Women in STEM Workforce Index | 2020

EXECUTIVE SUMMARY

While there are notable gains in female representation in the STEM workforce since our 2018 report, many challenges persist. As the demand for STEM talent increases, women's share of those jobs remain relatively flat. In an equitable workforce, men and women enjoy equal representation and equal pay. We're not there yet in the fields of STEM. In key areas, San Diego County is leading the way in positive trends that promote women in STEM, but in other areas, it lags. The UC San Diego Extension Center for Research and Evaluation analyzed the most recent publicly available data from the US Census and other sources to unveil the state of women in STEM. The most recent IPUMS micro-level census data is from 2018. Workforce trends are examined by STEM occupation, the educational achievement of STEM students at the K-12 and postsecondary levels are also evaluated. The data analysis compares representation of women both at the national and local San Diego level.

NATIONAL OUTLOOK

- The national demand for STEM talent is climbing with 11.2 million STEM jobs in 2018, a 9% increase since 2016
- There are more women than ever represented in the STEM workforce, but their share of jobs remains low with only 1 in 4 STEM jobs held by women
- Women's share of Life and Physical Sciences jobs increased by 16% since 1990
- Women's share of jobs in the largest STEM category—Computers and Math— decreased from 44% in 1990 to 27% in 2018 and women hold the fewest share of STEM jobs in the Engineering and Surveying sector at 16%
- Women in STEM earn $20,000 less per year than men in STEM, the pay disparity increased by 3% between 2010 and 2015, and has remained stable at 23% in recent years.
- Boys and girls perform at the same level in K-12 math and women enter higher education at higher rates than men, but women only earn 36% of STEM bachelor's degrees nationally, a rate that varies from 11% to 58% globally

SAN DIEGO OUTLOOK

- The number of STEM jobs in San Diego increased 77% since 1990
- San Diego County added 4,523 women to the local STEM workforce between 2016 and 2018, a rate of increase faster than the national average
- For the first time in history, women now hold an equal 50% share of the Life and Physical Sciences jobs in San Diego County, and their share of Engineering and Surveying jobs increased by 5%, between 2016 and 2018
- San Diego reduced the gender pay gap in STEM below the national average, with marked progress in recent years. Notably, San Diego has narrowed the pay gap from 33% in 2015 to 18% in 2018, 5% below the national average.
- San Diego K-12 students perform higher than the California averages on standardized math tests, and UC San Diego has a larger share of female STEM graduates than the national average—42% locally compared with 36% nationwide
- San Diego witnessed a steep drop in the share of STEM Management jobs held by women in recent years with 14% locally compared to 26% nationally



WOMEN IN STEM WORKFORCE INDEX **2020**

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UC San Diego EXTENSION

CR+E CENTER FOR RESEARCH + EVALUATION

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National Outlook

- The national demand for STEM talent is climbing with 11.2 million STEM jobs in 2018, **a 9% increase since 2016**

- **There are more women than ever represented in the STEM workforce,** but their share of jobs remains low with only 1 in 4 STEM jobs held by women

- **Women's share of *Life and Physical Sciences* jobs increased by 16%** since 1990

- Women's share of jobs in the largest STEM category—*Computers and Math*— **decreased from 44% in 1990 to 27% in 2018** and **women hold the fewest share of STEM jobs in the *Engineering and Surveying* sector at 16%**

- **Women in STEM earn $20,000 less** per year than men in STEM, the pay disparity *increased* by 3% between 2010 and 2015, and has remained stable at 23% in recent years.

- Boys are girls perform at the same level in K-12 math and **women enter higher education at higher rates than men,** but women only earn 36% of STEM bachelor's degrees nationally, a rate that varies from 11% to 58% globally

San Diego Outlook

- The number of STEM jobs in San Diego increased 77% since 1990

- San Diego County added 4,523 women to the local STEM workforce between 2016 and 2018, a rate of increase faster than the national average

- For the first time in history, women now hold an equal 50% share of the *Life and Physical Sciences* jobs in San Diego County, and their share of *Engineering and Surveying* jobs increased by 5%, between 2016 and 2018

- San Diego reduced the gender pay gap in STEM below the national average, with marked progress in recent years. Notably, San Diego has narrowed the pay gap from 33% in 2015 to 18% in 2018, 5% below the national average.

- San Diego K-12 students perform higher than the California averages on standardized math tests, and UC San Diego has a larger share of female STEM graduates than the national average—42% locally compared with 36% nationwide

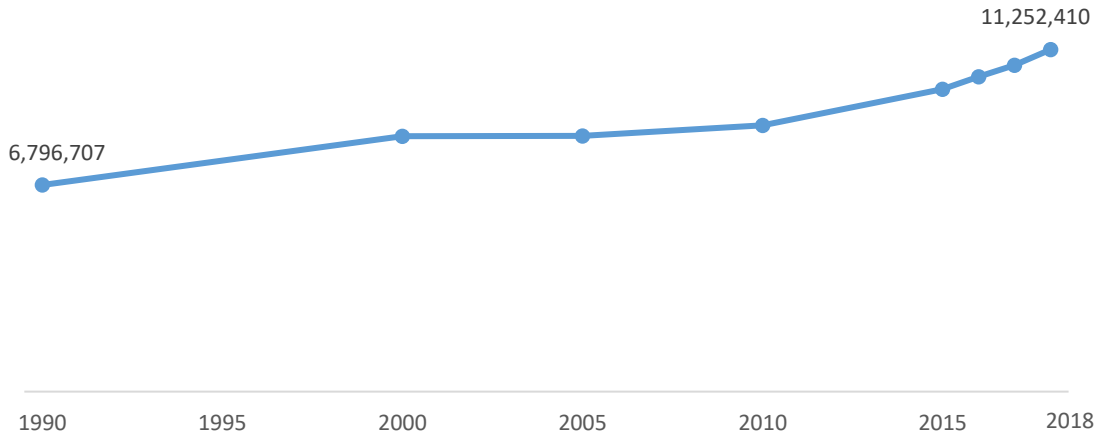
- San Diego witnessed a steep drop in the share of STEM *Management* jobs held by women in recent years with 14% locally compared to 26% nationally

The State of the STEM Workforce

The demand for STEM talent is higher than ever and despite widespread efforts to increase women's representation in the science, technology, engineering, and mathematics fields, women hold only 1 of every 4 STEM jobs nationally. In addition to the gender inequities in STEM, women annually earn almost $20,000 less than their male STEM counterparts. Although much progress has been made to ensure men and women are paid equally for doing the same job, few gains have occurred to improve female representation at the executive level across all fields, and particularly in STEM. This relative dearth of women in high-level leadership positions translates to a substantial pay gap between men and women in STEM.

In 2018, the national STEM workforce featured 11.2 million employees, equating to a 9% increase in STEM jobs between 2016 and 2018. The period between 2015 and 2018 experiences an even higher growth at 13%. The demand for STEM talent increased by 66% since 1990. Figure 1 illustrates the growth of STEM jobs nationwide.

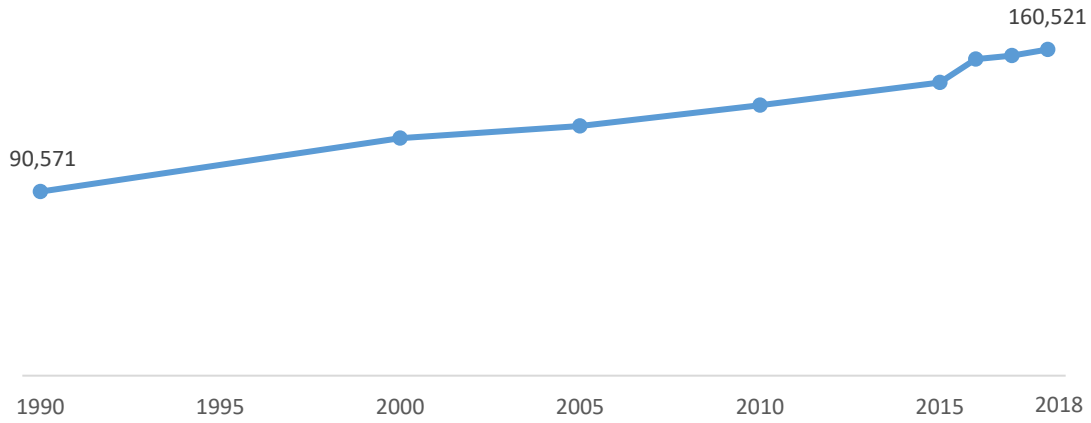
Figure 1: STEM Jobs | U.S.[1]



San Diego County also experienced a positive growth trend in STEM jobs. San Diego witnessed a 3% growth rate from 2016 to 2018. Paralleling national trends, there was greater increase in San Diego STEM jobs between 2015 and 2018 (11%). The demand for STEM talent in San Diego County has increased by 77% since 1990. Figure 2 illustrates the growth rate for STEM jobs in San Diego County.

