

Engineering Transfers Speak: Real Students, Real Stories

*Lisel Blash, Kelley Karandjeff, Rogéair Purnell and
Eva Schiorring*



the Research & Planning Group
for California Community Colleges

The RP Group is a nonprofit organization working to build a community college culture that views planning, evidence-based decision-making and institutional effectiveness as key strategies for student success.

Introduction

During a time of intense debate and discussion about how to support California's community college students towards completion, reflecting on the unique individuals served by the system can be grounding and informative. Through the Student Transfer in Professional Pathways Project (STP3), the RP Group spoke with students about how they use the state's community colleges to prepare for transfer in career majors and what factors impact their journey toward a bachelor's degree.

The following brief profiles six current and past engineering transfer students. The group includes four community college students, one successful transfer and a baccalaureate recipient now working in the field of engineering. The interviewees' collective experiences underscore the incredible diversity of learners engaged with our system and the determination and direction required to achieve transfer and a degree in this major.

Community college and university educators can use these stories to support ongoing conversations about how to best serve transfer students and to discuss opportunities for individually and collectively improving engineering transfer in California. The document concludes with a series of discussion questions to facilitate this dialog.

The RP Group's Student Transfer in Professional Pathways Project (STP3) is funded by the James Irvine Foundation and the California Community College's State Chancellor's Office and conducted in partnership with the California Partnership for Achieving Student Success (Cal-PASS).

STP3 research includes:

- Mapping the educational paths taken by 14,500 transfer students who achieved a bachelor's in accounting, criminal justice, engineering, nursing and teacher education between fall 1996 and spring 2009
- Connecting directly with over 750 transfer students currently enrolled in a baccalaureate program in these disciplines through surveys and focus groups
- Convening stakeholders to discuss findings and possible action toward improved transfer

Student Profiles

Before reviewing these profiles, consider the following questions:

- How would you describe the typical transfer student? Who are they?
- What challenges do they face?
- What supports them toward transfer and degree?

Javier

A strong student, Javier graduated high school in Mexico City and entered a career in design. In his early 20s, he decided to seek broader horizons in the United States. Arriving in the San Francisco Bay Area with limited English, he immediately enrolled in classes at a local adult school where he worked hard to learn the language.

At his first job in the country, Javier helped with a fundraising event where he met a number of scientists including chemists and engineers. Their conversations piqued his interest and motivated him to pursue an engineering degree.

Javier remembers, “I have always been inspired by science; I am very curious about things. I am always breaking things apart [to] see all the small parts and how they work and putting them back together.”

Armed with this inspiration and encouragement from a teacher at his adult school, Javier took the math placement exam at Cañada College. He tested into pre-algebra, landing three math classes below transfer-level coursework. He steadily worked his way through pre-algebra, elementary and intermediate algebra and trigonometry. He was about to enroll in pre-calculus when he heard about Cañada’s accelerated math course, MathJam.

MathJam gave Javier a big boost toward his goal. The five-week summer program “helped me to review everything I already knew but forgot I knew and made me feel pretty comfortable taking the placement test [a second time], even though English wasn’t my first language.” Javier scored 100% when retaking the placement exam. “Compared to when I started when my score was 28% to 30%, it was a huge jump.” As a result, he was able to skip directly to Calculus I. He found that beyond strengthening his math skills, MathJam helped him to better communicate what he was learning—to “speak math”.

Javier names two significant challenges to his pursuit of an engineering degree. “Money is, of course, always number one. Number two is the second-language part. Even though I understand really well, it’s harder to get the concepts right as my classes advance and it takes me longer than the native speakers. I’m taking Calculus II now and the wording is so complex for me.



Sometimes I have to ask the teachers for help, not on the math, but on the language... When I'm in a regular class, it is okay, but on a final or mid-term, it takes me a while to understand the problems and that's a real challenge."

