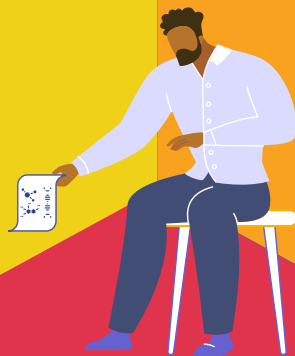


Mission Not Accomplished:

DISPARATE OPPORTUNITIES AND OUTCOMES FOR BLACK AND LATINX ENGINEERS

EXECUTIVE SUMMARY



2021

Anthony P. Carnevale
Nicole Smith
Michael C. Quinn



GEORGETOWN UNIVERSITY
McCourt School of Public Policy
Center on Education and the Workforce

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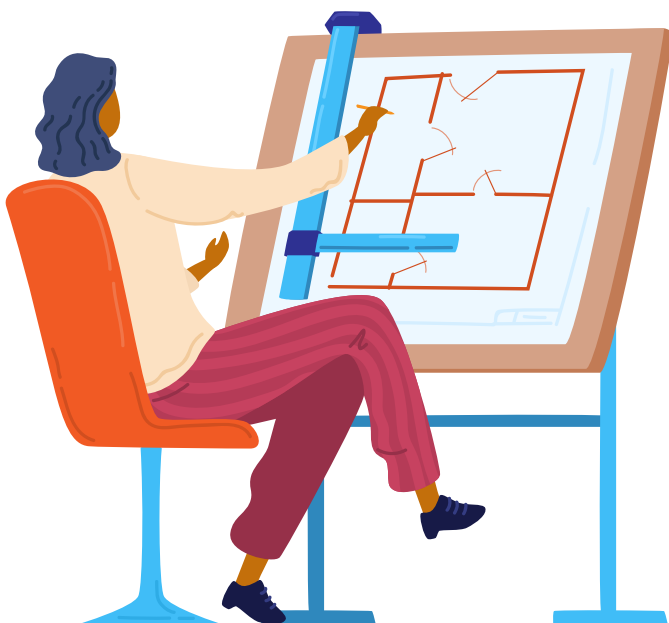
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Engineering has long been a highly respected and high-paying profession. Engineers contribute to our quality of life with their advancements in research and development, and improvements in efficiency and productivity. But a degree in engineering can lead to more than meaningful work—the high-paying jobs can lead to long-term personal prosperity. Engineering, however, continues to be dominated by White and Asian workers, and usually men.

Various groups—including colleges, some foundations, and government agencies—have worked for decades to recruit more Black/African American and Latinx students into engineering programs with hopes of diversifying science, technology, engineering, and mathematics (STEM) occupations in general. The number of Black/African American and Latinx workers in engineering has increased over the past few decades, but the share of jobs that they hold in engineering has barely budged.

The issues for underrepresented groups go far beyond access to jobs: even when Black/African American and Latinx students become engineers, they earn less on average than either White or Asian engineers. That is, in part, because Black/African American and Latinx workers in engineering jobs are more likely to hold sub-baccalaureate credentials or to have majored in general engineering rather than in an engineering specialty. And when they major in an engineering subfield, it is often one of the lower-paying ones, such as manufacturing and industrial engineering. However, differentials in attainment and field of study within engineering alone do not account for all of the observed pay gaps by race and gender. Historical bias in admissions and hiring practices are still prevalent in higher education institutions and in private companies.

Engineering pays well and should be open to persons from all walks of life.

On average, a person holding an engineering bachelor's degree (and no graduate degree) earns 25 percent more than the average bachelor's degree holder in the first job after graduation. Specialized engineering degrees can boost earnings even more: on average, a person with a bachelor's degree in petroleum engineering (among the highest paying majors at an average of \$106,000) earns 90 percent more than the average bachelor's degree holder and up to 125 percent more than those with some of the lowest paying bachelor's degrees.

However, as with almost all fields, Black/African American and Latinx workers earn less than the average. While White and Asian workers with a bachelor's degree in engineering earn 61 percent and 71 percent more, respectively, than the average for all bachelor's degree holders, Black/African American and Latinx engineering majors earn just 15 percent and 18 percent more, respectively. To attain earnings comparable to those of White engineering majors, Black/African American or Latinx engineers must earn an additional degree beyond the bachelor's degree. On average, a White worker with a bachelor's degree in engineering earns \$90,000 a year. However, a Black/African American worker with a graduate degree in engineering earns, on average, \$87,000. A Latinx worker with a graduate degree in engineering, on average, earns \$92,000.

