HIGHLIGHTS FROM THE NCWIT SCORECARD:

INDICATOR DATA SHOWING THE PARTICIPATION OF GIRLS AND WOMEN IN COMPUTING

national center for
women &
INFORMATION TECHNOLOGY

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What Is the *NCWIT Scorecard*?

The *NCWIT Scorecard* (www.ncwit.org/scorecard) is a compendium of the best available indicator and trend data on girls' and women's status in computing. NCWIT publishes the *NCWIT Scorecard* so that all of these data are together in one easy-to-find, easy-to-use place.

How Do I Navigate the *NCWIT Scorecard*?

The *NCWIT Scorecard* consists of more than 40 data sheets across 4 different Excel workbooks:

// The Status of Computing in Secondary Education
a compilation of relevant statistics about K-12 computing education from dozens of sources

// Gender, Race, and Ethnicity in Post-Secondary Computing Education
a series of spreadsheets of data drawn from the National Center for Education Statistics IPEDS database

// Gender, Race, and Ethnicity in the Computing Workforce
a compilation of relevant data from the US Bureau of Labor Statistics and other sources

// Job Growth and Career Stability in Computing
compelling statistics showing why computing is an attractive career

These Excel workbooks live online, and are free to download from the NCWIT website (www.ncwit.org/scorecard). Most of the data are presented longitudinally, showing trends over time.

The Scorecard not only compiles disparate data into a single source, but also includes sample charts and captions you can copy and use. The Excel format gives you the freedom to create your own charts and infographics, and enables us to update the spreadsheets as soon as new data are published. Each tab of each workbook contains an "Update" date so you know how recently the data were updated.

Peruse the Table of Contents in each Excel workbook, and think about how these datasets can help you write reports, articles, and grant proposals, make presentations, prepare class slides, make your point at the dinner table, and more.

Citation:

DuBow, W. & Gonzalez, J.J. (2020) NCWIT Scorecard: The Status of Women in Technology. Boulder, CO: NCWIT.

What Are Some of the Notable Highlights From the 2020 *NCWIT Scorecard?*

THE STATUS OF COMPUTING IN SECONDARY EDUCATION

More Girls Are Taking Rigorous Computer Science in High School, but Access Remains Unequal.

College Board research indicates that students taking an Advanced Placement (AP) exam in a given subject area are more likely to take college coursework in that area than students who did not take the AP exam. In large part due to the CS Principles exam, more girls are taking CS Advanced Placement exams than ever before. The potential for future parity is even higher, as some research shows a correlation between high school students who excel at math and seniors who intend to major in CS.

Since boys and girls in high school tend to have similar math course-taking patterns and outcomes, this bodes well for women earning future computing degrees. Although computer science classes are increasingly being offered, the majority of high schools do not yet offer rigorous computer science. Further, those schools with a majority of students from racial/ethnic groups minoritized in the U.S., or students eligible for free/reduced lunch, are the least likely to offer computer science courses. This lack of access reduces those students' chances of pursuing computing and further reinforces historical inequities.

// FOR MORE RELATED DATA, EXPLORE THE EXCEL WORKBOOK TITLED: *THE STATUS OF COMPUTING IN SECONDARY EDUCATION*

GENDER, RACE, AND ETHNICITY IN POST-SECONDARY COMPUTING EDUCATION

More Women Are Earning Associate's, Bachelor's, Master's, and Doctoral Computing Degrees, but at All Levels, a Persistent Gender Gap Remains.

Overall, women's proportional representation in STEM disciplines at the bachelor's level has generally risen since the mid-1990s — except in computer and information sciences (CIS) and mathematics. In CIS, women's proportion of bachelor's degrees has remained at 19 percent or below since 2004, until 2018 when it finally reached 20 percent. In 2019, it rose to 21 percent.