Javier feels ESL students need more information about the career and educational opportunities open to them in the sciences. "I go back to ESL classes and share my story. I try to convince my fellow Mexicans to go into science and not something like sociology." He tells them, "I've been there... I know how hard it is, I was sitting there where you are four to five years ago." He believes ESL students would think differently about choosing a major if they had more information about the market and job opportunities in the sciences.

While eager to transfer, Javier has great appreciation for his community college experience. "I love Cañada. It's a small campus. The students are a little older and we know what we want." He feels his teachers have been strong and the college's Math, Engineering and Science Achievement (MESA) and TRIO programs have served as valuable resources. MESA tutors have been particularly helpful, and when his computer broke, the MESA Center helped him secure a free replacement through California Connect. Through TRIO, Javier has visited universities like UC-Berkeley (UCB), San Jose State University (SJSU) and UC-Davis and received assistance applying for scholarships and internships.

If all goes as planned, Javier will transfer to a four-year university in spring 2013 after five years of community college enrollment. He intends to attend UCB or UC-Santa Cruz in material science and bioengineering. He says, "I can't believe that just four years ago I was taking ESL classes."

Wes

Wes had always wanted to earn a bachelor's degree and first began his postsecondary education in 1991 at Chabot College. He enrolled in a number of elective courses, many of which he failed to finish and petition for withdrawal. At that point, he decided to take a break from school and reassess his goals. In 1995, he entered the police academy while living in Colorado. However, a hiring freeze of new recruits forced a move back home to California. A number of job opportunities eventually led him to his current full-time position as a sales engineer which allows him to support his family.



In 2009, the father of four returned to Chabot with new resolve and commitment to preparing for successful transfer to UC-Berkeley in fall 2015 where he plans to major in bioengineering/biomaterials. A one-time "academic renewal" allowed him to expunge his

previously poor academic record. Without the option for renewal, “getting into Berkeley would be a pipe dream.”

Buoyed by the opportunity to start fresh, Wes has pursued a number of strategies to assure his success. Upon enrollment, he met with a Chabot counselor to review the UCB website and develop a detailed educational plan that he’s posted on his own personal website. One of his engineering professors, also a UCB graduate, confirmed that he had indeed identified the right courses needed to achieve transfer readiness. He also developed a Grade Point Average (GPA) map, which allows him to track the level of achievement required in each of these classes to keep his GPA in the 3.6 range needed for acceptance into UCB’s School of Engineering. “Getting anything less than an A in any class” could jeopardize his chances.

His girlfriend and family are extremely supportive of his efforts to prepare for transfer even though the program requires that he “study all the time.” He regularly studies four hours per day during the week and six hours per day on the weekends. Last summer, he took the semester off but felt the need to keep learning. He bought two calculus books, joking “if I stop (studying), I’ll die.” His employer allows him to set his own hours based on his course schedule so he’s been able to continue to work full-time in his job as a sales engineer. A partial Pell grant and Board of Governor Fee Waiver help him cover some of his educational expenses such as books and supplies. As a military vet, Wes also receives priority registration so he has been able to enroll in courses that often fill up quickly.

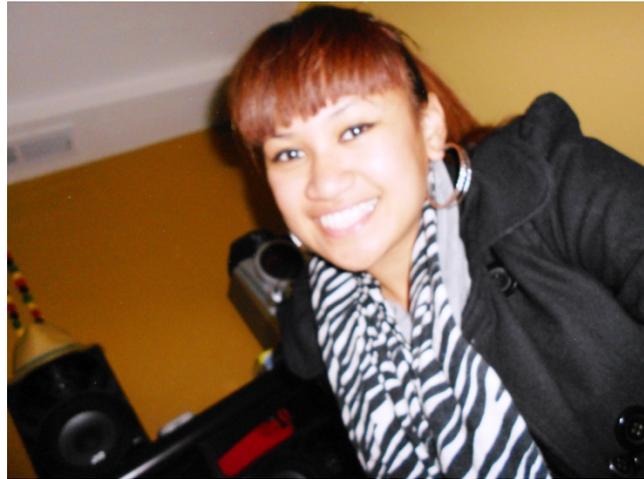
During his first three terms at Chabot, Wes was taking three courses per semester, but occasionally struggled to balance work, school and family responsibilities. After receiving a ‘C’ grade in a couple of courses, he petitioned to take them again. On the advice of a representative from the Transfer Alliance Project at UCB, he decided to take only two “hard” courses each term moving forward. This may extend his time to transfer by a year, but the lighter schedule will allow him more time to focus on his coursework while continuing full-time employment.