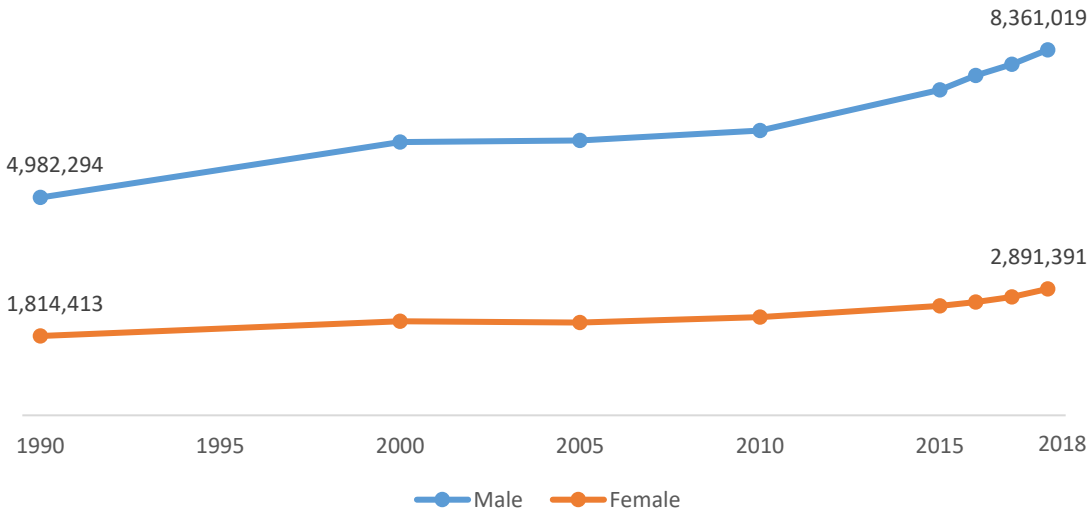
[1] Steven Ruggles, Sarah Flood, Ronald Goeken, Josiah Grover, Erin Meyer, Jose Pacas and Matthew Sobek. IPUMS USA: Version 10.0 [Extract of American Community Survey]. Minneapolis, MN: IPUMS, 2020. https://doi.org/10.18128/D010.V10.0

Figure 2: STEM Jobs | San Diego County[1]



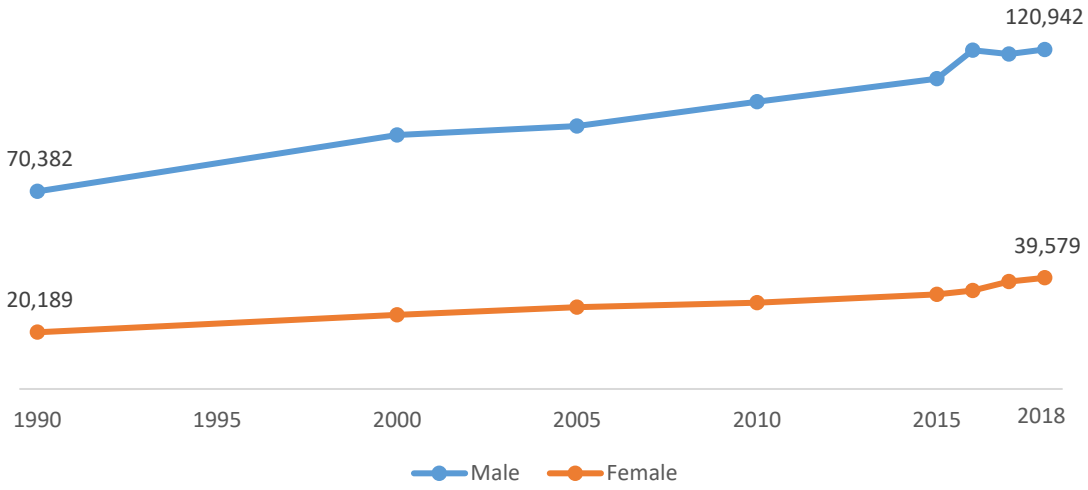
Men outnumber women in STEM jobs both locally and nationally, as illustrated in Figure 3. As the number of STEM jobs has increased over time, women's share of the STEM workforce remains relatively constant. While there are more women than ever in the STEM jobs, women are not filling new STEM jobs at the rate of their male peers. Over the last 30 years, women have represented 26% of the national STEM workforce, on average.

Figure 3: STEM Jobs By Gender Over Time | U.S.[1]



In San Diego County, the number of women in STEM jobs has increased slowly over time, with a notable uptick in recent years. In 2016, there were 35,056 women in San Diego holding STEM jobs and by 2018 that increased by 2% to 39,579, equaling 25% of the local STEM workforce. San Diego STEM job trends are presented in Figure 4.

Figure 4: STEM Jobs By Gender Over Time | San Diego County [1]



Women are consistently represented at roughly 25% of the STEM workforce over the past 30 years. Figure 5 displays the most current data available for the percentage of women in STEM jobs nationwide and in San Diego County. Between 2015 and 2018, the female share of STEM jobs increased by 1% nationwide, and by 2% in San Diego County; Figure 6 illustrates these trends.

Figure 5: STEM Jobs By Gender | 2018 [1]

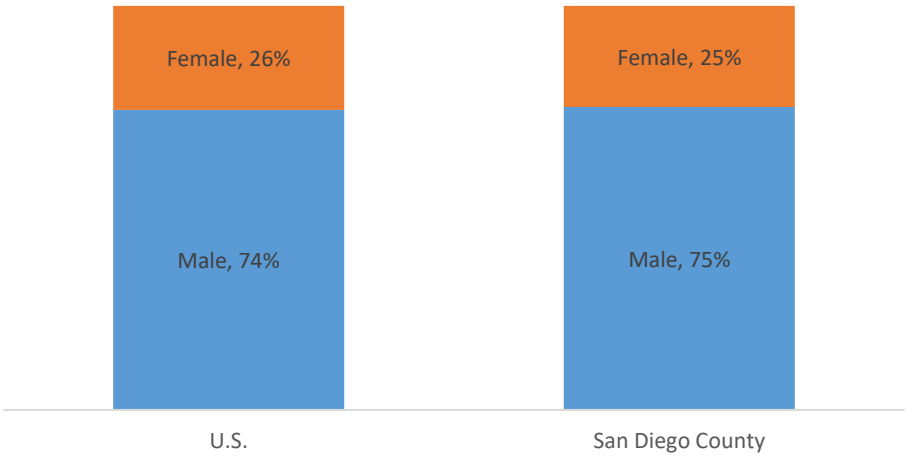
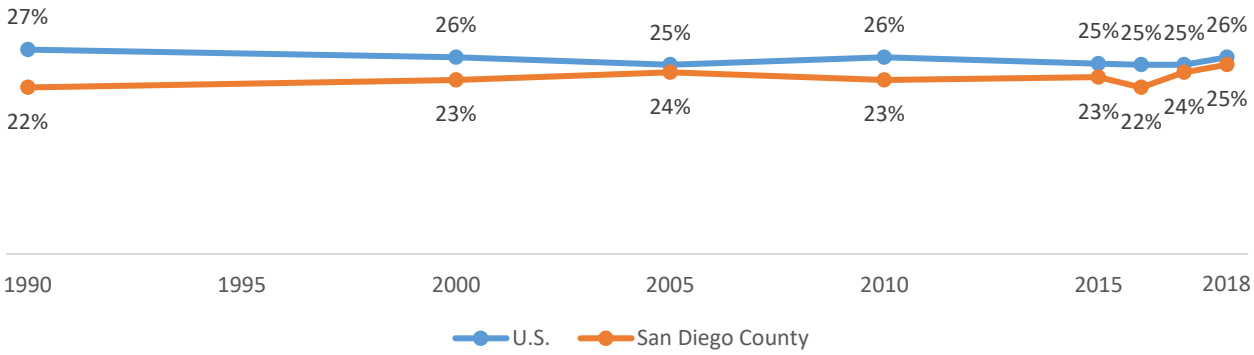