FIGURE 1. **Women's Percentage of CIS Bachelor's Degrees**
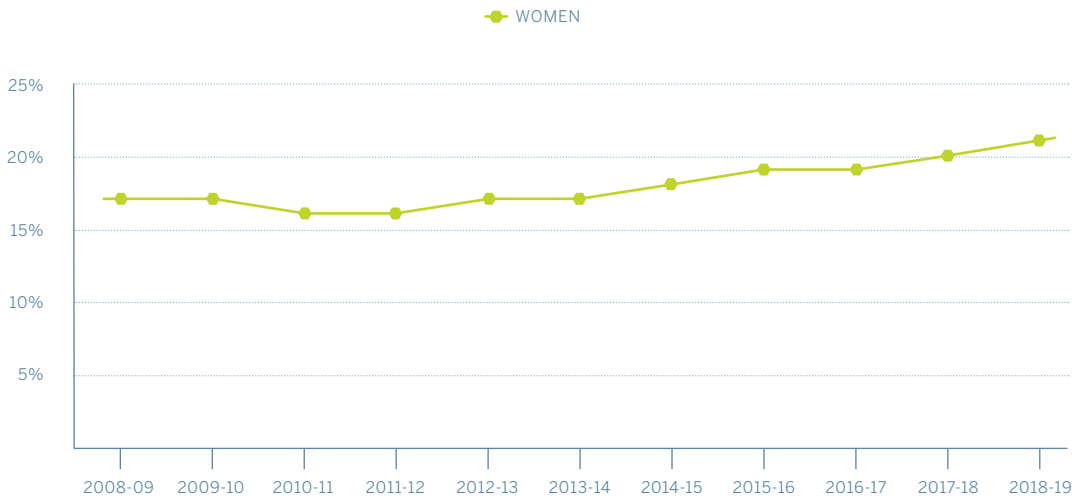
Source: National Center for Education Statistics:
Integrated Post-secondary Education System, 2009-2019
(CIP 11-Computer & Information Sciences).

Percentages do not tell the whole story, however: The *number* of women earning CIS bachelor's degrees has increased steadily since 2010, reaching 17,786 in 2019. In 2018, it was the first time in 33 years that the number had exceeded the 1985 historic peak of 13,733.

Trendlines for men and women earning computing bachelor's degrees show a similar overall pattern, but the number of men completing bachelor's degrees in 2019 (67,288) was more than double men's historic 1987 high of 25,887 degrees. Even though men have always earned more computing degrees than women, the rate of growth of women earning bachelors' degrees in CIS has outpaced that of men since 2010. In contrast, the percentage of associate's degrees earned by women in computing has decreased over time (from a high of 44 percent in 1999 to a steady 20 percent since 2014). This is largely because more men are earning CIS associate's degrees.

17,786
WOMEN EARNED
CIS BACHELOR'S
DEGREES IN 2019

THE RATE OF GROWTH
OF WOMEN EARNING
BACHELOR'S DEGREES
IS INCREASING

FIGURE 2. **CIS Bachelor's Degrees by Gender**

Source: National Center for Education Statistics:
Integrated Post-secondary Education System, 2009-2019
(CIP 11-Computer & Information Sciences).

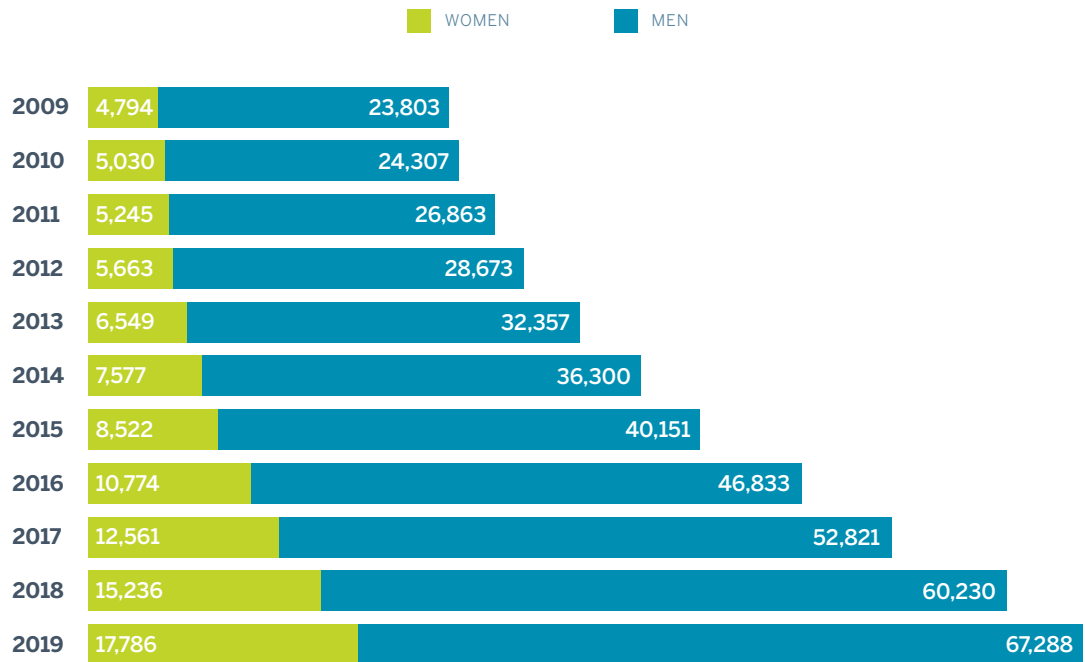**//** FOR MORE RELATED DATA, EXPLORE THE EXCEL WORKBOOK TITLED: *GENDER, RACE AND ETHNICITY IN POST-SECONDARY COMPUTING EDUCATION*

More Women Are Completing CIS Degrees, but They Are Disproportionately White.