A self-described auditory learner, Wes video records all of his classes, which he makes available online to his fellow classmates. Although his work schedule limits the time he has available to access tutoring, clubs or student groups on campus, he meets with classmates before major tests and uses several online resources (e.g., MIT’s online classes) to help him prepare. He has also spent time studying on the UCB campus so that the “the place is less intimidating.”

For other community college students who are studying engineering and pursuing transfer, Wes had the following advice. First, know what you want to do. Second, make sure your GPA is as high as possible. Third, map out the courses that are required by your transfer destination and double check the requirements often since they may change. And finally, “be ready to adapt...have a plan B in case one class you need is not offered during a particular semester.”

Picca

As a high school student in Hawaii, Picca decided to pursue an engineering major in college. With an early interest in technology, Picca taught herself programming by looking up material online and watching YouTube videos. High school counselors told her about the opportunity to study computer engineering and “since then it has been *all* engineering....My passion is computers. Engineering comes easy for me. It’s simple. I love it. It’s my hobby and my passion.”



“I was the youngest in most of my high school classes, but that would make me a little uncomfortable.” She would often be the only freshman in a class of mostly senior students. She ended up working with a tutor because it was a more comfortable way for her to learn math.

Picca moved with her family to California in 2011 during her last semester in high school. A cousin helped her enroll at Cañada College. Picca got involved with the campus MESA and TRIO programs, which provided her with an array of resources and opportunities. She tested into Math 110 (Elementary Algebra) and knew she could do better. In high school, math “was really easy for me; it was my favorite subject.” A MESA counselor told her to finish her other general education requirements first and attend MathJam before taking any math classes. She followed that advice, and moved up an entire level in math above the one she originally tested in at as a result.

“MathJam refreshed my memory, it refreshed the math skills that I thought I forgot. It also changed my attitude. I had math fears; I thought I was not going to be able to make it through. Now I don’t worry about getting a tutor between classes. I don’t have to worry about checking everything over and over.” Picca shares that it was helpful student tutors were all math majors who had gone through the MathJam program, so “it was comfortable. I thought I wouldn’t know anybody, but I was tutored by my own classmates, so I felt very safe.”

Another opportunity she discovered through her MESA program was the two-week residential Summer Engineering Institute offered at San Francisco State University (SFSU) and sponsored by Cañada. According to Picca, the program was “awesome!” Participants, mostly in their late teens, engaged in hands-on activities like programming iPhone apps and robots and taking field trips. The experience was “kind of like college, and kind of like home,” offering a university environment with strong structure. Picca found the program “intense” and “life-changing.”

Since that time, she has taken advantage of many other opportunities to learn and develop her skills, including traveling to conferences and mentoring younger students. Picca struggles most with balancing school and family demands as she works toward transfer. She looks after her little sister, who is disabled, and has helped her brother and his wife with their new baby. Her parents are in ill health, which makes traveling to conferences and participating in special programs difficult. She says of her family, “They have been very supportive, but they need my help a lot.”