Figure 6: Women in STEM [1]



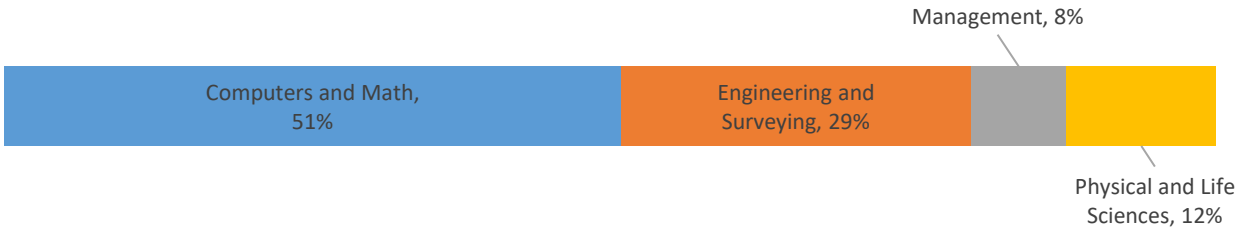
Trends by STEM Occupations

STEM jobs are classified into four occupational groups by the US Bureau of Labor Statistics:

> **Computers and Math**: Computer Scientists and Systems Analysts, Computer Programmers, Software Developers, Database Administrators, Network and Computer Systems Administrators, Operations Research Analyst, Mathematic Science Occupations.
>
> **Engineering and Surveying:** Surveyors Cartographers, and Photogrammetrist, Aerospace Engineers, Chemical Engineers, Civil Engineers, Computer Hardware Engineers, Electrical and Electronics Engineers, Environmental Engineers, Industrial Engineers, Drafters, Engineering Technicians, Surveying and Mapping Technicians, etc.
>
> **Physical and Life Sciences:** Medical Scientists and Life Scientist, Atmospheric and Space Scientists, Chemists and Materials Scientists, Environmental Scientists, and Geoscientists, Physical Scientists, Biological Technicians, Chemical Technicians, etc.
>
> **Management:** Computer and Information Systems Managers, Architectural and Engineering Managers, and Natural Science Managers.

A closer look at the occupational groups within STEM reveals that the majority of jobs are in the *Computers and Mathematics* sector, followed by *Engineering and Surveying*. Figure 7 shows the nationwide breakdown of STEM jobs by sector.

Figure 7: National STEM Jobs | 2018 [1]



Female representation in the STEM workforce varies by sector (see Figure 8). In 2018, women held 42% of the *Physical and Life Sciences* jobs nationwide. Despite a slight decrease at the national level in recent years, this sector has the most even distribution of men and women of the four STEM fields. Since 1990, there has been a 16% increase in the number of jobs held by

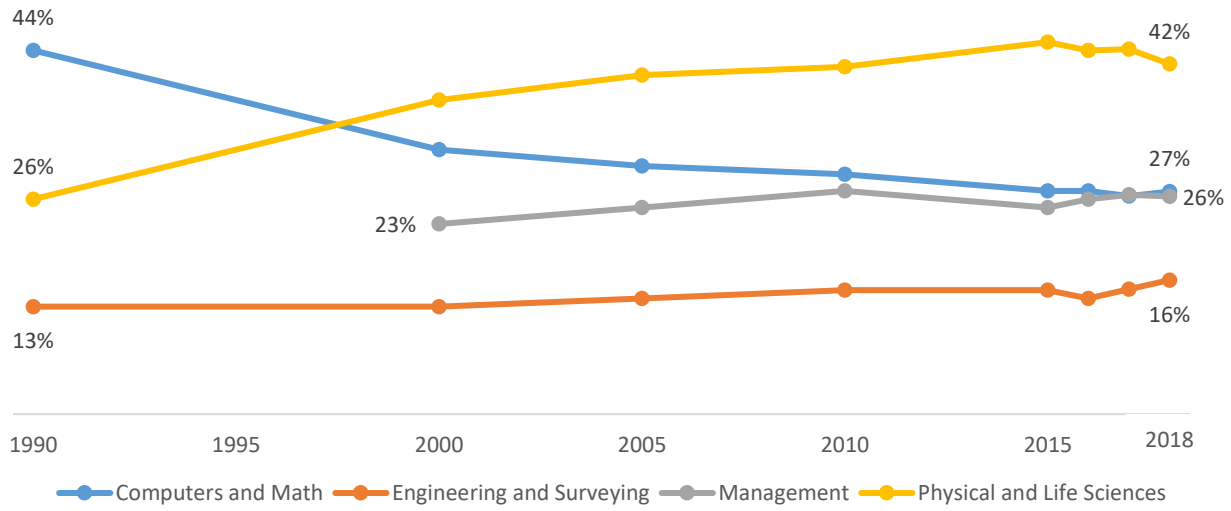
women in this group (an increase of 151,745 jobs). Although the *Physical and Life Sciences* sector is more equitable in terms of gender representation, this sector also has the smallest share of STEM jobs out of the 4 categories, constituting approximately 1.4 million total jobs nationwide in 2018.

The largest STEM field is *Computers and Math*, accounting for 51% of the STEM workforce, nearly 5.7 million jobs. Women's share of these jobs decreased from 44% in 1990 to 27% in 2018. Even though the raw number of women in these STEM jobs has increased by 532,445, the female share has decreased because women are not entering new *Computers and Math* jobs at the same rate as men.

The second largest STEM field is *Engineering and Surveying*. This sector has the lowest representation of women—only 16% in 2018 (526,459 of 3.2 million jobs). However, between 2016 and 2018, there has been a 2% increase in the number of jobs held by women in *Engineering and Surveying*, which can be seen in Figure 8.

STEM *Management* positions were not tracked uniquely until 2000. Women's share of this STEM category remains relatively stable over the past 20 years with women holding 26% of STEM management positions in 2018.

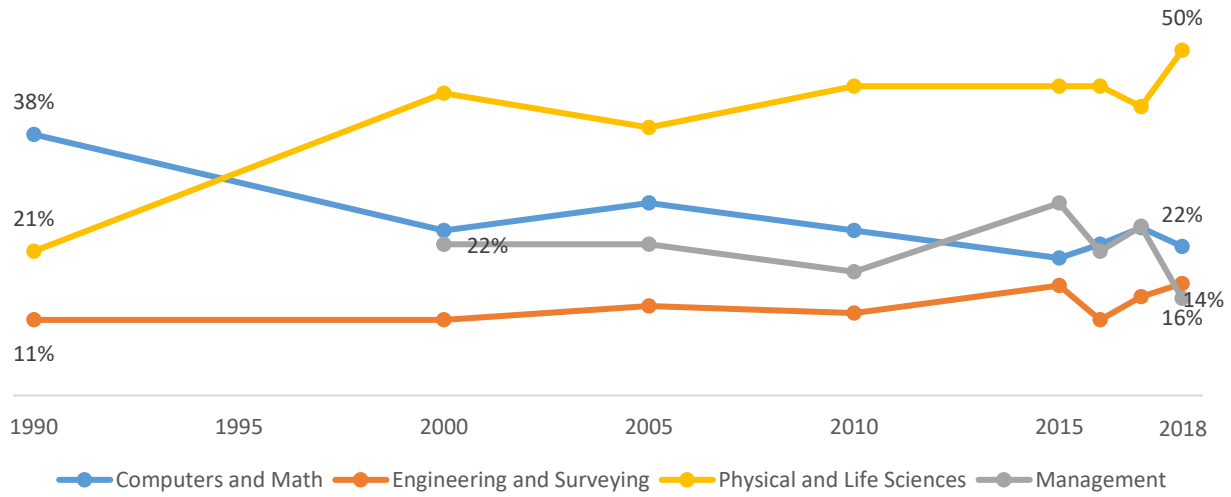
Figure 8: Women in STEM Workforce | U.S. [1]



Female representation in STEM jobs in San Diego County varies slightly from national trends. Fewer San Diego women hold jobs in the *Computers and Math* sector (22% share in San Diego County vs. 27% nationwide), a similar number in *Engineering and Surveying* (16% share in San Diego County and nationwide), and more women hold jobs in the *Physical and Life Sciences* locally than nationally (50% share in San Diego County vs. 42% nationwide). There are substantially fewer women in STEM *Management* positions in San Diego County than there are nationwide—only 14% of the STEM *Management* jobs in San Diego are held by women, compared with 26% nationwide. Figure 9 shows the representation of women in STEM jobs in San Diego County by occupation group, the grey line that tracks women in STEM *Management* occupations shows a steep drop in recent years.

