

# Chapter 2

## Who Are We?

### *Finding Our Voice*

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Perhaps because of their unique design as American institutions, community colleges have often been bellwether institutions for change, leading the way into new and unexplored territory.

~K. Patricia Cross (O'Banion, 1997, p. ix)

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For the ripple effect of change to occur, utilizing the four pillars of PROWESS, there needs to be an understanding of the role of two-year colleges and collective diverse voices it represents in the complex national education system. For educational systems to function, the levels—primary, middle, secondary, and post-secondary—need to work together. At the same time, each level must embrace its unique role. Within these levels, there is also the need for collaboration among the specific academic disciplines in order to develop a cohesive path for students on their journey to becoming educated citizens. Many studies on teaching and learning in general, including higher education, have been conducted. However, one area that has received insufficient attention regarding its role is two-year colleges (Mesa, Wladis, & Watkins, 2014). For two-year colleges, the way mathematics is taught presents a unique set of challenges. By examining mathematics curricula, student and faculty characteristics, and student academic goals, we can continue to make progress in fostering mathematical prowess and improving teaching in the first two years of college mathematics. Who are we? Collectively we are a united body of mathematics educators—AMATYC—whose intent and devotion is to provide a national forum for the improvement of mathematics in the first two years of college (AMATYC, n.d.).

## **A Look at Our Students**

Did you know that in the fall of 2015 in the United States, 40% of the 17 million undergraduates were enrolled in two-year institutions (National Center for Educational Statistics [NCES], 2015a)? Between 2015 and 2026, undergraduate enrollment at two-year colleges is projected to increase by 21%, while enrollment at four-year institutions is likely to increase by 9% (McFarland et al., 2017). This projected increase follows a recent decrease in enrollment numbers. Data from the Integrated Postsecondary Education Data Systems (IPEDS) indicated that, from 2010 to 2014, there was a 4% decrease in enrollment of full-time undergraduate students and a 2% decrease of all undergraduates at

public two-year colleges. This paralleled a 5% increase in enrollment of full-time undergraduate students and a 3% increase of all undergraduates at public four-year universities (Ma & Baum, 2016). When limited to enrollment in mathematics and statistics courses in mathematics program, the trend from 2010 to 2015 was similar (i.e., a 4% decrease). This decrease followed a 10-year increase in enrollment numbers in mathematics courses at two-year colleges (Blair, Kirkman, & Maxwell, 2018). In addition, according to the National Student Clearinghouse Research Center (NSCRC, 2017), in the 2013-14 school year 46% of four-year college graduates had attended a community college at some point. In fall 2015, approximately 42% of all higher ed mathematics students were enrolled in United States public two-year colleges (Blair et al., 2018). As faculty members at two-year colleges, we are involved in the education of a large diverse student population; thus we teach students who have a variety of mathematical skills, a wide array of personal backgrounds, and a variety of academic goals.

In fall 2015, about 2.5 million two-year college students were full-time students; four million were part-time (Ginder, Kelly-Reid, & Mann, 2017; NCES, 2015a). It is important to note that one challenge unique to community colleges is getting a better understanding of the experiences of part-time students. In general, research on both part-time and full-time students' educational experience is premised on the notion of fixed classification: that is, both student groups enroll in a fixed number of credits in a semester (American Association of Community Colleges [AACC], 2016). However, the Community College Survey of Student Engagement has cautioned that part-time and full-time should not be viewed as fixed classifications because of their fluidity (Center for Community College Student Engagement [CCCSE], 2014). In reality, two-year college students may begin college as either part-time or full-time students and then switch while others move between the two classifications multiple times throughout their college experience. Understanding the changing nature of enrollment practices of students is important in better understanding the experiences of part-time students.

