

The Critical Need to Support Student Parents in S-STEM Programs Designed to Support Transfer Student Success

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Stephen R. Beard is an Assistant Professor at Cal Poly San Luis Obispo in the Computer Science and Software Engineering Department with a joint appointment in the Computer Engineering Department. Stephen's educational goal is to develop opportunities for diverse sets of students to get hands on experience with security, architecture, languages, and compilers. Stephen's research interests primarily revolve around security that involves the hardware-software boundary. This manifests in lots of ways, in particular, cyber-physical security, secure architectures, secure language design, and secure compilation.

As a former transfer student and beneficiary of a great deal of invaluable mentorship throughout his life, Stephen participates in multiple mentoring and advising programs. While many of these are focused on transfer students, he is interested in improving the lived experience of all students. His door is always open if you ever need advice, someone to just listen to you, or just want to chat!

Stephen received his PhD and MS degrees in Computer Science at Princeton University, under the guidance of David I. August as a proud member of the Liberty Research Group. Stephen received his BS degree in Computer Engineering from Cal Poly!

Dr. Fred W Depiero, California Polytechnic State University, San Luis Obispo / Allan Hancock College

Dr. Fred DePiero earned his BS and MS degrees in Electrical Engineering at Michigan State University. After which he worked at Oak Ridge National Lab in the areas of robotics and machine vision. He then earned his PhD, also in EE, from the University of Tennessee. In 1996 he moved to San Luis Obispo, CA and joined the faculty of Cal Poly in EE. In 2005, Fred received the Distinguished Teaching Award, which is the University's highest recognition for teaching. Subsequently, he served as an Associate Dean, then rejoined the faculty in the Computer Engineering Department, and retired in 2024. His

areas of interest have branched out to include web applications for teaching and learning systems (see YourLearningCoach.org), as well as new approaches design nonlinear voltage transfer characteristics. Fred now teaches part time at Allan Hancock College.

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The Critical Need to Support Student Parents in S-STEM Programs Designed to Support Transfer Student Success

Abstract

This is a work-in-progress paper. Mirroring national trends, student parents are a critical yet overlooked group in California's higher education systems. Per California Competes: Higher Education for a Strong Economy, a nonpartisan research and policy organization, "California's 300,000+ student parents have greater financial need than their non-parenting peers and are less likely to complete a degree or certificate, despite having higher GPAs." Investments in low-income student parents can yield significant returns by improving college access, increasing degree attainment, and enhancing workforce readiness in high-demand fields. These investments strengthen economic competitiveness and create multigenerational benefits, enabling low-income student parents to achieve economic mobility while expanding opportunities for their children. Efforts to support parenting students moving from community college into B.S.-granting engineering and computer science programs often fail to account for their caregiving responsibilities. This oversight hinders student parent curricular and co-curricular participation and academic and professional success. In addition, little research on parenting students attends to the specifics of engineering and computer science-focused majors, with high out-of-class-time participation expectations and expectations that each student will participate in at least one summer internship or co-op, which typically require students to move for one or more academic terms. This paper shares how we "learned to see and center" student parents in an existing S-STEM partnership and develop a new approach to S-STEM program implementation and research design – including the utilization of tools from the 2023 California Competes Student Parent Policy Agenda as a resource and a research agenda asking how student parents are utilizing their strengths to support their academic and professional success, what supports and interventions have effective outcomes for student parents, and how can these be maintained over time?

Work-in-Progress Grantees Division Paper

Who are student parents and what do they have to do with this scholarship and mentoring program? This work-in-progress paper describes the ways in which an existing S-STEM partnership "learned to see and center" student parents and develop a new approach to S-STEM program implementation and research design.

The ENGAGE (Engineering Neighbors: Gaining Access, Growing Engineers) (NSF DUE 1834128, 1834154) scholarship and mentoring program is a partnership between a public, primarily undergraduate, highly-selective, B.S.-granting institution in California and two California Community Colleges designed to support low-income, academically talented engineering and computer science students. Our collaboration is strongly motivated by our

commitments to low-income transfer student economic success. Job prospects and salary potential for engineering and computer science majors are high, pointing to opportunities for social and economic mobility for low-income high potential students. Increasing access to and success for transfer students in STEM disciplines is necessary to meet U.S. and California workforce needs. California currently faces a “skills gap” in technical fields resulting, in large part, from under-participation of low-income students in STEM education and profession [1-2]. The Public Policy Institute of California [3] projects a gap between the number of jobs that will require a bachelor’s degree in 2030 in California vs. the number of people in California with bachelor’s degrees. Efforts to increase retention and persistence are key. The Campaign for College Opportunity via its work on the “transfer maze” [4] has identified that a) only 25% of community college students intending to transfer do so within 5 years of enrollment; b) California Community College (CCC) students transferring to the California State University (CSU) system take an average of 7 years to complete their bachelor’s degree post-transfer; and c) transfer students pay an additional \$36,000-\$38,000 compared to their peers who began their education in the UC or CSU system. The 2024 Tackling Transfer Dashboard [5] shows that only 11% of students who start at a CCC complete a bachelor’s degree within 6 years of their first enrollment at a CCC. Progress is critical for the future of the state and nation.