Between 2016 and 2018, San Diego experienced a 5% increase in the number of *Physical and Life Sciences* jobs held by women, granting women's representation with an equitable 50% for the first time in history. The *Engineering and Surveying* field also experienced a 5% increase in the number of jobs held by women during this time period. In contrast, the *Management* category had a 7% decrease while *Computers and Math* remained constant.

Figure 9: Women in STEM | San Diego County [1]



Economic Disparities

STEM gender inequities are also evident when evaluating positions and pay. In 2018, the average national salary for men in STEM occupations was $82,779, compared with $63,759 for women. Extensive research supports the conclusion that this pay gap is not just due to pay disparities for equal-level positions, but rather largely a result of less female representation in higher-level, higher-paying positions (see for example, McKinsey & Company's 2018 Women in the Workplace report). This pattern is echoed in San Diego County where the mean wage for men in STEM is $87,955, and the mean wage for women is $71,779.

Overall, the gender pay gap has been decreasing since 1990, however, there have been fluctuations with periodic increases in the pay gap over the last 30 years. Notably, Figure 10 shows San Diego has decreased the wage gap below the national average in recent years after a peak disparity in 2015.

Figure 10: Gender Pay Gap [1]

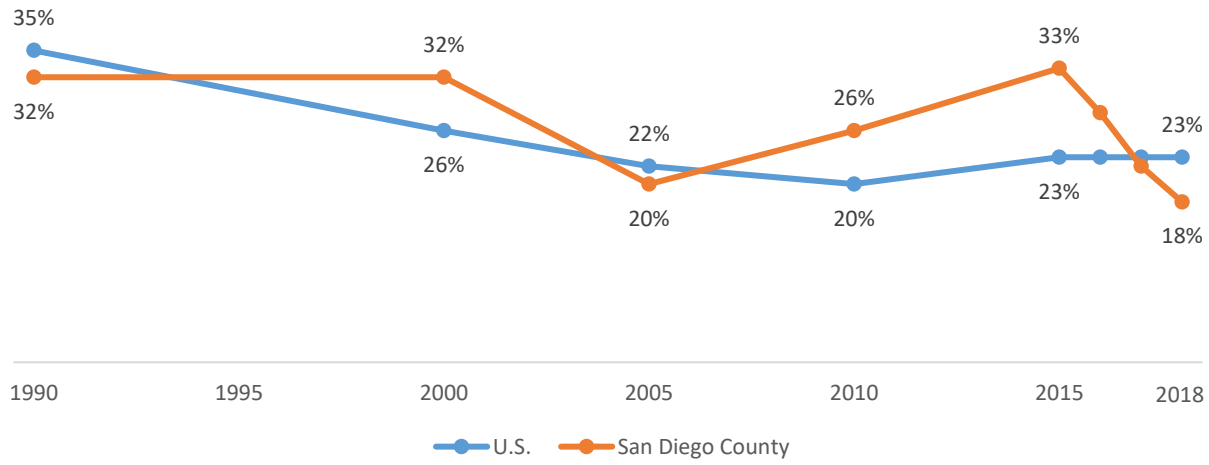
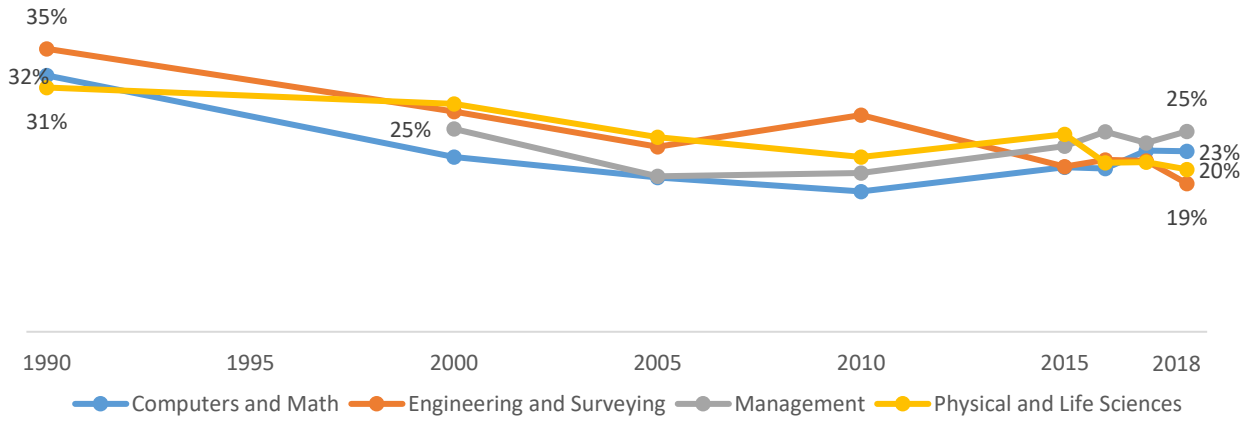


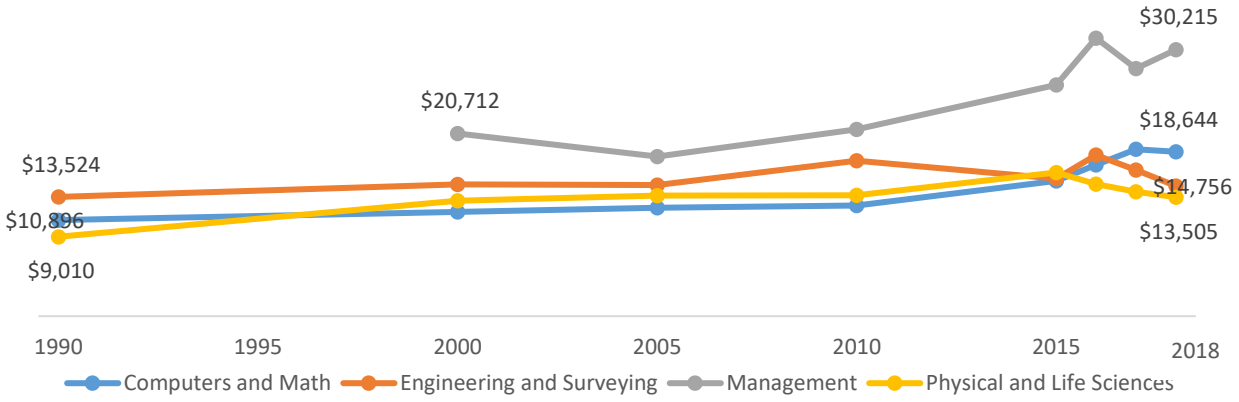
Figure 11 shows the national pay gap by each STEM field. There is a consistent downward trend for most sectors, which demonstrates progress towards closing the pay and position disparity gap. The *Engineering and Surveying* sector experienced the most substantial closing of the pay/position gap in recent years, decreasing by 2% between 2016 and 2018. This STEM field has the lowest pay gap with an average difference of 19% between men's and women's salaries. The gap in STEM *Management* positions remains at 25%.

Figure 11: Gender Pay Gap | U.S [1]



Pay disparities in male and female STEM salaries are shown in US dollars in Figure 12. The smallest discrepancy in wages is within the *Engineering and Surveying* field, with an annual difference of $13,505 in 2018. On the other end of the spectrum, the biggest gap in earnings is in *Management* positions. In 2018, women in STEM *Management* earned $30,215 less a year, on average, than their male peers in STEM *Management*.

