Developing a Culturally Adaptive Pathway to Success

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Abstract

The financial disadvantage of many students in the College of Engineering, Computer Science, and Technology (ECST) at California State University, Los Angeles, is often in parallel with inadequate academic preparation through K-12 education and limited family guidance. Hence, many students, including those who are academically-talented, experience significant challenges in achieving their academic goals. In 2018, the College of ECST received an award from NSF S-STEM program to establish a Culturally Adaptive Pathway to Success (CAPS) program that aims to build an inclusive pathway to accelerate the graduation for academically talented, low-income students in Engineering and Computer Science majors. CAPS focuses on progressively developing students' social and career competence via three integrated interventions: (1) Mentor+, relationally informed advising that encourages students to see their academic work in relation to their families and communities; (2) peer cohorts, providing social support structure for students and enhancing their sense of belongings in engineering and computer science classrooms and beyond; and (3) professional development with difference-education, illuminating the hidden curricula that may disadvantage first-generation and low income students. This paper presents our progress and core program activities during the first year of the CAPS program, including the recruitment process and mentor training program. In Fall 18, group and individual mentoring sessions have taken place following the culturally responsive mentoring strategy. In addition to program activities, the paper will also share the data collected through focus groups and report the lessons learned during the first-year implementation phase.

1. Introduction

It has been well recognized that the financial disadvantage of low-income students is not the sole barrier to their academic success. With a mission to increase the number of academically talented low-income students entering the STEM workforce, the NSF S-STEM program has granted awards to various type of institutions in order to advance our understanding of how "evidence-based curricular and co-curricular activities affect the success, retention, transfer, academic/career pathways, and graduation in STEM of low-income students [1]." To date there are a number of publications that document students' experiences, as well as strategies to help talented low-income students succeed in different institutional and disciplinary contexts [2][3]. Our project builds on this literature by providing a combination of an academic scholarship and culturally competent mentorship for students at a majority low-income Hispanic serving institution (HSI). Many educational programs at HSIs neglect to address the need to provide culturally competent mentorship because the majority of the student population is comprised of nationally underrepresented minority students (URM). This can lead some to presume that this population has a lesser need for culturally competent mentorship as compared to their URM peers at predominantly White institutions.

Designated as a Title III minority-serving institution, the College of ECST has a student body of which 63% are underrepresented minority (URM) students; 60% are first-generation college students; and 70% of the students are Pell grant eligible and need to work for more than 20 hours

per week to support themselves. In addition to financial disadvantage, many students – including those who are academically talented - have inadequate preparation for the increased rigors of college education through their K-12 education and limited family guidance due to the fact that most students are first generation college students. With support from NSF S-STEM, we explore a systematic approach to accelerate the graduation and enhance the professional development of our students through the Culturally Adaptive Pathway to Success (CAPS) program.

CAPS focuses on progressively developing social and career competence in our students via three integrated interventions: (1) Mentor+, relationally informed advising that encourages students to see their academic work in relation to their families and communities; (2) peer cohorts, providing social support structure for students and enhancing their sense of belonging in engineering and computer science classrooms and beyond; and (3) professional development with difference-education, illuminating the hidden curricula that often disadvantages first-generation and low income students. The educational research questions tested during the implementation of the CAPS program focus on studying (a) how these interventions affect the development of social belonging and engineering identity of CAPS scholars, and (b) the impact of Mentor+ on academic resilience and progress to degree. The findings will help enhance the CAPS program and establish a sustainable Scholars Support Program at the university that can be transferred to similar culturally diverse institutions to increase success for students who have socio-economic challenges, and can be used for all scholars in the College regardless of the source of their scholarships.

This paper presents our current progress and core program activities of the CAPS program. In particular, we share our practices on recruitment process and mentor training program. Through a structured outreach, 12 CAPS scholars have been recruited (7 Hispanic and 6 female). Led by a social psychologist who is also a Co-PI on the project, the training for faculty mentors focused on increasing the awareness of the benefits of growth mindsets and developing a culturally responsive mentoring procedure. In Fall 2018, the inaugural semester, group and individual mentoring sessions have taken place following the culturally responsive mentoring strategy. The rest of the paper is organized as follows. Section 2 briefly summarizes the core activities of the CAPS program; Section 3 describes the first-year implementation, including recruitment and mentor development, as well as findings through focus group meetings. Section 4 presents the action plans for the future based on what we learned through the first-semester assessment data.