Almost all two-year college mathematics programs (94%) offer diagnostic or placement tests; however, in fall 2015, only 75% required placement tests of students who are first-time enrollees. This percentage was a 25% decrease from the 100% of mathematics programs that required placement tests in fall 2010 (Blair et al., 2018). Nearly 60% of U.S. students who take mathematics in college begin in pre-college non-credit-bearing courses, with more than 80% of them having initial enrollments in such courses at two-year colleges (Mills, 2016). Not all students take placement exams, but among those placed into developmental mathematics, research with data from Achieving the Dream Community Colleges suggests that “more students exit their developmental sequences because they did not enroll in the first or a subsequent course than because they failed or withdrew from a course in which they were enrolled” (Bailey, Jeong, & Cho, 2010, para. 1). Bailey et al. (2010) also found that of the students who were advised to enroll in a remedial course, less than 50% completed the entire remedial sequence and about 30% did not enroll in a remedial course.

Course enrollment trends appear to be changing in mathematics at two-year colleges, possibly as an impact from accelerated pathway programs that were designed to provide alternative course and sequences such as from or to a college-level mathematics or statistics course. Data from CBMS indicated a decrease in the percentage of two-year college students enrolling in pre-college-level courses (−32%; 368,000 fewer students) from 2010 to 2015 with an increase in the percentage of students enrolling in precalculus-level courses (21%; 77,000 more students) and Elementary Statistics or Probability Courses (104%; 143,000). Regardless of those changing numbers, enrollment in pre-college level courses remains high. From 2010 to 2015, the majority of the 1,918,000 two-year college students accounted for in the CBMS fall 2015 survey were enrolled in Intermediate Algebra (high school level; 299,000), College Algebra (above Intermediate Algebra; 292,000), Elementary Algebra (high school level; 277,000), and Elementary Statistics (with or without Probability; 251,000). There also was an increase in enrollment numbers in Calculus courses (11% increase; 15,000 more students). In fall 2015, a total of 193,000 students from 58% of colleges that participated in the CBMS study had

enrolled in a Pathway course. Distance learning courses account for 12% of all mathematics enrollment with the largest enrollment in distance learning in College Algebra, Elementary Algebra, Intermediate Algebra, and Statistics (Blair et al., 2018).

Two-year colleges attract many students who historically have been underrepresented in science, technology, engineering, and mathematics (Mills, 2016; Smith, 2016; NSCRC, 2017). These students are more likely to face severe obstacles to success. From AACC (2017), we find that in the United States in 2015, 56% of two-year college students were women; in 2011-2012, 36% of two-year college students were in the first generation in the family to attend college; 17% were single parents; and 12% were persons with disabilities. Most two-year college students were employed. In addition to their studies in 2011-2012 22% of full-time students and 41% of part-time students have full-time jobs, and 40% of full-time students and 32% of part-time students have part-time jobs. Because of the lower tuition rates, many students with little to no income attend two-year colleges to further themselves toward a better socioeconomic life.

The two-year college student population is ethnically diverse. In 2015, in the United States about 60% of both Native-American and Hispanic undergraduates were enrolled in two-year colleges, as were more than half of black undergraduates (NCES, 2016). The general ethnicity of the students at two-year colleges nationwide is depicted in Figure 1.