Figure 12: Average Difference Between Women's and Men's STEM Salaries in Dollars | U.S. [1]



Growing and Emerging STEM Careers

National job posting data identified the top STEM jobs associated with significant increases in the number of postings over the past five years. Half of these fast-growing and emerging jobs are in the *Computer and Math* sector, followed by *Engineering and Surveying*, and then *Management*. Figure 13 shows the percentage increase in the number of job postings between 2015 and 2019. These rapidly growing and emerging jobs represent opportunities for greater female representation in STEM.

Figure 13: Emerging STEM Jobs [2]

Category	Title	2015	2019	% Change
Computer and Math	Devops Engineer	18,002	56,757	215%
Computer and Math	Data Engineer	22,912	66,081	188%
Computer and Math	Computer Information Research Scientists	24,325	50,324	107%
Computer and Math	UX Designer	15,941	30,789	93%
Engineering and Surveying	Surveyors, Cartographers, Photogrammetrist	7,064	13,541	92%
Engineering and Surveying	Maintenance Technician	99,032	187,755	90%
Management	Architectural Project Manager	2,222	4,206	89%
Management	Systems Engineering Manager	1,826	3,320	82%
Engineering and Surveying	Civil Engineer	18,798	32,700	74%
Computer and Math	Software Development Engineer	158,296	274,789	74%

[2] Burning Glass Technologies. (2019) "Labor Insight™ Real-Time Labor Market Information Tool." Retrieved April 10, 2020.

STEM Education | United States

The number of women entering the STEM workforce is low relative to their representation in the population. In order to help understand this trend, it is useful to examine the educational performance and trajectories of boys and girls in K-12 STEM education, and the gender distribution of students enrolling in and completing STEM degrees at the postsecondary level.

Nationwide, public school students take the standardized National Assessment of Educational Progress test (NAEP). As seen in Figure 14, average math test scores between genders are very similar at 4th and 8th grade.

Figure 14: Average NAEP Mathematics Test Scores | U.S [3]

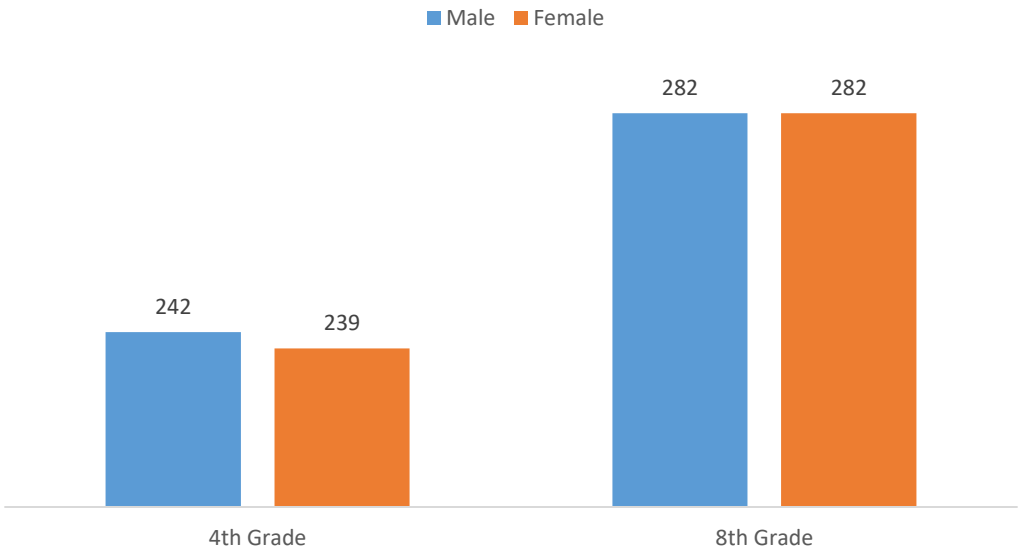
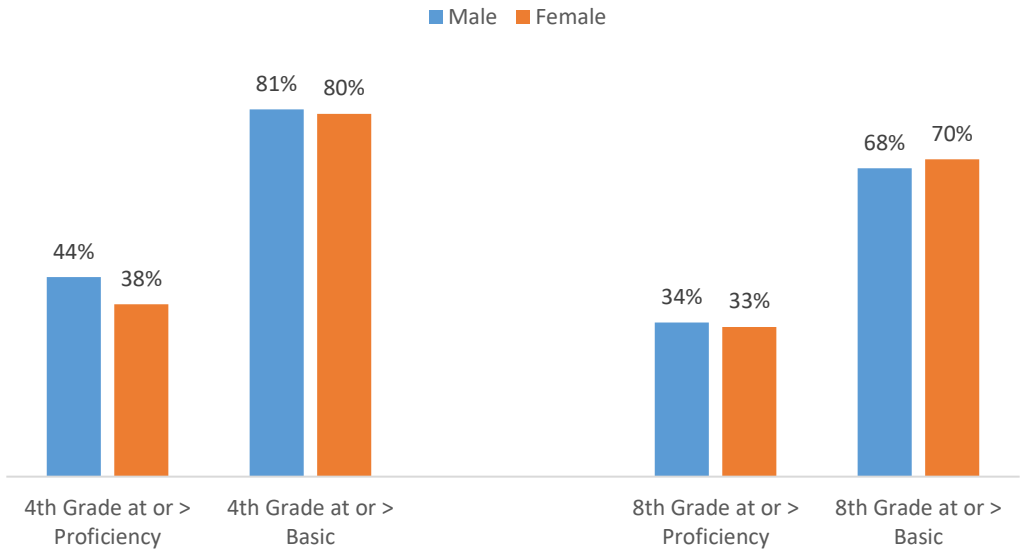


Figure 15 shows the percentage of each gender achieving at basic and proficient levels. Rates are similar across genders. However, slightly more 4th grade boys met the proficiency standard in math. This trend appears to dissolve in later grade levels.

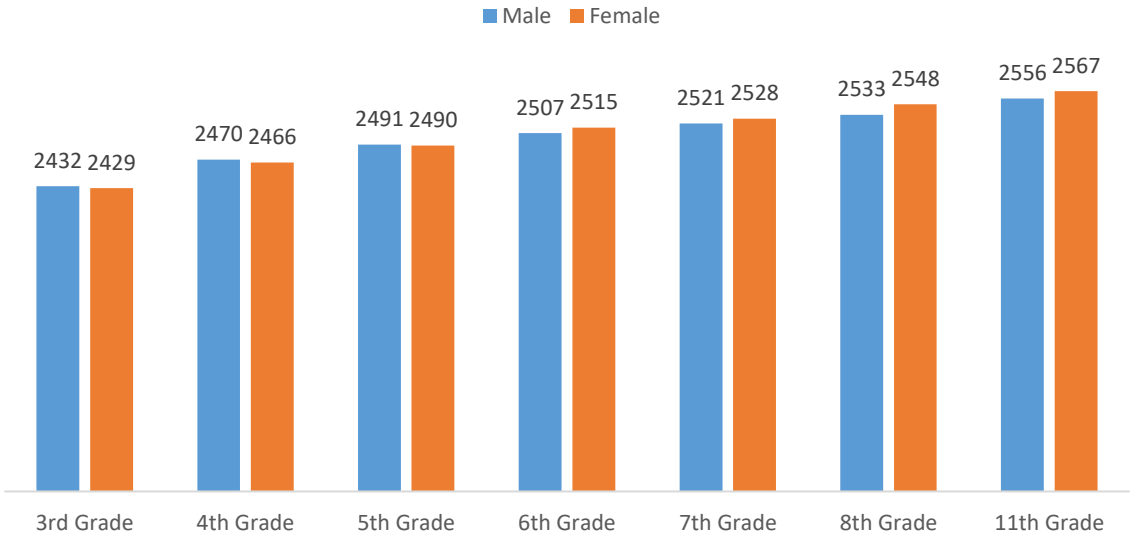
[3] "NAEP Achievement-Level Results." The Nation's Report Card, 15 Apr. 2020, www.nationsreportcard.gov/tel/results/achievement/

Figure 15: Percentage of U.S. Students Performing at or Above Proficiency on NAEP Mathematics Test | U.S [3]



California's standardized math test scores were also analyzed (California Assessment of Student Performance and Progress, CAASPP). Boys and girls performed at the same level with a negligible difference between math test scores across all grades. Figure 16 shows the mean California CAASPP scores by gender and grade.

