

Education Research Center

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POLICY BRIEF

Descriptive Analyses for the Texas Regional STEM Degree Accelerator Grant Program: 2015-16 to 2017-18

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What We Studied

In 2015, it was estimated that the demand for STEM (Science, Technology, Engineering, and Mathematics) workers in Texas would outpace the supply of individuals with necessary qualifications.¹ In that year, just over half of students who attended four-year institutions fulltime earned a degree within six years. Completion rates were lower at two-year institutions, where 20 percent of fulltime students graduated within three years.² To address this identified need in increasing and accelerating STEM degree attainment, Educate Texas (<u>www.edtx.org</u>) implemented the Texas Regional STEM Degree Accelerator Initiative from 2015-2018.

Educate Texas granted funds and support to five regional cross-institutional teams of educators and workforce partners across the state of Texas to strategically increase the number of underrepresented students earning STEM degrees that meet identified workforce needs. Regional consortiums included two- and four-year institutions of higher education, local school districts, regional education service centers, and local employers and industry representatives. During the first phase of the initiative, consortium members examined regional workforce data and identified the STEM career pathway(s) for which they planned to work toward increased and accelerated degree attainment. Regional consortiums were charged with re-designing gateway courses in targeted STEM majors to align with necessary workforce skills and provided PD for faculty to support student-centered methods for teaching in STEM fields, with a focus on active learning and project-based learning.

Table 1 provides the five regional partnerships and the STEM degree pathways they targeted. Each team received

technical assistance from the Charles A. Dana Center Mathematics Pathway Project, which focuses on alignment of math pathways to college majors, and from Collaborative Economics, which supports the development of regional education-workforce partnerships. The first wave of STEM Acceleratortrained faculty began implementing new instructional practices in the fall semester of the 2016-17 academic year, and this work continued through the spring 2018 semester.

Table 1. Regional Consortia

Region	STEM Degree Pathway(s)
El Paso	Engineering
Houston/Gulf Coast	Petrochemical
North Texas/Dallas	Information Technology
South Texas	Health Care & Information Technology
West Texas	Energy

¹ Center on Education and the Workforce. Georgetown University. Retrieved August 28, 2015 from:

² National Center for Education Statistics, 2015. Retrieved August 28, 2015 from: <u>http://nces.ed.gov/pubs2013/2013152.pdf</u>



https://cew.georgetown.edu/wp-content/uploads/2014/11/stem-states-complete-update2.pdf

How We Analyzed the Data

Through classroom observations, student and faculty surveys, and extant course and professional development data, Gibson Consulting Group, Inc. (Gibson) and American Institutes for Research (AIR) assessed the extent to which faculty in regional consortia implemented these instructional approaches and infused an industry focus into targeted courses during the 2016-17 and 2017-18 academic years. AIR researchers accessed Texas Education Research Center data for first-time college students between 2011 and 2018.

Longitudinal descriptive analyses of key student outcomes were conducted statewide, and for the participating 2-and-4 year public institutions in each regional STEM Accelerator partnership³, comparing outcomes for first-time college students during the six years prior to the STEM Accelerator initiative (2011 through 2016) to those during the implementation years of the initiative (2016-17 and 2017-18). Analyzed student outcomes included rates of persistence during a student's first year in college (measured by fall-to-fall enrollment), STEM certificate, associate, and bachelor's degree attainment rates, the number of months to degree attainment, and transfer rates from 2-year colleges to 4-year universities for students in STEM majors.

The research team also explored student diversity in STEM degree programs. The evaluation was not designed to establish a causal connection between student outcomes and participation in the STEM Degree Accelerator program. The research team calculated changes in key student metrics to descriptively analyze trends over time.

What We Discovered

STEM Degree Attainment

For STEM associate degrees, in four out of five regions (El Paso, North, West and South Texas) first-time college students declaring STEM majors in participating community colleges experienced increases, on average, in the three-year degree attainment rate (see Figure 1). Statewide, the rate of associate degree attainment within three years for first-time college students declaring STEM majors was 13% at the end of the period studied.

Figure 1. Rate of Associate Degree Attainment within Three Years (Y axis) and Average Annual Change for First Time Community College Students Declaring STEM Majors, Statewide and by Region



³ All first-time college students declaring STEM majors attending a participating institution were included in analyzed cohorts. Students were *not* verified to have participated in courses redesigned through the initiative or other initiative activities.