While taking the MathJam program saved an entire semester's worth of math coursework, Picca knows that it's still going to take several math and science classes to get to transfer. She intends to get her associate's degree, and then attend to MIT or Cornell. She's working with her MESA coordinator to figure out which classes will facilitate her transfer and guarantee that she has a chance of getting accepted to her top choice university. She did not choose to go directly into a four-year institution because she observed several of her cousins go straight from high school into university and have problems with the transition. This conviction was further reinforced when she visited some colleges with her TRIO program and interviewed some of the students. She says, "I am happy and grateful I started out at a community college. The financial aid is great, the environment is great, the classes are great, and the diversity is awesome. I'm not sure I would fit in right away at a four-year college."

When asked why she thinks relatively few young women go into engineering, she observed that "some of them have the passion, but they're scared...they're scared that they might not pass the classes. They just see obstacles so they change to a subject that's easier. But you have to realize that in college, nothing is handed to you on a silver platter." She also noted that women tend to go into the programs where their friends go like nursing. While this might not be their vocational passion, it is where they have the most social support.

She feels strongly that students need to "follow the passion they had in high school. If you enter college undecided, there will be a long way for you to go." She suggests that new engineering students get involved in at least two clubs, at least TRIO and MESA, so they can get counseling and tutoring in their major and find a community of support.

Stanley

As a high school student, Stanley Chen had clarity about his future. He'd graduate, go to a UC and pursue engineering. While he's started this journey, Stanley's not exactly taking the route he expected. After receiving no offers from his preferred UCs, Stanley enrolled at Chabot College in Hayward, California. At first, he was admittedly disappointed, skeptical of the preparation he'd get and the experience he'd have by traveling this path.



With three semesters at Chabot under his belt, Stanley has a decidedly different view.

"I'd definitely recommend going to [a community college] now. To be honest, I wasn't a great student in high school and I would've had the same kind of attitude and personality if I went immediately to a university. I don't think I'd have matured as much as I have. I'm really learning how to study, how to connect with people, how to manage time—skills you really need to succeed at a UC. I have friends who immediately enrolled in a UC, and while they're having fun, they're feeling disappointed academically. They just weren't ready."

Now more than ever, Stanley is certain he'll transfer to a UC and several factors are helping him progress toward the goal of completing the prerequisites for an electrical engineering major within two years. "My friends are probably most influential in helping me get to transfer....I really love studying in groups now. We meet every Tuesday and Wednesday. We complete assignments before meeting and then get together and share how we attacked a particular problem. It's a blast." Teachers have also played an important role, particularly his engineering instructor who embedded transfer planning into an introductory course—"I still go back to that education plan, update it every semester." He's also received real-world exposure to engineering through his father, an electrician. "My dad taught me about circuits, wiring, plumbing...he's a jack of all trades. He's the primary influence on why I chose electrical engineering and it's helped me see my major in action." Finally, starting off at Chabot in calculus has given Stanley a leg up, making him immediately eligible to access the courses required for transfer in this major.

A single issue stands to challenge Stanley's success. The considerable preparation needed for engineering transfer and the different courses required by the four universities he's interested in attending call for an intense workload. To make it through in two years, Stanley took 22 units in fall 2011 and enrolled in another 22 units this spring. Although his grades are good and his confidence high, maintaining this pace proves difficult. While Stanley is leveraging the UC Transfer Admission Guarantee (TAG) program, the system recently reduced the number of TAG agreements students can use to one, rather than multiple, universities. This limitation means Stanley's taking a gamble with his TAG application, applying to a UC where he believes he's most likely to receive acceptance rather than his top choice. He will not receive priority at other UCs even though he's fulfilled their TAG criteria.

When asked what advice he'd give students just beginning their journey toward transfer in engineering, Stanley suggests "manage your time, develop study skills, connect regularly with instructors, pick up an internship and get to know the major. And make sure...you understand your math and science. I'm picking up things now that I didn't ask about before. Get help. It's really important."

Alen

"When I was growing up [in Bosnia], there were always gunshots in the street outside of the house. I thought that was normal," says Alen.

In 1997, two years after the end of the Bosnian war, Alen's family immigrated to the US where he started fifth grade. Alen says that the instruction he received in his home country was more advanced than what he encountered after moving to the US, so he found himself ahead of the game in subjects such as math. In English, on the other hand, Alen had to play catch up.

