



Avenue-E: An Innovative Student Transfer Pathway Program

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Cynthia Murphy-Ortega is currently Manager of University Partnerships and Association Relations of Chevron Corporation. Her organization manages Chevron's relationships with universities and professional societies and institutes throughout the world. Cynthia joined Chevron in 1991 as an engineer with the Richmond Refinery in the San Francisco Bay Area. She held various engineering, maintenance, operations, financial, business planning and process safety management positions within the refinery. Cynthia then went on to work in the technology arena with the Chevron Energy Technology Company in 1998. She developed and managed Chevron's technical competency development programs for new hires in refining and exploration & production roles. She also worked in the Process Planning Group and performed process modeling on large-scale projects. In her role as Organizational Capability Manager with the Process, Analytical and Catalysis Dept, she supported technical competency management, staffing/recruitment, new hire and competency development, and business planning.

Cynthia participates on various Boards including the Dean's Advisory Committee, the Chemical Engineering Advisory Committee, the Mechanical & Aerospace Engineering Advisory Committee, the Leadership in Engineering Advancement Diversity and Retention Advisory Committee (LEADR) and the Avenue E Community College Transfer Program Advisory Board at University of California, Davis; the Broadening Opportunity through Leadership and Diversity Advisory Committee (BOLD) at University of Colorado, Boulder; the Viterbi Center for Engineering Diversity Industry Advisory Board at University of Southern California; the Industry Advisory Council for Minority Education at Massachusetts Institute of Technology; the President's Council on Diversity, Inclusion, and Access at Colorado School of Mines; the Women's Engineering Program Advisory Board at Cal Poly San Luis Obispo; the Corporate Membership Council of American Society of Engineering Education (ASEE); the Inclusion Committee of National Association of Colleges and Employers (NACE); the Postsecondary Pathways Innovation Lab Co-Chair of STEMConnector; the National Council on STEM and Technology for INROADS; and the



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Abstract

Over 68% of students in the California Community College system come from minority backgrounds, representing an opportunity to accelerate the diversification of STEM industries. However, according to a September 2017 report by the California-based Campaign for College Opportunity, these students transferred at an average rate of only 4% after 2 years or 25% after 4 years. Additionally, a recent report published by the Education Trust indicates that students from historically under-represented backgrounds complete associate degree programs and transfer to four-year degree programs at significantly lower rates than their peers. Most often, this is attributed to student-reported difficulties in transitioning from community college to a four-year university.

Avenue-E provides a support network that engages students in the last two years of their community college experience, laying the groundwork for eliminating barriers that often prevent retention and timely degree completion at UC Davis through a series of interventions and wraparound services. This initiative improves preparation and increases participation, resulting in a new generation of promising STEM talent and leadership that can secure our nation's future in engineering, science and technology. Avenue-E is designed to be a flexible model that can be replicated.

The primary objectives of the Avenue-E Program are to:

- Increase the pool of diverse students qualified to transfer into engineering or computer science programs at UC Davis from partner community college districts
- Implement targeted programs and services throughout the students' higher education careers
- Evaluate success by developing evidence-based best practices for moving students from community college to university engineering or computer science programs, and ultimately the workforce
- Position students to be successful engineering/tech sector employees while increasing the diversity of the candidate pool for the broader engineering/technology sector
- Collaborate with community colleges by providing financial resources to expand capacity in areas such as recruitment, advising, and student support services
- Leverage professional learning communities and cross-collaboration to aid faculty development at UC Davis and community college levels

The purpose of this paper is to present a first update of the Avenue E Program in which preliminary data indicate that the initiative is highly successful. Of the first year, 2016-2017 cohort of the initial seven students participating in Avenue-E, six remain enrolled in engineering or computer

science (one student left to join the military). Of the second year 2017-2018 cohort of twenty students participating, nineteen remain enrolled. No students participating in the Avenue-E program are on academic probation. Avenue-E students report highly positive experiences associated with their participation in the program.