First-time students in the three regions with participating public universities (El Paso, South, and North Texas) earned STEM bachelor's degrees at a higher rate during the initiative (see Figure 2). Statewide, four-year attainment rates for STEM first-time college students in public universities experienced a steady increase during the period analyzed, from 27% in 2011 to 32% in 2016.

Figure 2. Rate of Bachelor's Degree Attainment within Four Years (Y axis) and Average Annual Change for First Time 4-Year Public University Students Declaring STEM Majors, Statewide and by Region



Figure 1 and 2 Source: ERC, 2011-2018 student-level records Note: For each figure, the average annual percent of change in attainment rates is displayed inside the text box for the years prior to and during the implementation of the STEM Accelerator initiative. Only regions with public universities participating in this initiative are represented. Given the data available, it was possible to calculate three- and four-year attainment rates up to the 2016 cohort and 2015 cohorts, respectively.

Number of Months to Degree

In 2017 and 2018, first-time college students majoring in STEM in community colleges in three of the five regions (Houston, South and North Texas), experienced, on average, decreases in the average time to earn both a STEM certificate and associate degree. Comparatively, students in the El Paso and West Texas regions experienced increases in time to degree. Statewide, there was no change in the average time to earn an associate degree (approximately 60 months). For STEM bachelor's degrees, time to earn a degree slightly decreased, on average, in public universities statewide (approximately 60 months) and in the El Paso and South Texas regions during the initiative. No change was observed for students in participating public universities in the Dallas/North Texas region. As expected, part-time students have longer average times to earn an associate or bachelor's degree than full-time students statewide (approximately 10-15 months more for part-time students, across degrees).

Persistence

Statewide and in the El Paso, North Texas and South Texas regions, first-time college students in community colleges declaring STEM majors persisted, on average, at a lower rate during the 2017 and 2018 years compared to 2016 (see Figure 3). Students in participating community colleges in Houston and West Texas experienced, on average, increases in the one-year persistence rate. In participating four-year public universities, small decreases in the one-year persistence rate were observed regionally for first-time students declaring STEM majors (see Figure 4). No change over time was observed statewide.





Figure 3: Rates of First-to-Second-Year Persistence (Fall-to-Fall, Y axis) and Average Annual Change for First Time Community College Students Declaring STEM Majors, Statewide and by Regional Partnerships

Figure 4: Rates of First-to-Second-Year Persistence (Fall-to-Fall, Y axis) and Average Annual Change for First-Time 4-Year Public University Students Declaring STEM Majors, Statewide and by Regional Partnerships



Source: University of Texas Education Research Center longitudinal databases, 2011 – 2018. Note: For each figure, the average annual percent of change in one-year persistence rates is displayed inside the text box for the years prior to and during the implementation of the STEM Accelerator initiative.



Transfer Rates

The average rate of transfer from a community college to a public university within two years for first-time college students with declared STEM majors slightly increased statewide during 2016 and 2017, compared to years prior, going from 8% in 2011 to 12% in 2017 (see Figure 5). Across regional partnerships, transfer rates ranged approximately between 5% and 15% during the period analyzed (2011 to 2017). During the initiative, trends in transfer rates were mixed across regions with increases observed in community colleges in the North Texas and Houston regions, while transfer rates decreased for students in the West Texas region and remained fairly flat in the South Texas and El Paso regions.

Figure 5. Rate of Transfer to a 4-Year Public Institution Within Two Years and Average Annual Change for First-Time Community College Students Declaring STEM Majors⁴, Statewide and by Region



Source: University of Texas Education Research Center longitudinal databases, 2011 – 2018. Note: For each figure, the average annual percent of change in transfer rates is displayed inside the text box for the years prior to and during the implementation of the STEM Accelerator initiative. Given the data available, it was possible to calculate within two-year transfer rates up to the 2017 cohort.

STEM Enrollment and Student Diversity

In community colleges statewide, the number of first-time college students enrolled in STEM pathways decreased by about 9% between 2011 and 2018 (from 19,265 to 17,598 students) (see Table 2). During that time, there also was a decline in the overall number of first-time college students (12%). Among first-time college students enrolled in STEM pathways in community colleges, both the total number of Hispanic and Black students and their proportion out of total students increased during the initiative years (2017 and 2018) relative to 2016. Hispanic students were the largest racial group during the initiative years, having increased in representation from 38% in 2011 to 48% in 2018. Over the same time period, the proportion of female students decreased, with females representing 42% of the total number of students by 2018, down from 51% in 2011.