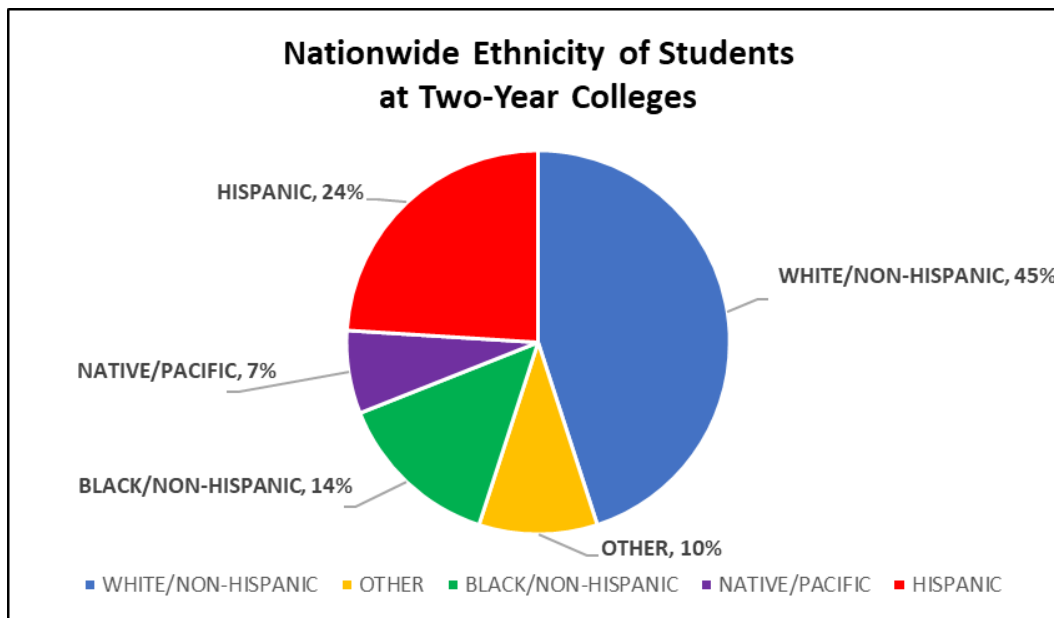


Figure 1. Nationwide student ethnicity of two-year college students (AACC, 2017).

The demographics at each college may be different, since the students served by your college usually represent the demographics of your local community. Three examples of the demographics of students at different colleges around the country are shown below. The pie charts show that there is no such thing as a typical student at a two-year college.

Miami Dade College, Florida is the largest institution of higher education in the country. Its eight campuses offer more than 300 educational pathways to a career. Since its founding more than half a century ago, the college has admitted more than two million students. During the 2014-2015 school year, the institution served one of the most diverse student bodies in the nation: 165,000 students from 191 countries, speaking 90 languages.

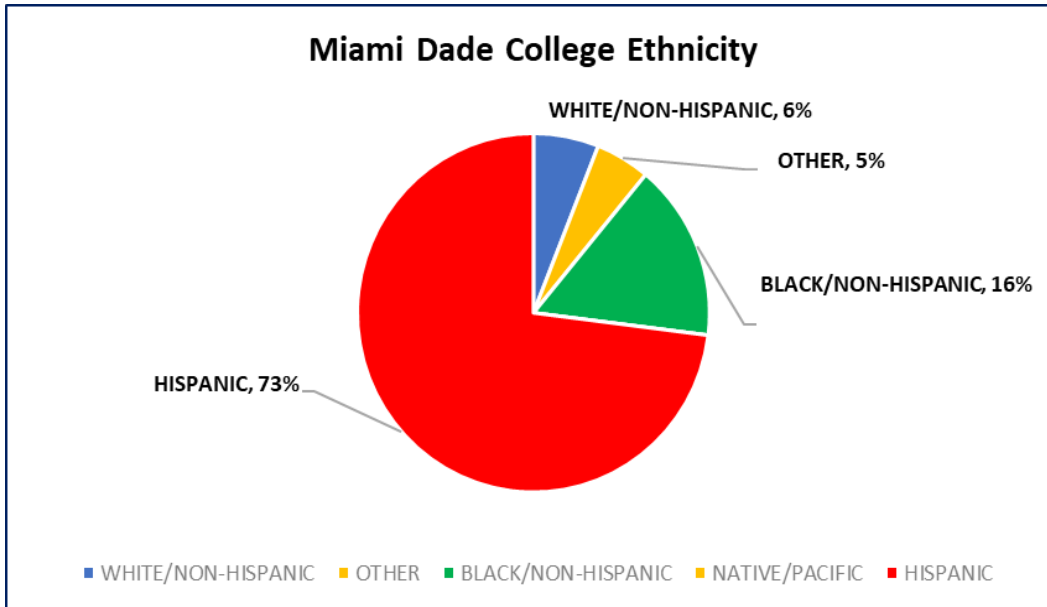


Figure 2. Miami Dade College (2015) student ethnicity.