Background – Historical Issues Associated with Transfer Student Success in Engineering

An analysis was performed on 1,051 undergraduate students who joined the College of Engineering at UC Davis between Fall 2007 and Summer 2016 [1]. The analysis was based on institutional survey data (survey approved by the UC Davis IRB) for upper division (third and fourth year) non-transfer and transfer students. The survey probed student demographic data and students' organization involvement, social satisfaction, time spent on different activities, frequency of obstacles faced, faculty/student interactions, and other questions related to student experience. It was found that underrepresented students and female students had (1) lower first quarter GPAs, (2) lower probability of graduating in two years and (3) lower GPA at graduation than freshman admits. Students who had community college preparation in engineering showed improvement in these three outcomes. Also, community college coursework in physical sciences and social sciences helped students to graduate in two years. Finally, coursework in social sciences and humanities increased students' final GPAs.

Sixty to ninety-minute discussions, in week four of the spring quarter, with three focus groups of junior and senior transfer students (nine students in total) were also conducted. The focus groups were led by one or two researchers and students were questioned about their academic preparation, social experiences, etc. Students indicated several issues associated with their transition experience from community college to UC Davis. One of the issues is that their community college advisors are not up to date on the UC Davis transfer process or required coursework at UC Davis. While students, in general, feel well-prepared academically based on their community college coursework, more preparation in computer programming was noted as an area needing improvement. Specifically, students noted their lack of MATLAB programming background – utilized in several introductory engineering courses at UC Davis – as a barrier to their success at UC Davis. Students also perceived more emphasis on grades rather than learning at UC Davis compared to their community college. The pace of work at UC Davis is high, given that UC Davis is on the quarter system, and students feel the pressure to get up to speed quickly on course material in 10-week course. Transfer students also note a difference in the accessibility of instructors between community college and UC Davis. They are also less likely, compared to non-transfer students, to engage in undergraduate research at UC Davis. Transfer students emphasized the need to build a social network and a study group quickly and felt at a disadvantage in this regard compared to freshman admits. Additional collaborative spaces for students to interact with each other and with faculty was noted as a way for them to build these relationships.

What is Avenue-E?

Avenue-E is an initiative designed to minimize the ‘transfer shock’ community college students experience when transferring to UC Davis. The initiative is designed to serve high potential, low resource students, students from historically underrepresented groups, first-generation students and students who, without additional interventions, would not achieve timely degree completion at UC Davis. Students participating in Avenue-E are/were enrolled in one of four partner community college districts: Los Rios (Sacramento); San Joaquin Delta (Stockton); Peralta (Oakland); and Contra Costa (Bay Area). All Avenue-E students intend to major in/are majoring in Engineering or Computer Science. Avenue-E was initiated in Fall 2016 with a cohort of six students; twenty students are in the Fall 2017 cohort. The current cohort of all Avenue-E students are 81% URMs, 35% female and 69% first-generation students. For Fall 2018 and beyond, a maximum of thirty students each year will make up the Avenue-E cohort. Avenue-E is best suited for smaller cohorts (<30) of students given the high-touch nature of the initiative. The transfer student program (USA-LINK) at the University of South Alabama [2] and the TiPi Scholars program at the Rochester Institute of Technology [3] also found smaller student cohorts to result in student success and retention.

Interventions and Programming

Based on the historical analysis, the following steps are being taken to provide a seamless transition for community college students transferring to UC Davis. Many of these steps were outlined in the recommendations in the reports Student Voices on the Higher Education Pathway [4] and The Promise of the Transfer Pathway [5].

1. Professional learning communities, consisting of 93 faculty and staff from UC Davis and the four community college partners, have been developed to facilitate student selection and identification, to enhance cross-institutional learning and communication and to build cultural understanding. In addition, courses taught at the community colleges were modified so to better align with courses taught at UC Davis. Avenue-E leadership, community college administration, student affairs staff, UC Davis admissions, academic advisors and student services, and engineering and computer science faculty are involved in weekly connections meetings to provide a feedback loop around the preparation of transfer students. The professional learning communities also facilitate data sharing to gain a deeper understanding of student persistence and degree completion.
2. One year before students transfer to UC Davis, they participate in a three-day, residential Summer Study Program on the UC Davis campus. The program focuses on transfer preparation information for meeting UC Davis admission requirements, connecting community college students with UC Davis campus resources, and allowing transfer students to explore campus life.

