

STEM GRADUATES INCREASING, BUT DISPARITIES PERSIST

The share of college graduates earning degrees in STEM fields is slowly increasing in southeast Wisconsin, which is an encouraging trend for the regional economy and one that may be bolstered by a new regional initiative to strengthen STEM education. However, we find that gender and racial gaps persist in the STEM higher education pipeline. Meanwhile, international students earn almost half of the graduate degrees awarded in STEM fields in southeast Wisconsin, but the extent to which they are retained in the region is unknown.

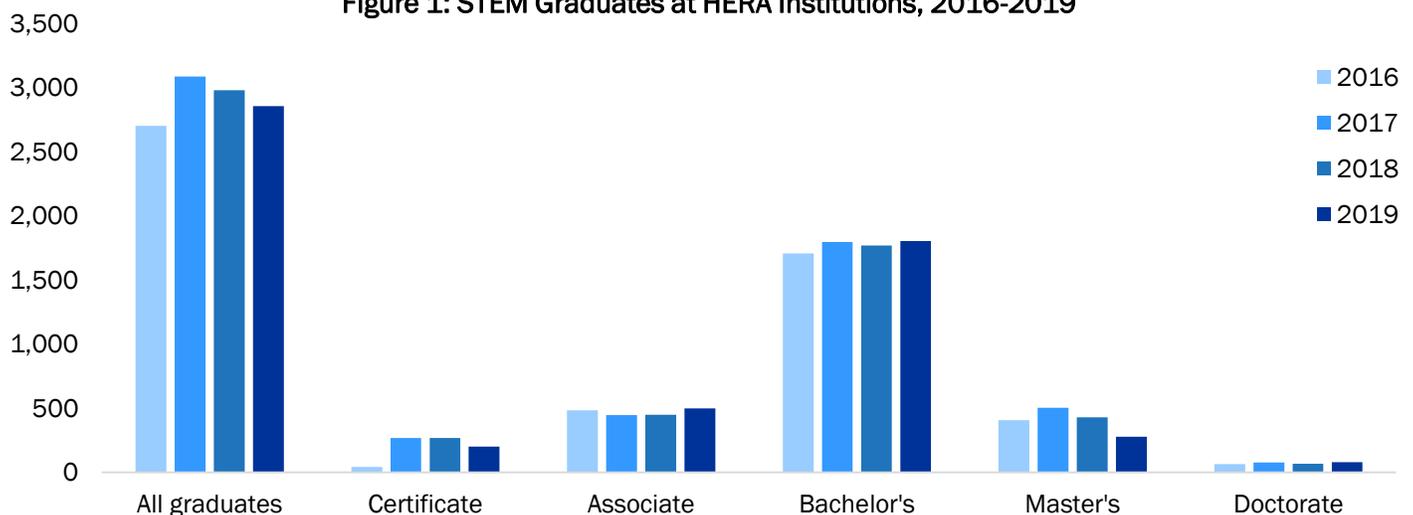
Colleges and universities in southeast Wisconsin have produced thousands of science, technology, engineering, and math (STEM) graduates over the last four years, infusing the region with the type of talent many view as critical to innovation and economic growth. Yet, women and Black students remain highly underrepresented among STEM graduates relative to their share among all college graduates.

These trends emerge out of data collected by the [Higher Education Regional Alliance](#) (HERA) and analyzed by the Wisconsin Policy Forum. HERA was formed in 2018 to promote collaboration among 18 public and private two-year and four-year institutions in southeast Wisconsin to work toward common regional goals.

Between 2016 and 2019, HERA institutions produced a combined 11,623 STEM graduates, including 8,973 who earned bachelor’s degrees or higher at four-year institutions and 2,650 who completed shorter certificate and associate degree programs primarily at technical colleges (see **Figure 1**). In this analysis, STEM fields include physical sciences, computer and information sciences, engineering, mathematics, statistics, and science and engineering technologies.

HERA’s data only cover 2016 to 2019, but STEM graduates inched up during that period both in number and as a share of all new college graduates. STEM fields accounted for 11.6% of all degrees and certificates awarded by HERA institutions in 2019, up from 10.2%

Figure 1: STEM Graduates at HERA Institutions, 2016-2019



Source: WPF analysis of HERA data

Note: Associate degree graduates from UW campuses in Waukesha, Washington County, and Rock County are only included in 2019 data.



in 2016. Between 2016 and 2019, the total number of new college graduates in the region decreased somewhat while the number of STEM graduates rose.