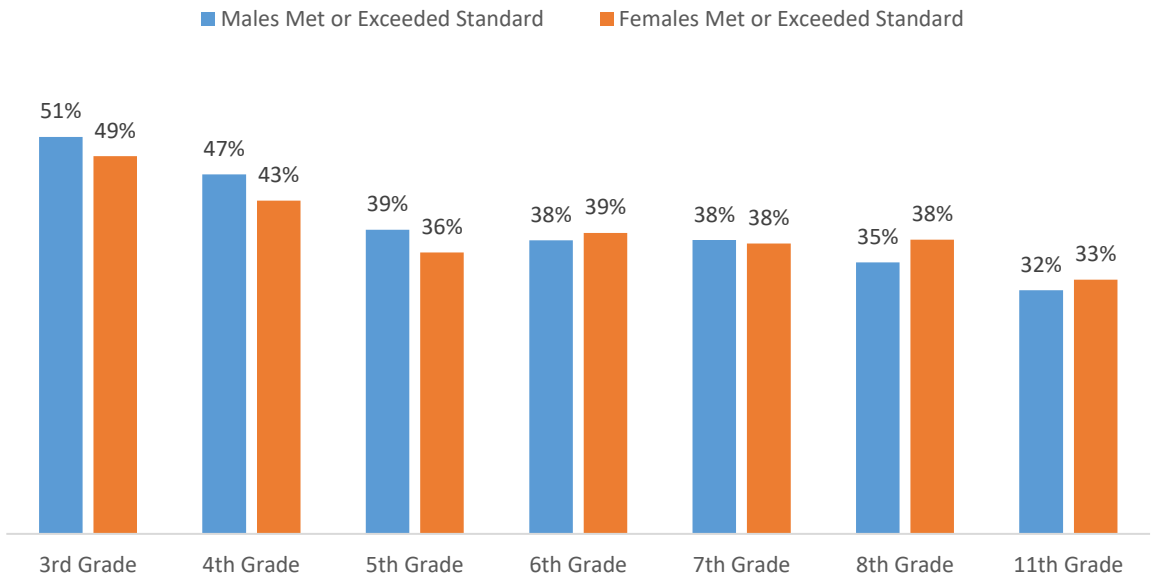
Figure 16: CAASP Math Scores by Gender | California [4]



[4] "English Language Arts/Literacy and Mathematics Smarter Balanced Summative Assessments." 2018–19 View Smarter Balanced Test Results at a Glance, 15 Apr. 2020, caaspp-elpac.cde.ca.gov/caaspp/DashViewReport?ps=true&lstTestYear=2019&lstTestType=B&lstGroup=1&lstSubGroup=1&lstSchoolType=A&lstGrade=13&lstCounty=00&lstDistrict=00000&lstSchool=0000000.

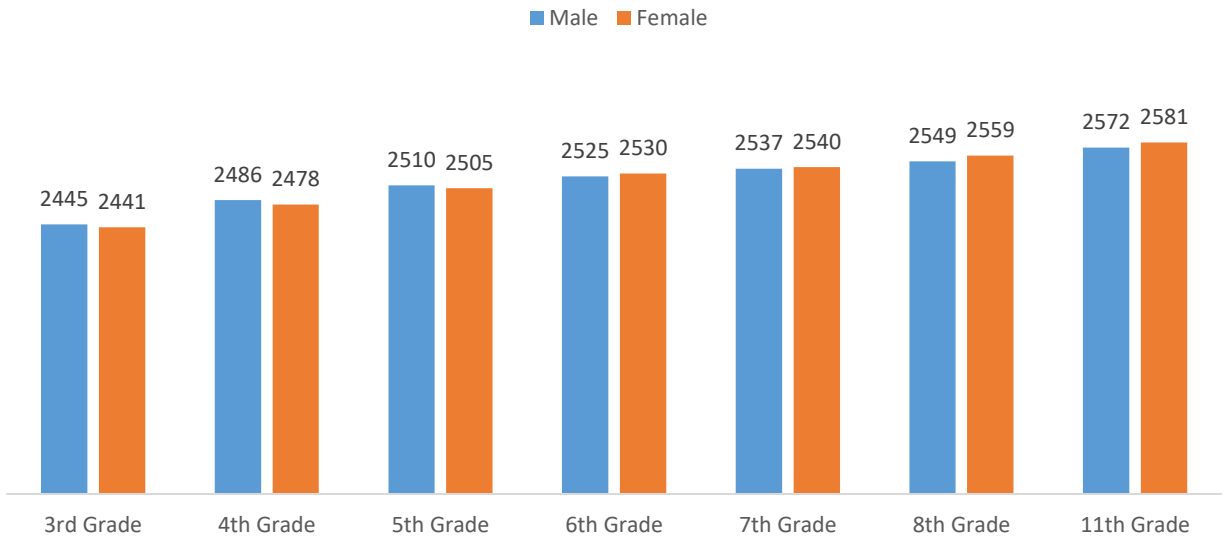
Figure 17 shows the percent of students that met or exceeded CAASP math scores by grade. Although there are some gendered differences in math scores, the variance is small ranging from 0% to 4%. In primary school (through 5th grade), girls meet standards at rates slightly lower than boys, but this trend flips at the 6th grade level with a higher percentage of girls meeting standards.

Figure 17: Percent of Students by Gender that Met or Exceeded CAASP Math Standard | California [4]



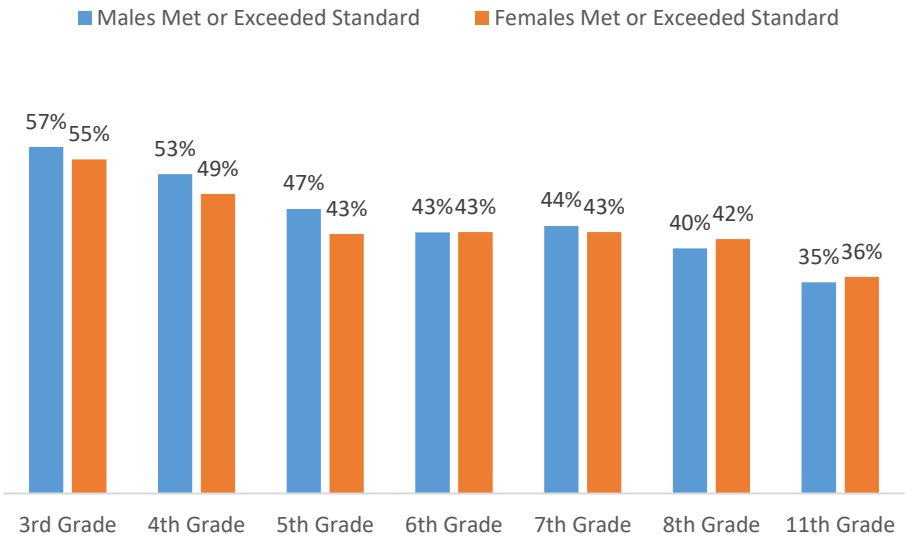
These gendered trends in CAASP math test scores are also observed in San Diego County, as is illustrated in Figure 18.

Figure 18: CAASP Math Scores | San Diego County [4]



In San Diego County, a higher percent of students of all genders met or exceeded the CAASP math standards, compared with the rest of California. As Figure 19 illustrates, the variance in test scores between genders is small and consistent with statewide patterns.