The number of Black/African American and Latinx engineering graduates is growing, but there is still far from equitable representation.

Between 1990 and 2019, the total number of Black/African American and Latinx students who graduated with a bachelor's degree in engineering increased nearly four-fold.

As a result, engineering programs have become more diverse relative to abysmally low initial enrollments. Yet the nation has a long way to go to achieve equity in the engineering profession. The Latinx share of bachelor's degrees in engineering increased from 3 percent to 13 percent between 1990 and 2019, while the Black/African American share held steady at 4 percent over the same time period. This increase in bachelor's degrees among Latinx students is partly

Historical bias in admissions and hiring practices are still prevalent in higher education institutions and in private companies.

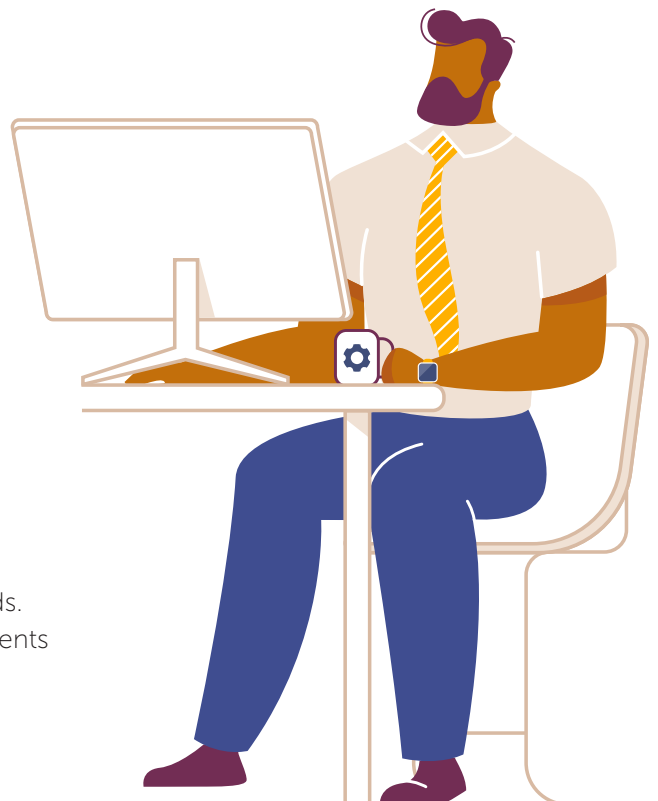
reflective of changes in demographics. The Latinx share of the college-age population increased from 12 percent to 23 percent between 1990 and 2019 (while the Black/African American population share declined slightly from 14 percent to 13 percent). At the current pace, it would take 76 years to achieve racial equity in engineering occupations on par with Latinx national representation. However, it would take up to 256 years at the current pace to achieve equity for Black/African American engineering workers.

Part of this slow progress is because of different rates of access to college. Despite Black/African American and Latinx students steadily increasing their college-going rate over the past 50 years, they still lag behind White and Asian students. When Black/African American and Latinx students go to college, they are less likely than White or Asian students to attend a college that has an engineering program. Also, Black/African American and Latinx students who earn a bachelor's degree are slightly less likely to earn a degree in engineering. In 1990, 3.5 percent and 5.9 percent of Black/African American and Latinx bachelor degree completers, respectively, earned a degree in engineering. Today it is just 2.6 and 5 percent, respectively. For White students, the reverse is true: they are slightly more likely to earn an engineering degree (5.5 percent in 1990 compared to 6.3 percent today).

Black/African American and Latinx engineering majors are less likely to pursue a specialized engineering degree.

Specialization pays. On average, those who majored in engineering subfields earn 14 percent more than those who majored in general engineering. However, Black/African American and Latinx students who major in engineering are far more likely to major in general engineering than White or Asian students. While only 14 percent of White and Asian engineering majors hold bachelor's degrees in general engineering, 23 percent and 19 percent of Black/African American and Latinx engineering majors, respectively, have degrees in general engineering.

When Latinx engineering majors do specialize, many of them find themselves in lower-paying fields. For example, 10 percent of Latinx engineering students major in industrial and manufacturing engineering, a greater share than for any other ethnic or racial group. However, this degree pays only 2 percent more than a general engineering degree.