While overall STEM graduates grew over the four-year period, it is worth noting that the peak year was 2017, which was followed by two years of modest decreases. In addition, UW-Milwaukee (UWM) and UW-Whitewater recently absorbed much smaller, two-year UW System campuses in Waukesha, Washington County, and Rock County that were not previously part of HERA; students graduating with associate degrees from those campuses are only included in HERA’s data for 2019, meaning the drop in graduates from 2018 to 2019 would have been slightly larger if not for the addition of students at those satellite campuses.

To provide additional context, we examined [UW System data](#) that are publicly available extending back over a much longer period of time. Those data show strong evidence of longer-term growth in STEM bachelor’s and graduate degree completion both regionally and statewide, including at UWM, UW-Whitewater, and UW-Parkside, which are members of HERA. Notably, the UW System’s definition of STEM is broadly similar but may not be identical to the definition we used in our analysis of HERA’s data.

The rising number of STEM graduates produced an increase in the share of STEM degrees awarded by each UW institution in southeast Wisconsin when viewed as a percentage of total degrees. At UWM, for example, STEM degrees made up 23.2% of all degrees awarded

This is the first in a series of reports the Wisconsin Policy Forum will produce through a partnership with the Higher Education Regional Alliance (HERA). These reports will examine degree production trends in several critical fields and gauge how the combined graduates of the region’s higher education institutions align with current and projected workforce demands in the regional economy.

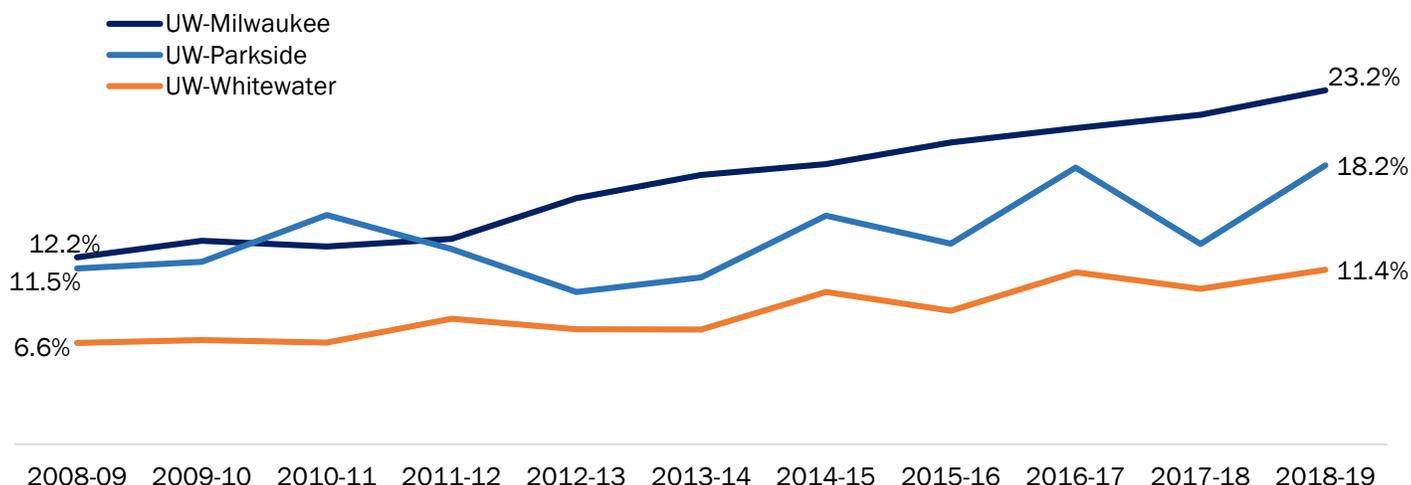
during the 2018-19 academic year, which was up substantially from 12.2% in 2008-09 (See **Figure 2**). UW-Parkside and UW-Whitewater also saw considerable increases in STEM fields during that time.

PERSISTENT GAPS BY GENDER & RACE

While the growing number of STEM graduates is a positive story for southeast Wisconsin, women and students of color are underrepresented among them. Between 2016 and 2019, women outpaced men overall in college completion, earning 58.1% of all degrees and certificates awarded by HERA institutions across all fields. In STEM fields, however, women accounted for just 23.7% of graduates (see **Figure 3**).