The Maricopa County Community College District is one of the largest community college systems in the nation, comprised of ten regionally accredited colleges that serve a diverse student body in the greater Phoenix, Arizona area, including Chandler-Gilbert, Estrella Mountain, Gateway, Glendale, Mesa, Paradise Valley, Phoenix, Rio Salado, Scottsdale, and South Mountain. Approximately 200,000 students enrolled in credit and noncredit courses at a Maricopa Community College in 2015-2016.

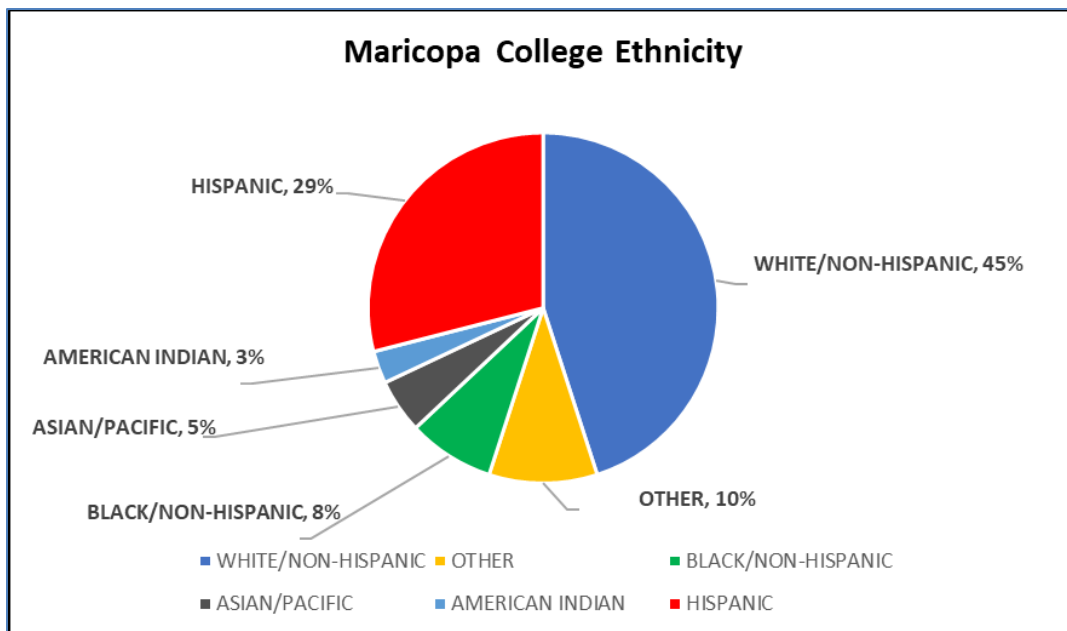


Figure 3. Maricopa Community Colleges (2017) student ethnicity.

Coconino Community College, Flagstaff, AZ, has served residents across the 18,000 square miles of Coconino County since 1991 and helped create the region's skilled workforce, which is improving the overall health, safety, and the economy in the region. The unduplicated headcount in 2015-2016 was 5,480.