3. Avenue-E students participate in a two-week, residential Summer Transfer Bridge program on campus just prior to their first quarter at UC Davis. Program elements include engineering design projects and activities, an introduction to undergraduate research and graduate school, social activities, training in public speaking, resume preparation, interviewing, and career development advice from industrial mentors. Through participation in this Summer Transfer Bridge program, students make strong connections with other Avenue-E students and develop a social network and support system that they can lean on as they start their first quarter of study at UC Davis.
4. Weekly connection meetings with an engineering advisor introduce, train and inform Avenue-E students on goal setting, preparation for successfully participating in career fair, student health and wellness, time management skills, journaling, scholarship opportunities and application, and unique UC Davis engineering facilities such as the Student Startup Center. Group outings, social activities, speakers and workshops also provide opportunities for students to engage in peer-to-peer learning and to maintain the strong community they developed during the Summer Transfer Bridge program.
5. Industry engagement is also a critical element of Avenue-E. Industry personnel participate in career development panels and workshops and provide internships. Each Avenue-E student is paired with an individual mentor
6. Students at UC Davis receive individual advising from both a college advisor and a departmental advisor each quarter.
7. Free tutoring services are available to all Avenue-E participants.
8. Each Avenue-E student participant receives a \$4000 Student Scholar award each year to greatly reduce the need to work during the academic year. In addition, community college students are awarded \$1000 during their final year of community college. In partnership with the UC Davis Office of Financial Aid and each community college's financial aid office, the awards help reduce each student's individual contribution and loans and do not adversely impact other financial aid that they receive.
9. In order to address students' concerns about a lack of preparation in computer programming, a MATLAB workshop was developed and offered to transfer students in Fall 2017.
10. So that transfer students can build a social network within a specific engineering discipline, faculty in the Civil and Environmental Engineering (CEE) Department at UC Davis initiated a one-unit course to help CEE transfer students build a social network and explore the CEE curriculum and career opportunities in CEE. This course was offered for the first time in Fall 2017.

Outcomes to Date

Avenue-E has provided students with experiences and information to mitigate the barriers that often prevent student retention and timely degree completion. By continuing to build community within the Avenue-E student cohorts and continuing the interventions and programming, it is anticipated that the number of at-risk students who successfully transition and complete a UC Davis engineering or computer science degree will increase. To date, six of the seven students in the 2016-2017 cohort have been retained at UC Davis, nineteen of the twenty students in the 2017-2018 cohort have been retained, and no Avenue-E students are on probation.

Seventeen of the Avenue-E students participated in individual interviews about their experiences in the program. Reports of students about their experience were 'satisfied' to 'very satisfied'. All students were 'very satisfied' with their interactions with Avenue-E representatives and their weekly connection meetings. Students expressed a desire for the weekly connection meetings to be more academic and for more time to be spent preparing their CV in advance of the career fair. Interviews with focus groups of Avenue-E students indicate that the Summer Transfer Bridge program 'exceeded' their expectations although some students indicated their community college representative did not know much about the program. Some students also reported being happy about participating in the program, as it allowed them the only opportunity available to them to live on campus.

Avenue-E is flexible in that the key programmatic elements (professional learning communities, summer study, summer transfer bridge, weekly connection meetings, industry engagement, advising, tutoring, etc.) and the cohort/team-approach to student success can be adapted by other institutions, disciplines and targeted populations. The cost per student is \$4300 to cover all the programmatic components of Avenue-E. Chevron is a founding corporate partner for Avenue-E, and the Koret Foundation has provided funds to support the Summer Transfer Bridge program.

A new initiative, Avenue-M, currently being pursued at UC Davis seeks to focus on Veterans transitioning from active duty to higher education to pursue STEM degrees. Adoption of the Avenue-E program by sister UC campuses at UC Berkeley and at UC Riverside is also planned and discussions are underway.

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