The gender gap in STEM fields is not new or unique to southeast Wisconsin. It has been widely documented and analyzed for decades both locally and nationally, with a large body of research pointing to a variety of contributing factors, including a lack of female role models in STEM fields, longstanding stereotypes regarding which fields are appropriate for women versus men, and [structural biases](#) that fail to create a

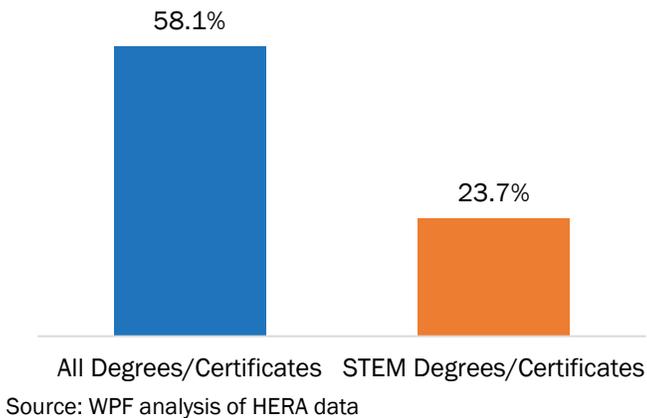
Figure 2: STEM Degrees as Share of All Degrees at UW Institutions in SE Wisconsin



Source: [University of Wisconsin System](#)



Figure 3: Share of Degrees/Certificates Earned by Women at HERA Institutions, 2016-2019



welcoming and inclusive environment for both women and people of color to study and work.

Southeast Wisconsin is roughly in line with the national average when it comes to representation of women among new STEM graduates. We analyzed data from the [National Center for Education Statistics](#) (NCES) and found women earned 26.6% of all bachelor’s and advanced degrees awarded in STEM fields during the 2017-18 academic year. At HERA institutions, women earned a similar 25.3% of STEM degrees at the bachelor’s level or higher between 2016 and 2019. HERA’s data and the NCES data ultimately draw from a common source: the federal [Integrated Postsecondary Education Data System](#) (IPEDS), though it is again important to note that the definitions of STEM may not be identical between the two datasets.

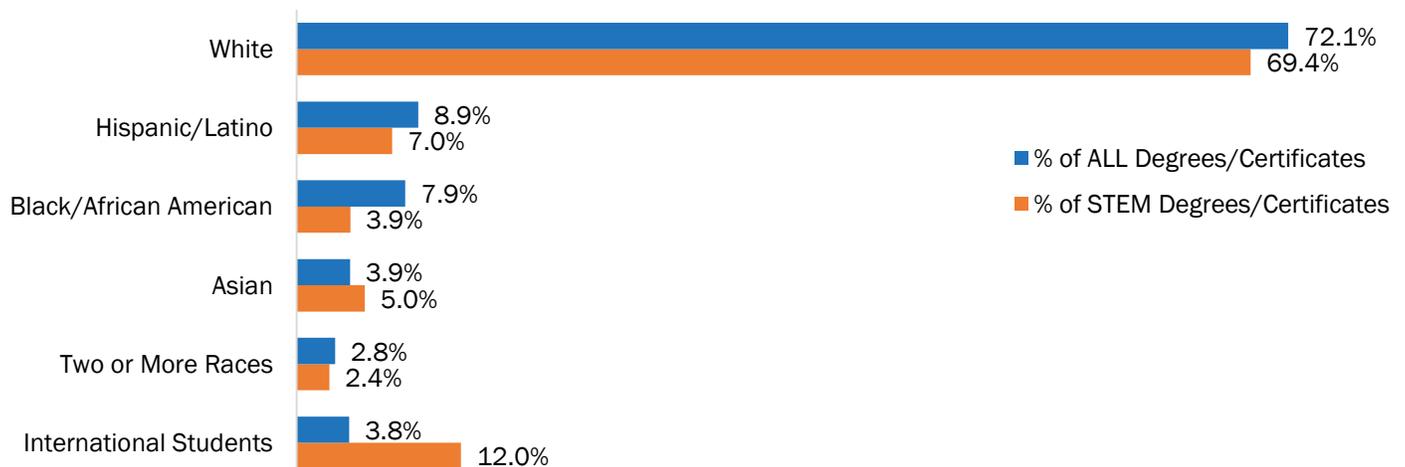
It is also clear that gender gaps are larger in certain fields than others within STEM. For example, the HERA data show that between 2016 and 2019, women earned 38.3% of all degrees conferred in mathematics and statistics and 36.6% of those in physical sciences, which include chemistry and physics. They were less represented, however, in other areas like computer and information sciences and support services (21.5%) and engineering and engineering technologies (18.5%).