Your occupation matters once you get an engineering degree.

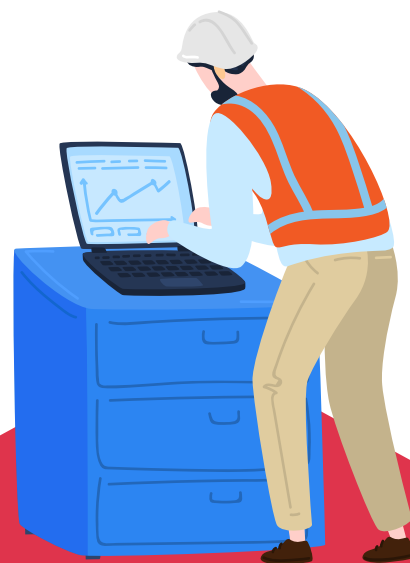
Not everyone who graduates with a degree in engineering works in the engineering profession. In fact, engineering is a profession that many degree holders, for various reasons, tend to leave for other careers.

Sometimes workers move away from specific engineering specialties into the management of engineering workers. Other engineering workers with bachelor's degrees move away from specific engineering specialties into the teaching of engineering or other technical subjects. Regardless of the reason for the move, one thing is clear: White and Asian men in engineering earn more when they move out of field, while Black/African American and Latinx men earn more when they remain in field.

The average White man with an engineering degree earns \$97,000 per year if he works in field as an engineer, but \$104,000 per year if he works out of field. Asian men who major in engineering fare even better: they earn \$102,000 per year on average working in field and \$107,000 on average by working outside of their field. This is driven, in part, by the fact that White engineers working out of field are more likely to work in management occupations, and Asian engineers working out of field are usually still working in other STEM-related occupations, in which their engineering background and related skills offer them an advantage.

Black/African American men with bachelor's degrees in engineering, however, suffer an average loss of \$17,000 in earnings when they work out of field. They earn \$84,000 on average working in field, but only \$67,000 on average if they transition to working out of field. Latinx men with a bachelor's degree in engineering face an even larger penalty: they earn \$89,000 on average when they work in field, but only \$68,000 on average if they work out of field. When not working in an engineering occupation, Black/African American and Latinx engineering degree holders are more likely to work in blue-collar occupations, sales and office support, and food and personal services occupations than White or Asian engineering majors.

For women engineers, the results for working in or out of field are very similar. This is partly because women



working out of field are more likely to be working as teachers—a profession that pays less than working as an engineer within the field.

For example, the average White woman with a bachelor's degree in engineering earns \$85,000 per year if she works in field, but only \$74,000 per year if she works out of field. Asian women who are engineers can earn \$95,000 per year on average working in field but \$87,000 on average by working outside of their field.

Black/African American women who are engineers working in field earn \$90,000 on average, but only \$66,000 on average if they work out of field. Latinx women who are engineers working in field earn \$82,000 on average, but only \$46,000 on average if they transition to working out of field.

Even when Black/African American and Latinx workers are in the engineering field, they are more likely to hold sub-baccalaureate credentials.

The vast majority (85 percent) of engineers have a bachelor's degree or higher. But there are still opportunities for work in the engineering profession for workers with an associate's degree or even an engineering certificate or certification. The distribution of these credentials differs, however, by the worker's race or ethnicity.

Generally speaking, the engineering jobs with lower educational requirements have lower earnings. An engineering job that does not require a bachelor's degree is still a good job, paying on average \$71,000—more than the average pay for a worker with a non-engineering bachelor's degree. However, engineering jobs that require a bachelor's degree pay \$87,000 on average, and jobs that require graduate degrees in engineering pay an average of more than \$100,000.

