Direction	100%
*Limited participation in the survey may have impacted these data.	

Implementation Characteristics at UTEP

Recruitment

Program staff acquired the funds and began the process of recruiting scholars. However, the recruitment fell short of initial expectations. Due to the constraints of a tight timeline, the program staff faced challenges in adhering to all selection criteria. For example, though the target population was former students who had not participated in undergraduate research, a significant percentage (35%) of PRELS scholars who completed the survey reported that they had previous research experiences. In total, program staff recruited nine scholars into the program.

Disbursement of funds

UTEP encountered challenges in disbursing the funds due to the absence of a dedicated payment mechanism at the institution. In addition, there was a difference between the university's payment rules and the project's funding categories available. The scholars' lack of registration as students at the university hindered our ability to facilitate payments efficiently. Program staff spent copious amounts of time and energy attempting to remedy this and thus did not have time to spend on other program activities.

Program Activities

Program staff were unable to conduct the proposed professional development workshops for the PRELS scholars (see Table 1 for proposed workshops). Program staff leveraged this contingency by giving participants access to other professional development workshops held by the LSAMP program managed by the same team. However, it is worth noting that the professional development program that program staff diverted scholars to was originally designed for undergraduate students and not explicitly tailored for post-baccalaureate participants. Additionally, there was no faculty involvement in mentoring workshops. Payments for faculty stipends were delayed due to appointment restrictions. The majority of PRELS faculty had a 12-month appointment and UTEP policy did not allow for supplemental funding. Program staff made alternate arrangements with the College of Engineering Business Center to avoid appointment modifications to their original salaries.

However, supply funding for scholars was used as intended. All scholars who wished to purchase research supplies did so directly through the program staff. Those who found it more useful to use the funding for travel and conference purposes were able to do so as well with the help and guidance of the program staff. It is worth noting that travel was supported but was processed in a different way than usual due to the post-baccalaureate scholars not being enrolled as UTEP students. The takeaway lesson for the program staff was that no payment mechanism of any kind exists at UTEP for scholars with no specific designation as an undergraduate or graduate student.

Graduate/Professional Program Enrollment / STEM Workforce

Of the nine (9) scholars hosted at UTEP, one (1) student is working full-time as a firefighter, two (2) students are enrolled in a STEM Ph.D. program, and one (1) student has plans to enroll in an MBA program in Fall 2024. Five (5) students continue to work in their PRELS labs as post-baccalaureate researchers. Two (2) of these students have applied to medical school and are awaiting acceptance.

Implementation Characteristics at UTRGV

Recruitment

At UTRGV, recruitment of PRELS scholars began late in the first semester of the program and scholars began the program in the second semester. Recruitment was most successful through

emails sent through the UTRGV Center of Excellence in STEM Education (C-STEM) listserv which was comprised of over 8000 students from the College of Sciences, the College of Engineering and Computer Science and those enrolled in the biomedical degree program. Interested individuals applied and provided brief descriptions of any research or work experience and a list of three potential faculty members to conduct research with. In the first semester of implementation, the PRELS program served 16 scholars (Spring 2023). Out of these 16 scholars, 13 continued to the second semester of funding with a new PRELS scholar; and in the final semester of implementation (Fall 2023) only two PRELS Scholars were selected due to the limitation of grant funds.

Disbursement of funds

At the beginning of the program, program staff conducted meetings with various offices at UTRGV to identify a pathway to pay students and faculty. For students, the group identified giving the students a scholarship and requiring them to enroll into a zero-credit undergraduate research course as the best option. To facilitate the distribution of scholarships, the Registrar's Office assisted in submitting applications and registering the PRELS Scholars as post-baccalaureates which allowed program staff to start the research program at the beginning of the semester. This assistance from the Registrar's Office also allowed students to focus on finding a mentor. Overall, this process was new to the university, and the solution laid the foundation for future post-baccalaureate programs.

Program

During the first semester of implementation, program staff conducted nine professional development workshops to scholars. Workshops ranged from learning about graduate studies and completing a graduate school application, to the NSF Graduate Research Fellowship Program, conference travel scholarships, and summer internships and employment at national laboratories. Program staff provided poster preparation workshops to prepare scholars for research presentations for the UTRGV College of Sciences Annual Research Symposia and a UT System conference. Additionally, throughout the three semesters, program staff informed PRELS Scholars on upcoming employment opportunities with government agencies, national laboratories or industries or internal/external graduate school opportunities. Most of this information was communicated to the PRELS Scholars through individual emails and the C-STEM listserv. PRELS Scholars took advantage of these workshops, and a few applied directly to conferences and were awarded travel scholarships to present their research at external conferences.

Graduate/Professional Program Enrollment / STEM Workforce

Of the 16 PRELS scholars, two participants began medical school studies; four participants are in graduate studies in biology/biochemistry and molecular biology/physician assistant program; and two began part-time employment in STEM related fields. We do not have data on the remaining 8 scholars.

Lessons learned: A Multi-Institutional / Programmatic Perspective

In navigating the complex landscape of multi-institutional coordination, the program's staff encountered a spectrum of administrative hurdles. These challenges yielded invaluable insights, revealing disparities in administrative procedures across the participating institutions in the UT system, which significantly impacted the program's timely execution. Notably, compensation processes proved arduous, with one institution successfully streamlining procedures while the other grappled with regulatory conflicts, hampering the fulfillment of the program activities. Moreover, low faculty engagement in mentorship workshops underscored additional impediments faced during implementation.

Future programs should establish robust mechanisms to facilitate funding disbursement for scholars not currently enrolled at participating institutions. Since this program was new, program staff did not have clear program objectives and guidelines for scholars and faculty to follow. Clear and comprehensive guidelines, encompassing program overview, timelines, and deliverables, are imperative for both faculty and scholars. These guidelines should delineate participation requirements for workshops, specify permissible uses of research funds, and designate points of contact for inquiries.

Furthermore, it is essential to integrate program evaluation mechanisms to gauge efficacy and proactively address potential challenges. Since this program implemented an evaluation post-award, the program staff were unable to utilize the program budget for evaluation. This oversight resulted in insufficient time for program staff to implement better tracking mechanisms for scholars after their participation in the program. Survey data on our scholars was difficult to collect, leading to a significant amount of missing data. Additionally, zero faculty involvement occurred in mentor workshops, and program staff at both institutions had difficulties paying faculty. The program was unable to capture faculty perceptions to adjust or to make improvements.

Despite these challenges, scholars reported minimal disruptions in their research experiences and expressed appreciation for the transparency of the program's staff in addressing and mitigating program issues. Survey responses revealed minimal disruptions in research experiences, with 100% satisfaction reported among participants. In addition, participants described their mentors as supportive and actively involved in their research experience. As a result, scholars emerged with a heightened sense of purpose and confidence, crucial for their transitions into graduate school or the STEM workforce. Notably, the experience helped give scholars the confidence to further their graduate education. The program served as a springboard for participants' academic and professional aspirations, instilling the confidence to pursue doctoral degrees and beyond. This study underscores the critical role that post-baccalaureate research programs play in the participants’ success as it prepares them for further educational and professional pursuits [7].

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