⁴ Note that the total number of students (N-denominator) across this table are smaller than the annual cohorts presented in the persistence rate tables only because students without valid social security numbers as student identification numbers were removed from the N-denominators because they could not be reliably tracked outside of their original institution.



The number of first-time college students enrolled in STEM pathways increased in public universities statewide by 54% between 2011 and 2018 (from 20,384 to 31,444 students). This increase was approximately twice that found overall among first-time college students (27%). Among first-time college students enrolled in STEM pathways in public universities, the total number of first-time STEM students increased during 2017 and 2018, as it had in prior years, with both Black and Hispanic students increasing their representation relative to White students. Between 2011 and 2018, the largest racial group of first-time STEM students changed from White (31% in 2018) to Hispanic students (40% in 2018). The proportion of female and male students remained fairly steady over time, with females representing 48% of the total number of students in 2018, up from 46% in 2011.

Table 2. Total Number of First-Time in College Students in Texas Community Colleges and 4-Year Publ	lic
Universities with STEM Majors and its Proportion by Race and Gender	

Texas State	2011	2012	2013	2014	2015	2016	2017	2018			
Community Colleges											
Enrollment, STEM	19,265	18,779	18,826	19,253	18,668	17,664	16,515	17,598			
White, STEM	37%	36%	36%	35%	34%	31%	32%	29%			
Black, STEM	14%	14%	13%	13%	11%	10%	11%	12%			
Hispanic, STEM	38%	40%	42%	44%	45%	48%	47%	48%			
Other Races, STEM	11%	10%	9%	8%	10%	11%	10%	11%			
Female, STEM	51%	50%	48%	46%	44%	41%	40%	42%			
4-Year Public Universities											
Enrollment, STEM	20,384	21,942	22,935	24,520	27,509	28,331	30,231	31,444			
White, STEM	40%	37%	36%	36%	34%	33%	32%	31%			
Black, STEM	13%	12%	12%	11%	11%	10%	10%	11%			
Hispanic, STEM	31%	34%	34%	36%	37%	37%	38%	40%			
Other Races, STEM	16%	17%	18%	17%	18%	20%	20%	18%			
Female, STEM	46%	47%	48%	48%	47%	47%	47%	48%			

Source: University of Texas Education Research Center longitudinal databases, 2011 – 2018. Note: the other races category was composed of students who self-identified as Asian or Pacific Islander, American Indian or Alaskan Native, or students with unknown or unreported racial information, as well as international students.

Summary

As part of the broader evaluation, the research team found that the STEM Degree Accelerator initiative was successful in executing its goal of improving instructional methods in STEM courses across the five regional partnerships in Texas. Based on faculty surveys, student surveys, and classroom observations, the team found strong evidence that instructional methods in STEM course sections taught by participating faculty included instructional techniques more aligned with active and collaborative learning and project-based learning, and student engagement appeared to be higher in those courses.

Survey and interview data also revealed that, as a result of STEM Degree Accelerator participation, collaboration and communication between school district personnel, community college faculty, 4-year university faculty, and local employers improved.

The evaluation was not designed to establish a causal connection between student outcomes and participation in the STEM Accelerator program. Longitudinal descriptive analyses were conducted statewide and for the regional STEM Accelerator partnerships. Overall highlights include:

• Increases in STEM associate degree and bachelor's degree attainment rates were observed across most colleges participating in the regional partnerships and statewide.



- Trends in one-year rates of persistence in college, months to STEM degree attainment, and transfer rates from 2-to-4-year colleges were mixed across the regional partnerships and only minor shifts in statewide rates were observed over time.
- In community colleges statewide, the number of first-time college students enrolled in STEM pathways decreased by about 9% between 2011 and 2018, compared to a 12% decline overall across all majors. Among first-time college STEM majors, the number of Hispanic and Black students increased compared to White students statewide during 2017 and 2018, compared to prior years. A decline in female students enrolled in 2-year colleges declaring a STEM major was evident over the 2011 to 2018 period, compared to males.
- In public universities statewide, the number of enrolled first-time college students increased during 2017 and 2018, compared to prior years, with numbers increasing at a higher rate for students declaring STEM majors. Among first-time college STEM majors, both Black and Hispanic students increased in numbers relative to White students. The proportion of female and male first-time college students with STEM declared majors in public universities statewide remained fairly steady over time.



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