Figure 19: Percent of Students by Gender that Met or Exceeded CAASP Math Standards | San Diego County [4]



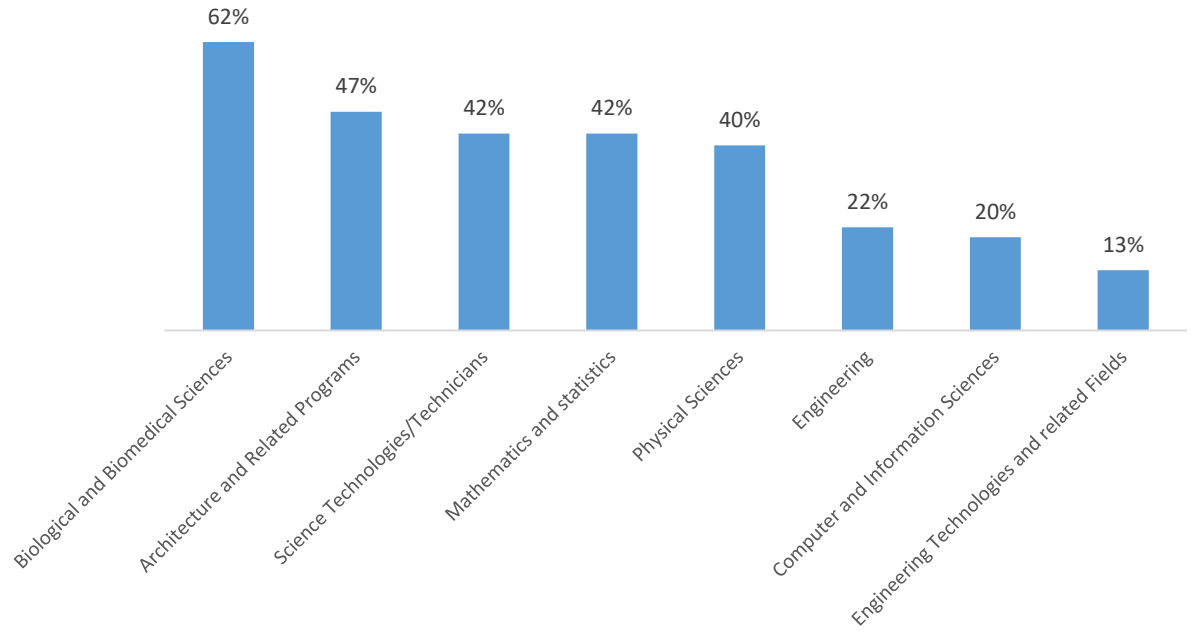
When evaluating gendered STEM trends in higher education, far fewer STEM degrees are earned by women than men. Figure 20 shows this gender distribution.

Figure 20: Gender Distribution of STEM Bachelor Degrees | U.S [5]

Figure 21 shows 2018 STEM degree completions by discipline. Overall, women earned 36% of STEM degrees awarded in 2018. A higher percentage of women than men earned bachelor's degrees in the *Biological and Biomedical Sciences* (62% of 118,763 degrees), but a much smaller share of women earned bachelor's degrees awarded in *Engineering Technologies and Engineering-related Fields* (13%).

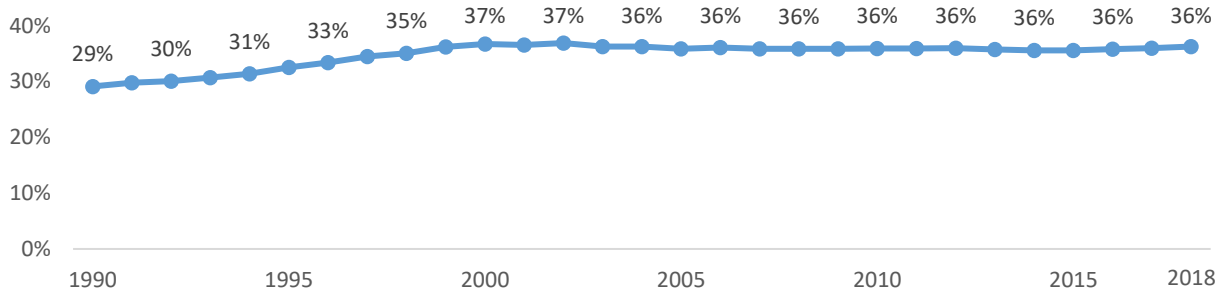
[5] U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics. (IPEDS)

Figure 21: Share of Women Completing STEM Degrees by CIP [5]



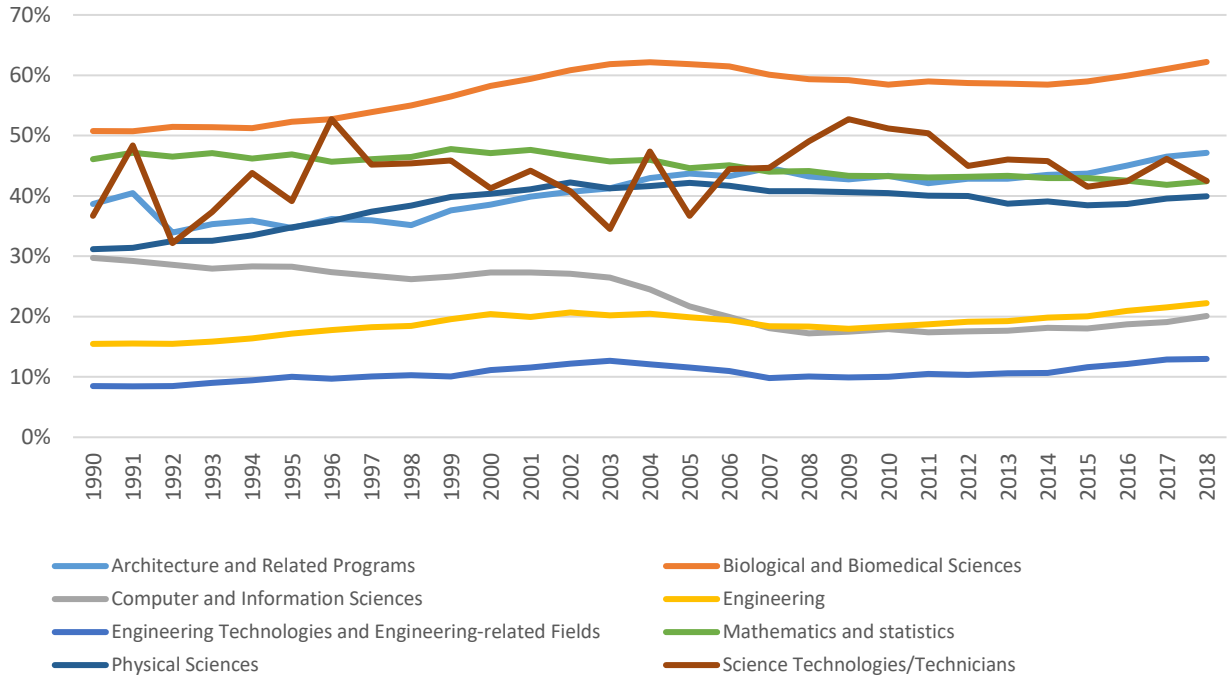
Despite a 10% increase in the percentage of STEM degrees earned by women between 1990 and 2000, the share of STEM degrees earned by women has remained constant at 36% for the past 20 years (see Figure 22).

Figure 22: STEM Post-Secondary Degrees, Percent Female [5]



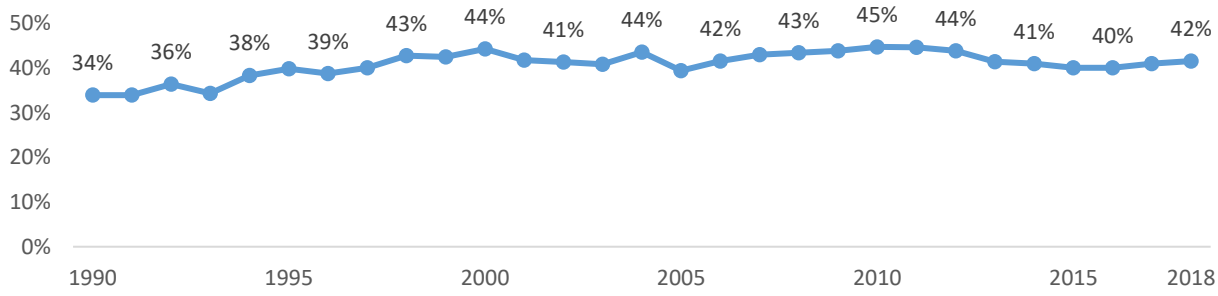
Since 1990, the share of women completing *Computer and Information Science* programs has dropped by ten percent, even though *Computers and Math* is the STEM occupation group experiencing the most job growth. This trend is shown in Figure 23.