While the data and charts presented in the Scorecard can be used as is, we encourage the use of these data to examine hidden trends. For example, although women are classified by the National Science Foundation (and many others) as a single underrepresented group, it is important to understand that trends differ among women of different racial/ethnic backgrounds because they may experience exclusion at multiple intersecting axes.

For example, the last decade has seen high growth of U.S. women of color completing CIS degrees, as part of a positive trend of more women of color completing bachelor's degrees. There has not been an associated growth spurt of white women earning bachelor's degrees. However, there has been growth of white women completing CIS degrees in the last decade, more growth proportionally than that of women of color. This suggests that we are making more progress bringing white women into computing than we are U.S. women of color.

FIGURE 3. **Percent Growth for Women Receiving Bachelor's Degrees, 2011-2018**
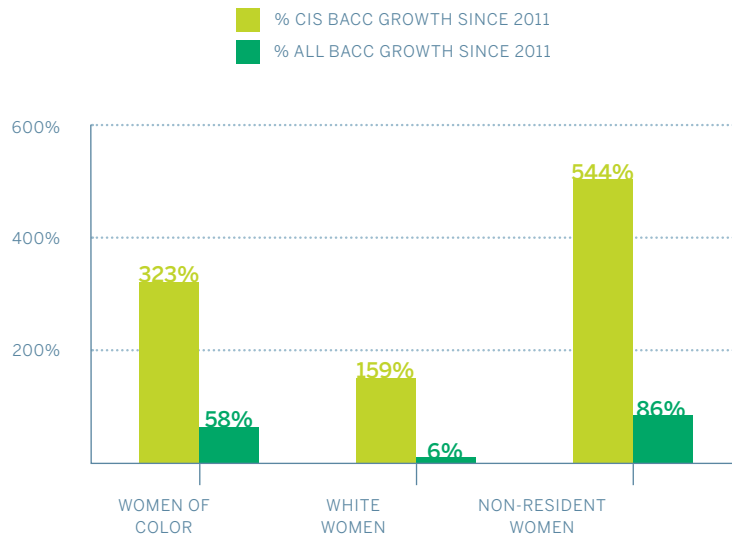
■ % CIS BACC GROWTH SINCE 2011
■ % ALL BACC GROWTH SINCE 2011

Source: National Center for Education Statistics:
Integrated Post-secondary Education System, 2011-2018
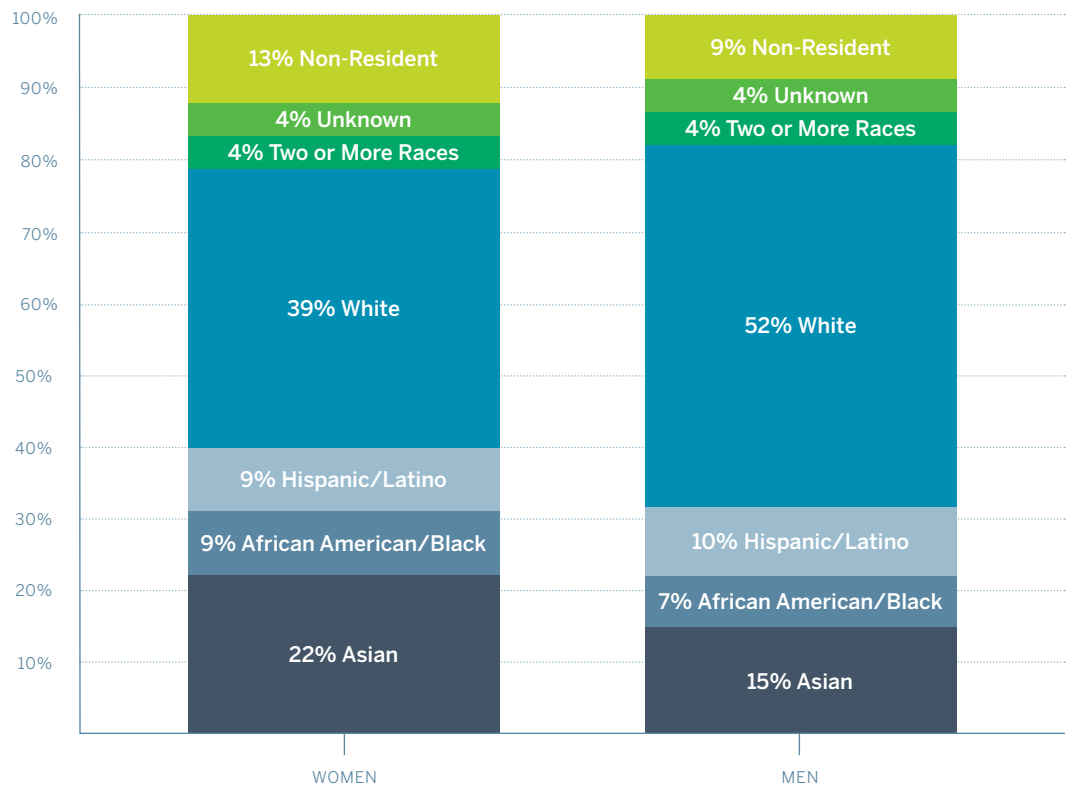(CIP 11-Computer & Information Sciences).