Our initial frameworks for program implementation and research design focused on building transfer capital [6-10]; utilizing a strength-based approach to support student success [11-16]; supporting student networks within the program and to the transfer institution [17-20]; and increasing student opportunities for professional development through high impact practices [21-26]. This work is further informed by the “essential transfer practices” identified by the Aspen Institute’s College Excellence Program in partnership with the Teachers College Community College Research Center [27] to develop/strengthen the implementation of practices that 1) make transfer student success a priority; 2) create clear programmatic pathways with aligned high-quality instruction; and 3) provide tailored transfer student advising pre- and post-transfer.

In this initial S-STEM implementation, we were excited about student parents but provided – at the programmatic level – little intentional support. For example, in 1:1 advising with the PI at the transfer institution, if students shared that they were student parents, the PI recommended that students join the Students with Dependents campus program for student parents to access priority registration and parking permits. The PI then also shared information about the two on campus childcare programs and later added this information to the campus resource list provided to all students. However, our S-STEM program did not purposefully seek information about student parenting status and student parenting status can, of course, change during undergraduate education. In addition, this information is not systematically collected or tracked on our campuses. For example, student parents must opt-in to the Students with Dependents campus program for student parents and voluntarily disclose this information to Financial Aid. These

voluntarily disclosures are hampered by the pressure many students at the transfer institution experience to hide their parenting status due to fears that their commitment to their educational pathway and future career may be questioned if it is revealed that they spend less time on curricular and co-curricular activities due to their caregiving responsibilities in comparison with non-parenting students.

Why is this significant? In some cases, our S-STEM program only “learned” that a student was parenting after the student parent had spent an extended time already part of our scholarship and mentoring program. This invisibility of student parents within our initial program design and implementation is especially problematic given that, in the area of California in which we are located, low-income households are exceptionally cost-burdened in this area: 47% of low-income households with young children in California are paying more than half of their income on housing costs (2022) [28]. Salary.com indicates that the cost of living in the communities in which our program students live is 43.6% higher than the national average.

Unfortunately, our S-STEM program is not unique. It is critical that we transform our programs so that student parents are no longer an overlooked group. Per California Competes, a nonpartisan research and policy organization, “California’s 300,000+ student parents have greater financial need than their non-parenting peers and are less likely to complete a degree or certificate, despite having higher GPAs” [30]. Investments in low-income student parents can yield significant returns by improving college access [29], increasing degree attainment, and enhancing workforce readiness in high-demand fields. These investments strengthen economic competitiveness and create multigenerational benefits, enabling low-income student parents to achieve economic mobility while expanding opportunities for their children [30]. In addition, efforts to support parenting students moving from community college into B.S.-granting engineering and computer science programs often fail to account for their caregiving responsibilities. This oversight hinders student parent curricular and co-curricular participation and academic and professional success.

Research in higher education has identified this as “care-evasiveness,” where colleges/universities fail to recognize how caregiving responsibilities hinder student parents' success [31]. However, little research on parenting students attends to the specifics of engineering and computer science majors, with high out-of-class-time participation expectations and expectations that each student will participate in at least one summer internship or co-op, which typically require students to move for one or more academic terms. There is also a lack of research addressing pedagogical practices tailored to engineering and computer science student parents, such as curriculum design, classroom instruction, as well as departmental and campus-wide policies and practices that hinder (or conversely, support) parenting students' academic success.

Next Steps and Recommendations based on what we have learned to date

1. S-STEM programs must provide intentional programmatic support so that parenting students do not need to “hide” their experiences and do not need to ask for resources. For example,
 - At least once per term, offer family friendly community building events
 - Ensure that students have accessed programs (for example: priority registration, parking & subsidized childcare)
 - Ensure that students have worked with Financial Aid to add childcare expenses to their Cost of Attendance
 - Develop and share narratives (stories of family thriving) via research and evaluation
 - Recognize and respond to student parent identities as part of professional development and advising offered through the S-STEM program
2. As part of S-STEM program team efforts to incorporate promising supports and interventions into the operation of our campuses and to disseminate effective outcomes, supports, and interventions, student parents and their strengths, needs, and realities must be centered. Located in California, our efforts in this area are shaped by the 2023 California Competes Student Parent Policy Agenda, which identifies four main strategies to address the needs of student parents:
 - a. Increase the availability of affordable, quality dependent care
 - b. Improve higher education affordability for student parents
 - c. Advance student-parent-friendly institutional design
 - d. Collect and share data on student parents
3. Include attention to student parents and their strengths, needs, and realities as part of program evaluation and research design. For example, how are student parents utilizing their strengths to support their academic and professional success, what supports and interventions have effective outcomes for student parents, and how can these be maintained over time? Research underway at the transfer institution in our partnership focuses the importance of researching engineering and computer science pedagogy in the context of parenting students, which has been overlooked despite its significant impact on students' motivation and disciplinary identities. Research questions include: 1) What are alternative pedagogical approaches in engineering and computer science that challenge care-evasiveness regarding student parents' caregiving responsibilities?; 2) How can student parents and institutions utilize a strengths approach to support low-income student parents and shape their engineering and computer science transfer experiences?

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