"My parents really pushed me to do well in school," he says. His father, who worked as an accountant in Bosnia, struggled to find work in the US and he finally landed a job



as a machinist. His mother initially went to school to learn English. While she worked as a medical assistant in Bosnia, she couldn't find comparable work in the US even after she completed a two-year medical assisting program. Eventually, she took a job in retail which she held until she was diagnosed with atypical Parkinson's disease.

"My parents couldn't pay for a four-year college, so I went to the community college to save money," explains Alen, who attended San Jose City College (SJCC) for two and a half years. "I came in having completed intermediate algebra in high school, and took a similar course at SJCC. During that first semester, it felt nice to know most of the stuff already." Alen eventually completed two calculus courses, a physics course and all other general education requirements for transfer. Along the way, he took advantage of a transfer agreement program between SJCC and San Jose State University that enabled him to be admitted to the university as a computer science major one year before transfer.

Alen says the transfer agreement program was great. However, the discipline, proved to be a less a good fit. "I found that I was different from other students in computer science. I didn't share their perspectives and interest. Then I took a class in engineering that was very hands-on and I knew what I wanted to do." Alen switched his major to civil engineering and is on track to graduate in June 2013 and be the first in his family to complete college in the US.

Academically, the road to transfer and degree was a long, but manageable, haul. However, Alen has struggled to balance his education with work and taking care of his mother. For the past several years, she has required constant live-in care because her illness is getting progressively worse. Alen lives at home with his brother and his father where they juggle their schedules to make sure that somebody is there with Alen's mother around the clock. Alen sums up his life saying, "I study, work and take care of my mom." "I want to finish school so I can help my family pay for the bills," Alen says. He has a 20-hour a week job with the Santa Clara Water District which he hopes may turn into full-time employment after his graduation. In addition to working, Alen has depended on financial aid to make ends meet throughout his higher education journey. "I could never have done this without FAFSA," he says.

Alen's advice to other community college students who want to transfer is to work hard and research transfer agreements as soon as possible. For engineering students, he warns that if you complete all your GE requirements in the community college you should understand that you will only have hard courses left after transfer. He states, "A history course would've been very nice to counterbalance upper-division courses in physics and math."

Juanita

Juanita's interest in engineering began when she was just a high school sophomore. She wanted to take an elective and narrowed her choices down to drafting and choir. Concerned that she would be the only girl in the drafting class, she checked with her high school counselor about the gender mix and enrolled after ascertaining that she wouldn't be the lone female. She discovered that she really liked technical drafting and drawing. This initial exposure inspired her to take a number of other technical and industrial courses like auto shop. Juanita recalls, "I really liked seeing how stuff works." She was a good student, and found that she appreciated disciplines where she could directly apply her learning. "I always liked stuff with numbers; it just made

more sense. I did well in courses like English and history, but I was just more interested in math and science. It's more fun and easier to grasp; there is no gray area. It's either one or three; you either have it or you don't...In English, you can read it, but you always have to read between the lines."

When she started making college plans, Juanita again consulted her high school counselor. She was torn between architecture and mechanics. Considering that "one of these jobs is really clean and the other really dirty," Juanita asked her counselor which program she should choose. The counselor suggested that she consider engineering, which would require both technical and mechanical skills.

Juanita went to her high school's career center to research engineering and quickly realized that there were many different types of engineering. She found electrical engineering the most interesting because of the diverse range of applications. She then had to determine which colleges offered a degree in this field. Since no one in her family had ever attended college, she had to put in extra effort to learn about the expectations of and opportunities for postsecondary education. She recalls, "When I was in high school, I didn't even know what a junior college was."