Non-resident women earning U.S. bachelor's degrees, and CIS degrees, has grown even faster than either white women or women of color. Scorecard data show a large increase in non-residents receiving CIS graduate degrees over time. Notably in 2019, 56 percent of the CIS Master's degrees earned by men, and 64 percent of those earned by women were by non-residents. Overall, 64 percent of women's graduate degrees in CIS were earned by non-residents. It remains to be seen whether or not this trend of increasing numbers of non-resident students earning computing degrees will persist as a result of COVID-19.

// FOR MORE RELATED DATA, EXPLORE THE EXCEL WORKBOOK TITLED: *GENDER, RACE AND ETHNICITY IN POST-SECONDARY COMPUTING EDUCATION*

Women Degree Earners Are More Racially/Ethnically Diverse Than Men Degree Earners.

At all degree levels, the women earning CIS degrees are more racially and ethnically diverse when compared to men.

FIGURE 4. **Racial Composition of Women's and Men's CIS Bachelor Degrees 2019**

Source: National Center for Education Statistics: Integrated Post-secondary Education System, 2019 (CIP 11-Computer & Information Sciences).

In the chart above, the categories used are those reported in the National Center for Education Statistics IPEDS data. Two categories are not pictured because the percentages round to zero. These are: American Indian / Alaska Native (women: 0.22%; men: 0.25%) and Hawaiian / Pacific Islander (women: 0.19%, men: 0.18%).

// FOR MORE RELATED DATA, EXPLORE THE EXCEL WORKBOOK TITLED: *GENDER, RACE AND ETHNICITY IN POST-SECONDARY COMPUTING EDUCATION*

Compared To Academia Average, There Are Fewer Women Faculty in Computing.

Almost a quarter of computing faculty at the newly hired (tenure track), assistant, and associate levels are women. This proportion has been relatively consistent for the last decade, except for the associate level, which has increased 7 percentage points since 2009. The full professor level has the lowest proportion of women computer science faculty. Even allowing for academic hiring and promotion practices that result in slow changes in the population of full professors, computing lags behind the rest of academia, where women comprised between 34 percent of full professors in 2018, compared to 15 percent in computer science.