2. Overview of CAPS Program

Funded by NSF, CAPS is a 5-year project that emphasizes broadening the participation of underrepresented minority students including female students, by helping ECST scholars graduate faster and with better academic records. The program aims to 1) ensure that 50% of scholars graduate in 5 years which is 4 times higher than our college's current graduation rate; and 2) ensure that 90% of scholars retain their scholarships year to year. In addition, CAPS program will build a pathway to help the scholars achieve their full academic potential through three integrated interventions.

The very core of CAPS interventions is based on a constructive relationship between mentors and scholars. To ensure success of these interventions, the CAPS program places great emphasis

on developing culturally responsive advising methods and training faculty mentors to facilitate a culture of culturally adaptive advising.

1) Mentor+

Mentor+ provides relationally informed advising that encourages students to see their academic work in relation to their family and community. Core characteristics of Mentor+ are 1) a consistent long-term relationship with advisor; 2) holistic interest from advisor (not just academic but also personal and career oriented) and 3) training for Mentor+ advisors. Mentor+ establishes an advisement model requiring every CAPS scholar to meet a faculty advisor beginning in their sophomore year and build mutually trust-worthy and long term relationship focusing on personal, educational, and professional development.

As indicated by many studies, advisor training is key to successful mentoring programs [4][5]. Our previous work has shown that engineering faculty advisors can learn to provide more holistic advising, with the right professional development program [6][7]. The CAPS program will establish a series of professional development sessions for Mentor+ advisors through the college's Advising Council [8] and the college's Teaching and Learning Academy [9].

2) Peer Cohort

Scholars are cohorted in two ways: *by award year* and *by major*. Each recruitment year (1st and 2nd program years), a group of 12-16 new scholars are cohorted *by award year (term cohort)* and will build their cohort fellowship through a variety of cohort activities. Inspired by prior research [10], the program has adapted collaborative cohort activities promoting personal, professional development and strengthening cohort relationship across disciplines

Also, scholars cohorted *by major* (*major cohort*) are assigned a faculty mentor from their academic program. Scholars and their Mentor+ advisors have opportunities to interact during the academic year through mandatory Mentor+ Advisement hours, Major Cohort Gatherings, and Field Trips. From the second year of the program, cohorts include both new and continuing scholars. The upper-level scholars will serve as near-peer mentors within the major. Peer mentors have been shown to be effective in building communities, developing leadership skills, and increasing student retention and graduation [11][12].

3) Professional Development with Difference-education

Difference-education can be defined as giving students insight into how their different backgrounds influence their academic pathways [13][14]. We apply this concept, which has largely been studied in reference to students' ability to navigate the academic world (e.g., classes, campus life), to a career and work setting. In the same way that students must recognize that their own background impacts their experiences and expectations, it may be powerful to apply that insight towards recognizing that research directors and internship sponsors may have a different set of expectations because they come from a different background. In order to make scholars more prepared for future challenges and continue to succeed in their fields, scholars will be trained to thrive in the face of stressful

research/internship situations.

In this intervention, it is important that Mentor+ advisors address these differences without stigmatizing and threatening students' identity [15], so advisors are to brainstorm and craft their own stories based on their own backgrounds, providing examples of how they may have experienced mismatches in the past with research advisors and/or internship sponsors. In order to do so, Mentor+ faculty advisors are also taught about the concept of difference-education so that it can inform their advising. The scholars are provided a variety of seminars to learn how to communicate with research advisors and/or internship sponsors, avoid misunderstandings, set common expectations, and develop productive relationships as well as enhancing required skills such as research, presentation, and interview skills.

3. First-Year Implementation

Starting from January 2018 the project team began preparations and successfully launched the program in June 2018. We have been implementing the proposed interventions through a variety of activities. This section presents our current implementation progress.