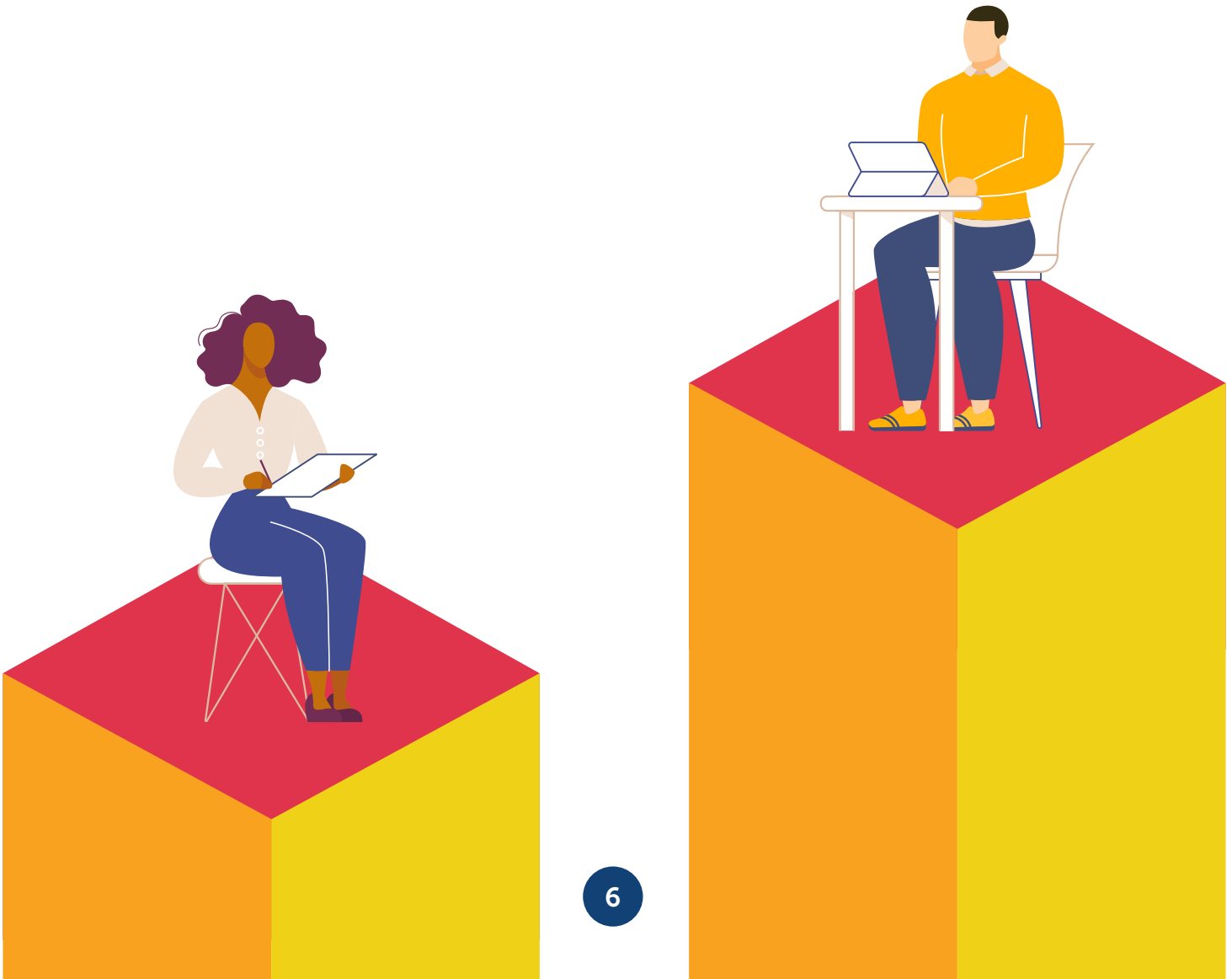
Among employed engineers, Black/African American and Latinx workers are more concentrated in lower-paying engineering jobs that don't require a bachelor's degree: 25 percent and 24 percent of Black/African American and Latinx engineers, respectively, have a sub-baccalaureate credential, compared to just 16 percent of White engineers.

Black/African American men with bachelor's degrees in engineering suffer an average loss of \$17,000 in annual earnings when they work out of field

A more conscious approach to faculty diversity, enrollment, counseling, and placement is needed to improve diversity in the field.

Bias—conscious and unconscious—continues to hamper diversity in the engineering field. It even provides an explanation for why there are continued differences in access and representation within engineering. Some believe the underrepresentation of Black/African American and Latinx workers in the engineering workforce is due to limited access to high quality education and opportunities, but others believe it is because Black/African American and Latinx students are not interested in engineering.

Without fresh approaches to recruitment, counseling, and enrollment, and a renewed commitment to diversity in engineering majors, the engineering faculty, and, ultimately, the engineering workforce, we will continue to see White workers holding upwards of two-thirds of engineering jobs, the majority of which are in the highest-paying subdivisions of the engineering field. While the increases in Latinx and Black/African American engineers is heartening, the pace of change is too slow to bring about any dramatic reshaping of the engineering workforce.





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