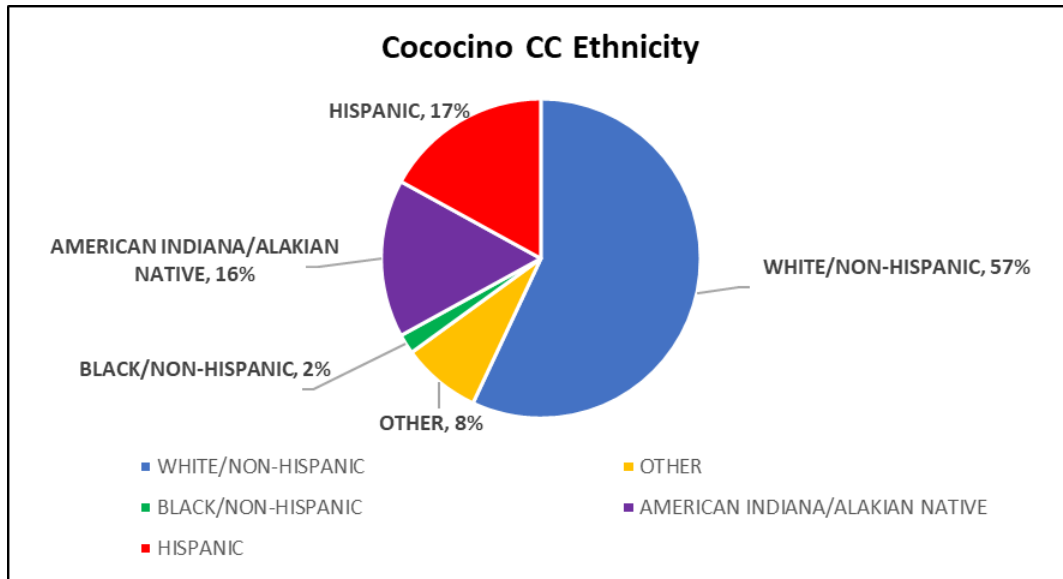


Figure 4. Coconino Community College (2016) student ethnicity.

These demographic characteristics highlight real students, each with their own story. One of them is Eddie, whose story is similar to that of many community college students.

*Eddie and his parents arrived in San Fernando Valley, CA from Sofia, Bulgaria. He learned English quickly since his parents spoke none. He once remarked, “I had to be their translator for just about everything—setting up cable TV, calling the gas company, filling out DMV paperwork.” Eddie was accepted to the University of California, Los Angeles (UCLA) through the Guaranteed Transfer Option program, where students attend a community college of their choice for two years, and then automatically transfer to UCLA without applying, as long as they kept a GPA above 3.5. Eddie chose Los Angeles Pierce College.*



*While at Pierce, he obtained his first job, a mathematics tutor at the tutoring lab. While working as a tutor, he helped a student with hearing impairment to understand a problem and the big picture of concepts. “My mind was made up that day. I was going to be a math teacher,” Eddie said. Eddie is currently the mathematics department vice-chair and the Math Specialist at Pierce’s Center for Academic success. The opportunities available at two-year institutions for Eddie and others from diverse backgrounds are invaluable.*

## A Look at Our Faculty at Two-Year Colleges

The faculty at community colleges account for a large part of the faculty in higher education. In 2013, 24% of all higher education faculty taught at two-year colleges; one fifth of this number worked full-time at a public two-year college. Although the part-time faculty represented 37% of all higher education faculty, they represented 70% of two-year faculty, according to the National Center for Educational Services (2015b). CBMS fall 2015 survey data indicated that 67% of two-year college faculty were part-time and, when third party payees were omitted, 65% were part-time. In 2015, 64% of part-time faculty members were teaching six or more hours but fewer sections (36%) were taught by part-timers. Full-time permanent faculty members' weekly contact hours increased with an average of 18 contact hours per week in fall 2015 compared to 15 hours in fall 2010. Some faculty members were teaching more than 19 contact hours per week (Blair et al., 2018).