3.1 Program Outreach and Scholar Selection

The CAPS scholarship recruitment process was newly established. The program created a dedicated web portal to advertise the program and also receive applications on a secure online platform. In early February, the program hosted a scholarship information session in the college and advertised the opportunity through flyers, emails, college Kiosk TV, college webpages, e-newsletters, student organizations, and announcements in classrooms. The scholarship application required minimum academic information (e.g., GPA, Calculus I grade and ENGR 1500 grade) for efficient screening as student academic record is available on the university server, and included an essay describing 1) how being awarded this scholarship would impact the applicant's life and 2) what the applicant's interests, motivation for study and career goals are. When the application window closed in late March, the CAPS program selection committee reviewed the online applications, essays, recommendation letters (optional), and academic records. 16 finalists out of 38 applicants were selected and notified by mid-April for interviews. Individual interviews were held by the CAPS selection committee, comprised of the CAPS PI and a Mentor+ faculty advisor from the applicant's department. Through interview questions, students were assessed on their potential for academic success, passion and dedication to the STEM field and what obstacles they perceive to pursuing their goals. Each interviewer thoroughly documented interview answers and feedback. 12 students were finally selected based on four criteria: the funding agency criteria (citizenship and fulltime enrolment); academic ability (e.g., GPA); financial need as determined by the campus financial aid office; and their potential to succeed based on their application and interview. Other criteria (such as Physics course grade) were also considered to narrow down the list further.

While establishing the recruitment process, one concentrated effort was to develop a collaboration with other campus programs in order to create an efficient way to fill the applicant pool with highly eligible candidates. The CAPS team closely worked with the the ECST First-Year Experience program (FYrE). FYrE is a first-year experience program for incoming

freshmen who are Calculus ready in the Fall. It engages first-time freshmen by cohorting them in their Calculus and Physics courses, as well as in (1) a 3-unit course, Introduction to Engineering and Technology, which includes hands-on team design projects and culminates in an underwater robot design contest (2) Introduction to Mechanics, a discovery-based course linking mathematics and physics, designed to improve critical thinking skills and prepare students for the physics sequence; (3) Supplemental Instruction, peer-facilitated workshops to support students' success in math and physics.. As a majority of eligible CAPS candidates are part of FYrE, the CAPS program has established an official communication route to inform FYrE students of the CAPS scholarship opportunity and encourage them to apply. In fact, the FYrE and the CAPS have a joint Co-PI and a joint Professional Advisor.

Through this structured process, 12 CAPS scholars have been recruited for the first-year cohort. 8 out of 12 were recruited from FYrE. Table I shows the distribution of students in the first CAPS cohort. All of them will be financially supported until they graduate as long as they meet the maintaining eligibility every term.

Table I. First CAPS Cohort Demographics (2018-19).

Major	Male	Female	Former FYrE Student
Civil Engineering		2	2
Computer Science	2 (2 URM)	3 (1 URM)	4
Electrical Engineering	2 (2 URM)		1
Mechanical Engineering	2 (1 URM)	1 (1 URM)	1

3.2 Implementation of Program Activities

1) Mentor+

Led by a social psychologist who is also a Co-PI on the project, the training for faculty mentors focuses on increasing the awareness of the benefits of holding growth mindsets [16][17][18] and developing a culturally responsive mentoring procedure. During the summer 18 - fall 18 period, two mentoring sessions took place following the culturally responsive mentoring strategy.

The Summer18 training session focused on a general overview of how to maximize the success of diverse engineering students. The training session presented three mindsets that can help maximize the success of our students. They are Growth mindset, Purpose and Value, and Social Belonging. Mentor+ advisors learned to encourage a growth mindset in students to maximize persistence in the face of challenges, help students make connections between their academic endeavors and their personal values to maximize interest and motivation, and regularly check in with students to ensure that they feel like they belong.