Those variations within STEM disciplines are consistent with national trends. Based on our analysis of NCES data, the share of total degrees earned by women within STEM fields nationally ranged from as low as 22.6% in engineering and engineering technologies and 24.5% in computer and information sciences to as high as 41.8% in mathematics and statistics.

Students of color are also underrepresented among STEM graduates in southeast Wisconsin, which is especially problematic given their underlying underrepresentation among all new college graduates. That is particularly true for Black students, who earned 7.9% of all degrees and certificates awarded by HERA institutions between 2016 and 2019 but only 3.9% of those in STEM fields (see **Figure 4**). A smaller gap also is present for Hispanic/Latino students.

On the other hand, international students are *overrepresented* in STEM fields, accounting for only 3.8% of all graduates at HERA institutions but 12% of those who earned STEM degrees or certificates. That trend is even more pronounced among students completing advanced (master’s and doctorate) degrees. International students earned 10.8% of the advanced

Figure 4: Racial Breakdown of STEM Graduates at HERA Institutions, 2016-2019



Source: WPF analysis of HERA data



degrees awarded by HERA institutions overall but 43.6% of those in STEM fields.

The fact that international students, who generally pay higher non-resident tuition, are earning almost half of the region's advanced degrees in STEM fields may help the finances of institutions coping with declining enrollment (and for UW System schools, an in-state undergraduate tuition freeze) in recent years. Yet the trend raises questions about the extent to which the regional economy is benefiting from educating those students locally given that many may return to their home countries after graduation or pursue opportunities elsewhere in the U.S. or internationally.

No comprehensive analysis has been done to examine the retention rate of international students who graduate from HERA institutions. The federal Student and Exchange Visitor Program's [database](#) allows colleges and universities to know whether graduates have applied for employment authorization in the U.S. or left the country, and (for those who have stayed in the U.S.) where they are working or studying. HERA or its members could consider analyzing those data or taking other steps to understand how well southeast Wisconsin is retaining international STEM graduates and how the region compares with state and national averages.

LOOKING AHEAD

HERA's data show that progress is being made overall but additional efforts are needed to attract students to STEM fields at southeast Wisconsin colleges and universities and to increase participation of women and people of color in those fields. Fortunately, a number of efforts that aim to do that are already underway.

For example, several institutions have developed outreach programs designed to increase participation of women in computer science and engineering. The Milwaukee School of Engineering (MSOE) offers a number of [programs](#) that provide opportunities for thousands of K-12 students to explore STEM through hands-on activities. At UWM, [Girls Who Code](#) is a year-round program that introduces girls in grades five through 12 to computer science, while [EnQuest](#) is a summer camp that allows middle- and high-school girls to explore engineering.

Eight postsecondary institutions in southeast Wisconsin (Alverno College, Carthage College, Marquette

University, Milwaukee Area Technical College, MSOE, UWM, UW-Whitewater, and Waukesha County Technical College) are members of the National Center for Women in Information Technology ([NCWIT](#)), which provides them with [resources](#), [programming](#), and other [opportunities](#) designed to close the gender gap in computer science. None of them have participated in NCWIT's more intensive [Extension Services](#) program, however, which could be a next step toward accelerating the pace of change.

In December 2020, a major effort was launched to strengthen STEM education in the region through the creation of the [Greater Milwaukee STEM Ecosystem Initiative](#). Southeast Wisconsin is now one of almost 90 communities nationally that have developed these [initiatives](#), which help education and business leaders strengthen their regional "K-20 STEM pipelines" by analyzing the current landscape of programming and outreach services, collaborating on shared goals and strategies, and tracking progress over time. The initiative also will provide Greater Milwaukee with access to national resources and support. This effort is being led by MSOE, the Milwaukee Tech Hub Coalition, Northwestern Mutual, and STEM Forward.

These recent efforts suggest that the region's higher education and business leadership recognize the need both to broadly prioritize advances in STEM education and to focus on some of the more specific issues raised in this report. HERA is also in a good position to do so. Important next steps could include a deeper look at the retention of international students and continued efforts to improve gender and racial equity within STEM fields.