In regards to gender and ethnicity, two-year colleges have a slightly different mix of faculty. Women comprise 54.8% of two-year college mathematics faculty, compared with 45.9% in four-year colleges and universities (NCES, 2014a). Those findings were in alignment with results from CBMS 2015 (52%) (Blair et al., 2018). Even though the ethnic minority faculty population is increasing, the majority of full-time permanent mathematics faculty are white (non-Hispanic; 75%) and 40 or older (75%). Ethnic backgrounds of two-year college faculty were as follows: 8.6% Black (compared with 5.2% for four-year colleges and universities), 5.5% Hispanic (vs 3.9%), 3.5% Asian (vs 8.0%), 0.4% Pacific Islander (vs 0.2%), 0.6% American Indian/Alaska Native (vs 0.4%), 0.7% two or more races (vs 0.7%), 4.5% race or ethnicity unknown (vs 4.5%) (NCES, 2014b).

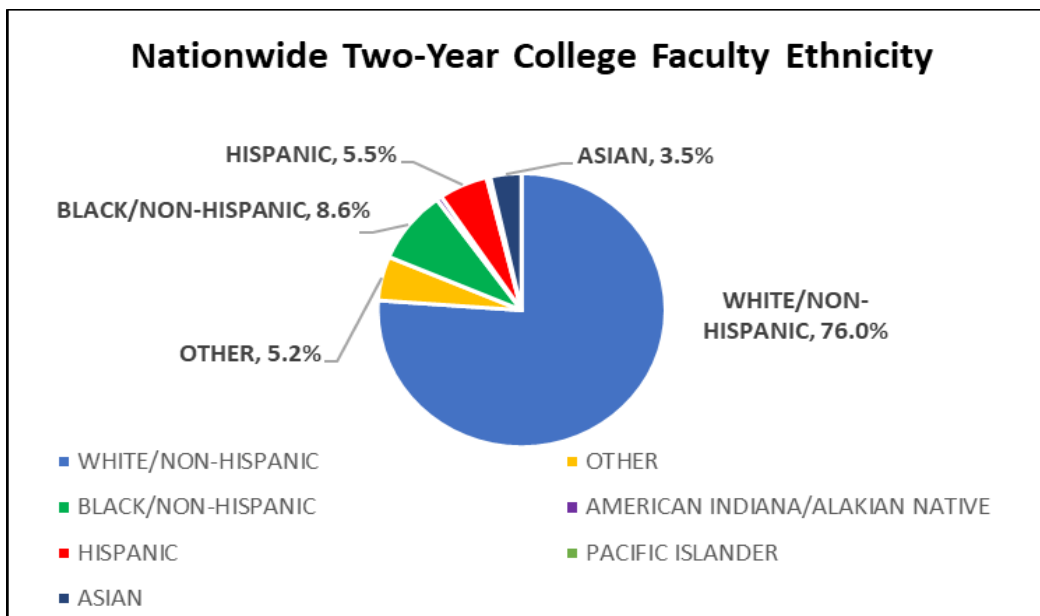


Figure 5. Nationwide two-year college faculty ethnicity (NCES, 2014b).