The Fall18 training session was designed to guide mentors to have effective first one-on-one meetings with each CAPS scholar. The training session focused on how to build rapport with them and encourage them to come to the mentor with both traditional challenges (i.e., failing an exam) and non-traditional challenges (i.e., feeling like they don't belong). The script-like meeting guidelines and checklist were provided for Mentor+ advisors to facilitate their building rapport with their mentees (scholars), especially including the reasons why their mentee decided

to pursue their degree, and the goals that they have for themselves. These training items were also connected back to the mindsets that were discussed during the Summer18 training. Mentor+ advisors were given other guidelines such as reducing the intimidation that students might feel by sharing a bit about their personal journey to success or a challenge that they had to overcome, and/or a turning point when they first started to feel like they mastered their craft. At the end of the training, Mentor+ advisors outlined talking points to cover in their initial and subsequent meetings, as well as homework to give their mentee to help them get to know students. Mentor+ advisors were asked to record their observations after every meeting with each mentee.

All CAPS scholars are paired with trained Mentor+ advisors from sophomore year until graduation. Mentor+ advisors consist of faculty mentors, a Professional Advisor from the college student advising center, and the CAPS PI. Scholars must meet Mentor+ advisor individually at least twice per semester to talk about their educational, personal and professional progress. Upon requests, frequency can increase. In the Fall 2018, each scholar met a Mentor+ advisor (a Professional Advisor) more than once, the CAPS PI, and/or their faculty mentor. Faculty mentors conducted their individual meetings based on the guideline given through the training session. Scholars also met the professional advisor and the PI to review and plan their academic work, extra-curricular activities, fellowship opportunities, and discuss multi-tasking and time management. On average, each scholar had 4 contact points (for mentor and advisement only). This is significantly higher than the average number of contact points (0 through 2 times) experienced by all other engineering sophomore students.

2) Cohort building

The program arranges cohort gatherings by year and by major. The program helps faculty mentors to arrange a social meeting for scholars to meet as a group (by major) at multiple times per year. At these informal gatherings, scholars and mentors build a supportive community focused on leadership development and academic, professional, and personal growth. During the Fall 2018, the program hosted two cohort gatherings (the orientation and Friendsgiving potluck party) for the entire cohort group and some faculty mentors hosted major cohort meetings. Since the Fall 2018 was the first semester, gatherings focused on icebreaker activities , getting to know each other, and sharing course work information and their personal experiences. The program looks forward to seeing closer cohort dynamics as we progress.

3) Professional Development and Difference Education

Difference education is to prepare scholars to adapt themselves to new challenges. This is an important professional preparation for future career development. Our program embeds this within multiple activities like research activities, professional conference or seminar and field trips, where students are exposed to and experiences in working with a variety of people with different backgrounds and expectations. First of all, the program has provided abundant information for scholars about a series of seminars providing opportunities for discussion and presentations related to student success (e.g., time management, effective communication), research topics, and more from various campus student support centers, engineering research and design team projects (students and faculty), industry, etc. It also includes a series of seminars to help students to build their portfolio, review students' resume, and enhance required skills such

as research, presentation, and interview skills.

During the Fall 2018, while encouraging scholars to attend as many professional events as they can afford, the program required each scholar to attend at least one event (a seminar, presentation, industry visit, or workshop) and submit a reflection essay on their experience with memorable take-away points. In addition, the program encouraged scholars' participation in professional workshops, conferences, internship opportunities and research opportunities at other institutions (e.g., REU programs) to foster their educational and career goals. Several scholars participated in the 2018 HENAAC conference, have been involved in research activities (e.g., Robotic lab and Quantum Physics lab) and are currently applying for summer internships or REU programs. Identifying that not all scholars are active to contact people or seek opportunities, the program decided to 1) require scholars to initiate meetings with faculty mentors instead of faculty mentors initiating the meetings and 2) connect several faculty with relatively passive scholars to make them involved in undergraduate senior research projects. We expect that this minor change will give all the scholars a fair opportunity to train themselves to interact with their supervisors proactively and adapt themselves to new and challenging environments easily.

The program also provides field trips. Showing potential workplaces and career role models in their study field will help scholars to stay motivated, connect academic work to real world professions, and concretize their career vision. Scholars will visit local industry, national labs, infrastructures, public utilities, other research universities, professional workshops, conferences, and engineering construction projects. In Spring 2019, the program provided the first field trip to NASA Jet Propulsion Laboratory (JPL) to the scholar cohort group.