Figure 23: Female Shares of STEM Post-Secondary Degrees (by CIP) [5]



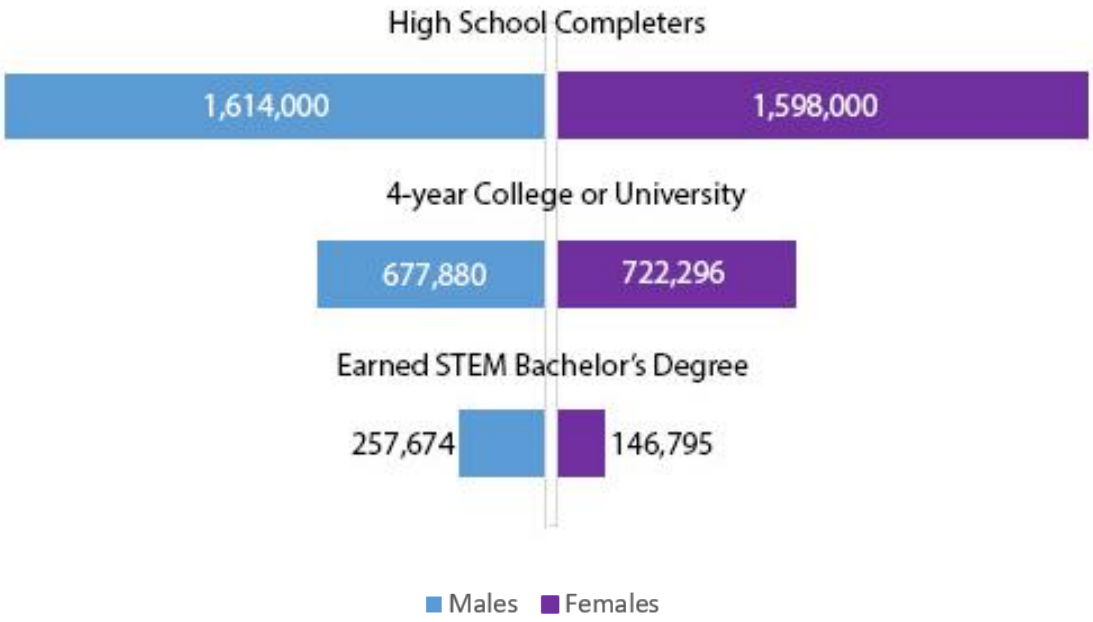
In 2018 there were 146,795 women in the United States who graduated with a bachelor's degree in STEM, representing 36% of all STEM graduates. The percentage of STEM degrees completed by women at UC San Diego, the regions premier STEM institution, was significantly higher at 42% (1,656 female STEM graduates). Historically, UC San Diego has been graduating women in STEM at higher rates than those observed nationwide.

Figure 24: STEM Bachelor's Degrees, Percent Female | UC San Diego [5]



National primary and secondary school data suggest that boys and girls perform at similar levels in mathematics. However, as women enter higher education at greater rates than men, female rates of enrollment in STEM majors are substantially lower than males. Figure 25 shows a funnel of the STEM education pipeline that undergirds the workforce.

Figure 25: STEM Education Funnel to Workforce | U.S

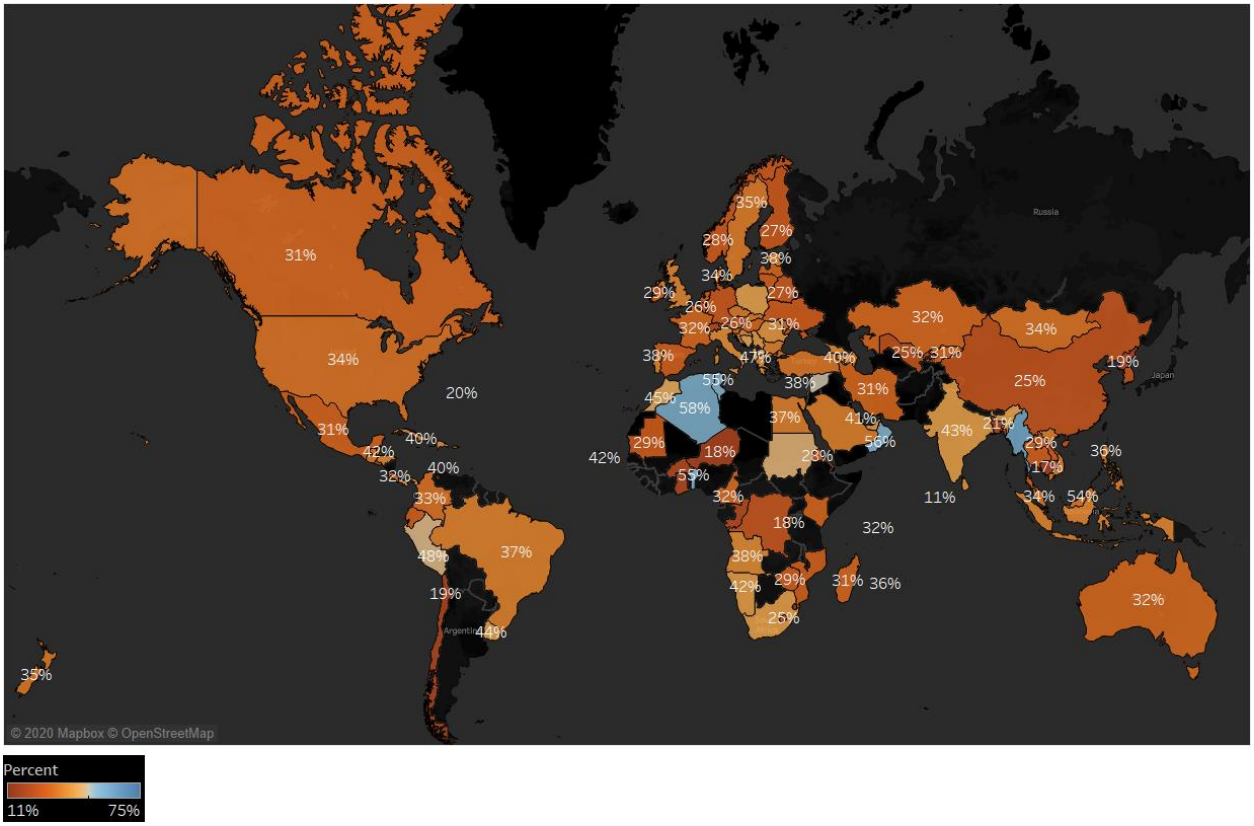


STEM Education | Global

Data from the UNESCO Institute of Statistics was analyzed to better understand STEM education trends on a global scale (most recent available data from 2013 through 2019 was analyzed).[6] As can be seen in Figure 26, the share of women earning STEM degrees varies by country from a low of 11% in parts of Asia to a high of 58% in parts of Africa, demonstrating that the 36% share held by women in the United States is not a ceiling.

[6] UNESCO Institute of Statistics (UIS), 10 April 2020, http://data.uis.unesco.org/#.

Figure 26: Share of Women Graduating with STEM Degrees | Global [7]



Conclusion

While many efforts are directed towards promoting female representation in STEM—and some gains have been realized—there is still much progress to be made. Women are competent in STEM, but they don't purse postsecondary STEM degrees at the rate men do, substantially decreasing their odds of being equally represented in the STEM workforce. There are some exceptions—women are relatively well represented in the *Physical and Life Sciences*, but unfortunately this is not where the majority of STEM jobs exist. More efforts are required to better understand why women don't pursue higher education STEM degrees as frequently as men, and in particular why they are not pursing the STEM fields that offer the most employment potential, such as *Computers and Math*.

In recent years, San Diego hit an important milestone by achieving gender parity in the *Physical and Life Sciences* workforce. San Diego has also made important strides in closing the STEM pay gap, and UC San Diego is awarding STEM degrees to women at higher rates than the national average. It is imperative that San Diego County probe deeper into understanding why local women are not well represented in STEM *Management* positions. San Diego should also seek to understand why the greater number of female STEM graduates in the region is not translating into more equal representation in the local workforce.

[7] Data in China was only available for Macao Special Administrative Region.

Although progress towards achieving gender equity in STEM is slow, we must not view the prospect of achieving equity as insurmountable. Other countries across the globe have demonstrated capacity to graduate equal numbers of men and women with STEM degrees, which should translate to better representation in the workforce. The United States should work towards doing the same.