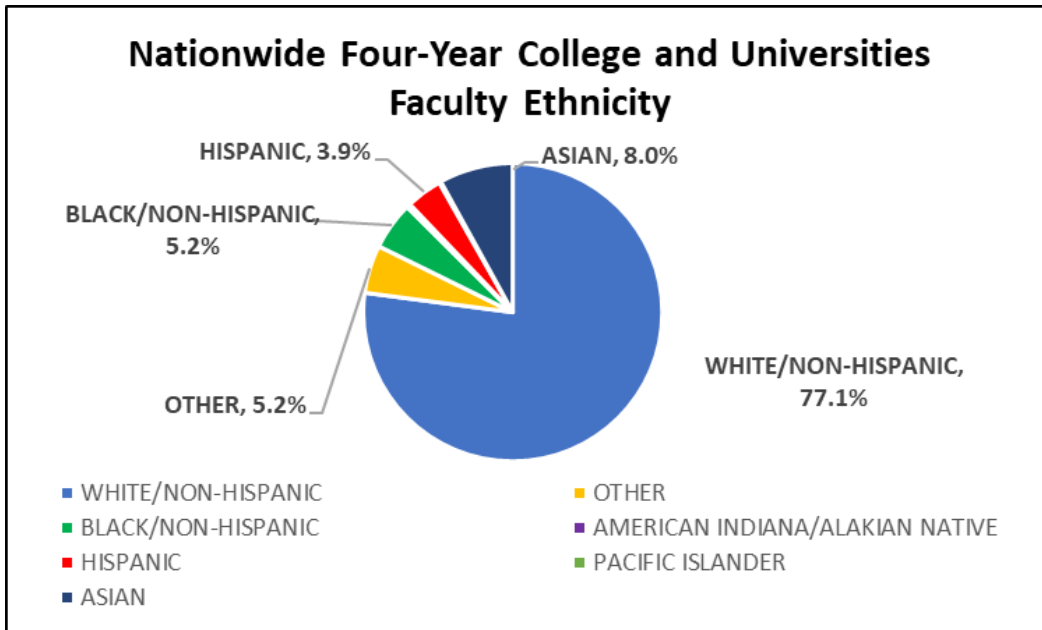


Figure 6. Nationwide four-year college and universities faculty ethnicity (NCES, 2014b).

Faculty educational background and work history are also different from counterparts from four-year colleges and universities. The majority of mathematics faculty have a master’s degree as their terminal degree (80% of full-time permanent faculty; 76% of part-time faculty) and 15% hold a doctoral degree. Seventy-three percent (73%) of full-time permanent faculty and 58% of part-time faculty have a degree in an academic major in mathematics (Blair et al., 2018). The primary source of new hires of two-year college faculty is graduate school (37%) followed by part-time or full-time temporary employment at the same college (26%) and teaching at other two-year colleges (19%); secondary sources include four-year colleges and universities (4%), unemployed (4%), secondary schools (1%), and nonacademic employment (1%) with 9% unknown (Blair et al., 2018). This may suggest that becoming a two-year college faculty member is a primary career goal and not just a fallback option.

As with students, examining overall demographic data masks the stories of individual faculty members. Julie is another example of a community college student who became a successful two-year college faculty member.



*Julie’s start with mathematics was not a positive one when she failed algebra in her first year of high school. When she later attended Indian River Community College (now Indian River State College) in Florida, somehow her College Algebra teacher convinced her she was one of his very best mathematics students. Due to his intervention, Julie became confident enough to become a mathematics tutor and a high achieving student in addition to being a college athlete and a musician,. She has an earned doctorate, and is now a mathematics professor at Valencia College, and has been honored with a long list of local teaching awards and national accolades as well as being invited to be involved with a plethora of national initiatives. Julie’s journey demonstrates the impact that community colleges and a caring faculty have on students. Her understanding of the community college student and of the importance of individual faculty actions helps keep the ripple effect of IMPACT moving through her students.*

## AMATYC's Voice for Change

Two-year colleges make up almost 1,700 of the 4,700 degree-granting postsecondary institutions (counting branch campuses as separate institutions) (NCES, 2014c). While we have many commonalities with four-year institutions, we also have a specific niche, and thus voice, in higher education. The basic mission of a two-year college is to provide education to residents in their locality. The culture of a two-year college usually reflects the culture of the local community. The goals a two-year college typically include academic and vocational instruction at the lower division level, remedial instruction, and lifelong learning. In addition, many of these colleges allow for open admission access, provide education at an affordable cost, and have small class sizes (Pannoni, 2015).

The diverse demographics of two-year colleges and consequently the challenges that faculty may encounter in teaching, provide opportunities for them to be more innovative in their vocation. AMATYC continues to support educators by providing leadership in improving mathematics teaching and learning in the first two years of college throughout the United States and Canada. The global society, technological advances, social media, diverse workplace skills, changes in K-12 education, and innovations in brain and learning science are influencing teaching and learning of mathematics. Thus, we have the opportunity to IMPACT mathematics education in the first two years of college, and beyond.

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