3.3 Program Impact on Scholars and Mentors

After the Fall 2018 semester, the program conducted two focus group meetings (Mentee Focus Group and Mentor Focus Group) to discover impact on scholars and Mentor+ advisors.

1) Mentee Focus Group

Eight scholars participated in the mentee focus group. The focus group consisted of a semi-structured discussion with a moderator. The questions answered converged around four themes: financial impact of the scholarship, the scholars' relationships with their mentors, the scholars' perceptions of program events, and the scholars' recommendations for future program events.

- Financial impact – Eight out of eight scholars found the scholarship money beneficial. In the fall 2018 semester, they either 1) did not have to work a job at all, 2) reduced their hours worked, 3) mentioned that the scholarship allowed their parents to reduce their work hours, or 4) reduced their financial stress.

- Relationships with faculty mentors - Seven out of eight mentees met with their faculty mentors and agreed that the mentors were easy to meet with. While comfort level and preference about talking personal topics vary, most mentees want non-sugar coated advice.

- Perceptions of program events – Most mentees indicated that two cohort gatherings (the orientation and the Friendsgiving potluck) were highlights of the program and suggested to have more similar gatherings.

- Recommendations - There were a variety of constructive suggestions for having more program events (seminar, field trips, or career fairs) that are relevant to professional development. One interesting suggestion from the focus group is to have competitions that led to prizes including food, gift cards, bus passes, and free parking permits to further encourage their participation.

2) Mentor Focus Group

All the four Mentor+ faculty advisors participated in the focus group. The questions answered converged around three themes: the mentors' relationships with their mentees, the mentors' perceptions of the mentees, and the mentors' recommendations for future program events.

- Relationships with mentees - Two out of four mentors mentioned success in establishing relationships with their mentees, building off of their expertise developed in roles as mentors in previous programs. However, the other two mentors mentioned struggles connecting with students, feeling discomfort around discussing the personal lives of their students, fearing the student's perception that they were overstepping their mentorship role. It was shared that revealing one's own background (i.e., sharing stories of one's own immigration, revealing one's own college journey and struggles) helped to build rapport with mentees. This exchange provided an important benefit of intra-group training in mentorship for the two remaining mentors.

- Perceptions of mentees - Overall, all four mentors held positive perceptions of the mentees. Mentors mentioned poor professional habits (e.g., unanswered email) as a main needed improvement for some mentees. A mentor suggested to challenge mentees (academically talented scholars) with higher expectations.

- Programming recommendations - All four mentors recommended more structured time, either with the mentees in their major, or with the entire scholarship cohort to facilitate relationship building and mitigate against interpersonal awkwardness during one-on-one meetings. Also, mentors requested more clarity on whether their discussions with mentees should be limited to scholarship activities, or should address the students' lives holistically.

3) Recommendations

The qualitative data obtained from focus groups reveal several successes in communicating the initial expectations for the program, and for establishing initial contact between mentors and mentees. Scholars report a high level of satisfaction with the program and report financial and academic benefits. Faculty also report satisfaction with their participation. Although several recommendations for improvements were reported by both students and faculty, these reflect

minor issues and/or room to grow into an even more effective program rather than shortcomings in achieving the core goals of the program. These suggested improvements can largely be addressed through the rollout of planned programming and the consideration of additional programming to accelerate the development of trust between mentors and mentees.

4.   Conclusions and future work

This paper presented progress of the Year 1 implementation of the CAPS program (NSF S-STEM). From the recruitment, mentor training through scholar advisement, the program has established many core CAPS activities for a short amount of time. Even though the program collected only qualitative data so far, the feedback shows that the participants agree to have benefits from the core activities other than scholarship itself. The program will continue to improve program activities based on suggestions and optimize the proposed interventions to enhance understanding of factors that make engineering students including URM and female students succeed. The program will conduct qualitative data collection (additional focus group meetings and interviews) and data analysis as well as quantitative analysis on academic records and surveys to compare scholars' performance with the control group and report findings on how the program impacted on scholars' academic growth and mentors' understanding about the culturally adaptive advisement.

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