She decided to begin her higher education journey at Santa Rosa Junior College (SRJC) for a number of reasons. SRJC was close to home and affordable. It was a place where she could test the waters and see how well she could do. Juanita also received a Doyle scholarship, which could only be used at SRJC. She found that by going to a community college, she could actually save money that she could apply towards educational costs at a four-year institution. Juanita remembers SRJC as "nice and small and comfortable," where she could really get to know her teachers and classmates.

She did not find the path to transfer particularly confusing because she made use of available resources, first at her high school, then at SRJC and SFSU. For example, she joined SRJC's Extended Opportunity Programs and Services (EOPS), where a counselor helped her determine which classes to take to apply for transfer. An online resource, www.ASSIST.org, enabled her to identify which of these courses could be applied toward transfer at specific institutions in the CSU and UC systems. She also tapped SRJC's MESA program, which connected her with additional resources and other students who were interested in engineering

Juanita attended SRJC for three years, transferring to SFSU in 2003. She found SFSU a little overwhelming at first. The classes were bigger and the student population was very diverse. It was the first time she had ever lived away from home, which was also a shock. However, she found supportive professors and joined SFSU's [MESA Engineering Program](#), which helped her find study partners. She graduated in 2006 and began looking for work.

Juanita knew right from high school what career she wanted to pursue and which educational institutions she wanted to attend. She made it from high school graduation to baccalaureate degree in a little less than six years, largely because she always enrolled with a full course load and didn't take time off from her studies.

However, Juanita's path to baccalaureate degree and employment was not without challenges. Her parents, Mexican immigrants with no postsecondary experience, were supportive but unable

to provide guidance. She remembers, “Sometimes I did not even know what to ask—what kinds of questions to ask or how to go about getting a degree. Throughout college, I would get stuck with my homework while my peers could go to their parents and friends for help.” After graduation, since she did not know anyone who worked in engineering, Juanita had to seek out advice on potential career paths on her own.

Juanita has also found the gender imbalance in engineering challenging at times. She noticed immediately when she started at SFSU that there were very few female students in her engineering classes. She observed that civil engineering classes generally had about 25 students, ten of which were female; in mechanical engineering, it was more like five females, and in electrical, only one or two. She remembers, “It was kind of intimidating. At first it was hard to form study groups and talk to the guys. They were very competitive.”

This sentiment carries through to her experience in the workplace. She has now had two jobs since she graduated, and she is often the only woman in her department. That said, she really enjoys her work and the chance for continuous learning. She says, “It’s a pretty demanding profession, but if you really like what you are doing, you won’t mind the minor obstacles, like working with a bunch of guys!” She continues, “Now that I’m actually working, it has paid off. Stick with it; if you really want it, the rewards will come.” She reiterates, “Persistence + Focus + Dedication = Engineer.”

When asked what advice she’d give students just beginning their journey toward transfer in engineering, Juanita advises that students make full use of the existing resources at their educational institutions including career, transfer and tutorial centers. She recommends using community college programs like EOPS and MESA, especially because they help students meet others “in the same boat.” Finally, she strongly advises that students meet with an engineering department counselor, in addition to a general counselor, because engineering counselors know exactly which courses students need to take to transfer in this discipline.

Discussion Questions

Consider using the following discussion questions to guide a conversation about how your community college or university currently engages transfer students and opportunities for strengthening support to these learners as they work toward transfer and a degree in engineering.

- Reflect back to your original brainstorm about a typical community college transfer student. What's similar and/or different between your perception of these learners and these students' stories? How do the challenges that these students face align with your own students' experiences?
- Given their range of experiences, are there support resources that seemed to make a difference for all of these transfer-directed students? Would these same supports help your students?
- Many of these students successfully made it through basic skills math into a STEM major. What enabled students to make this transition? How could these concepts be applied at your college?
- These students have been in community colleges for a number of years and still are not ready to transfer—even when they take heavy course loads. How can we help transfer-directed students get through community colleges faster?

For more information

Visit www.rpgroup.org/stp3.html or contact Project Director Eva Schiorring, eschiorring@rpgroup.org.