FIGURE 5. **Women's Percentage of Computer Science Faculty at PhD-Granting Institutions (2009-2018)**
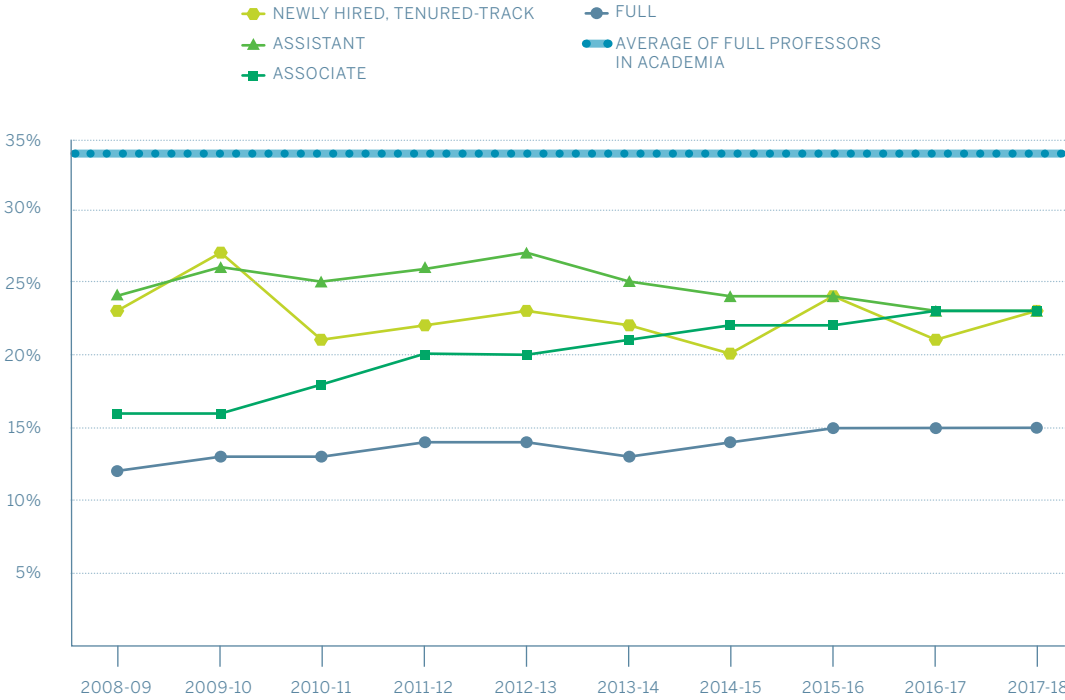
Source: CRA Taulbee Survey, 2009-2018; Tenure Status, Academic Rank, Race/Ethnicity, and Gender (Degree-Granting Institutions): Fall 2018," National Center for Education Statistics: Integrated Post-secondary Education System, Fall Staff 2018 Survey.

// FACULTY DATA ARE LOCATED IN THE EXCEL WORKBOOK TITLED: *GENDER, RACE AND ETHNICITY IN THE COMPUTING WORKFORCE*

## GENDER, RACE, AND ETHNICITY IN THE COMPUTING WORKFORCE

One-Quarter of Computing Professionals Are Women, With Some Increased Participation of Women of Color in the Last Two Decades.

From 2003 to 2019, women comprised more than half of the overall professional workforce. The percentage of women employed in computing and mathematical occupations has consistently hovered at about 25 percent since 2007. Computing occupations have grown in popularity among both women and men, as the *number* of individuals in these occupations has increased substantially over the years (2009: 863,000 women and 2,618,000 men; 2019: 1,397,000 women and 3,973,000 men).

There is no consistent trend for women of color in computing occupations, but overall the participation of women of color is higher in 2019 than it was in 2009. Black women's participation has decreased slightly since a record high of 12.9 percent in 2017. After decreasing in previous years, the percentage of women in computing and mathematical occupations who are Hispanic/Latinx or Asian/Pacific islander has increased since 2018.

// FOR MORE RELATED DATA, EXPLORE THE EXCEL WORKBOOK TITLED: *GENDER, RACE AND ETHNICITY IN THE COMPUTING WORKFORCE*

Women Employed in Computing and Mathematical Occupations in 2019

26%
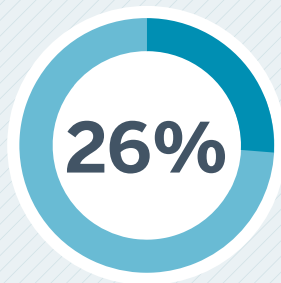
Women Employed in All Professional Occupations in 2019
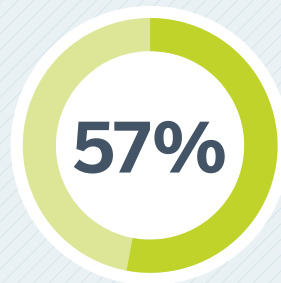
57%

Source: US Bureau of Labor Statistics, Employed and experienced unemployed persons by detailed occupation, sex, race, and Hispanic or Latino ethnicity (unpublished table, 2019)

Women Are Grouped in Certain Professional Sub-fields of Computing.

There are many computing sub-fields that show occupational segregation by gender, with women often being clustered in execution rather than core, creative technical roles. Operations Research Analysts historically have had the highest percentage of women (43 percent in 2019), and computer hardware engineers have consistently had the smallest proportion of women. In 2019, though, computer software engineers and computer programmers had the lowest proportion of women (19 and 20 percent respectively).

FIGURE 6. **Percent Female Employment in Select Computing Occupations (2009–2019)**
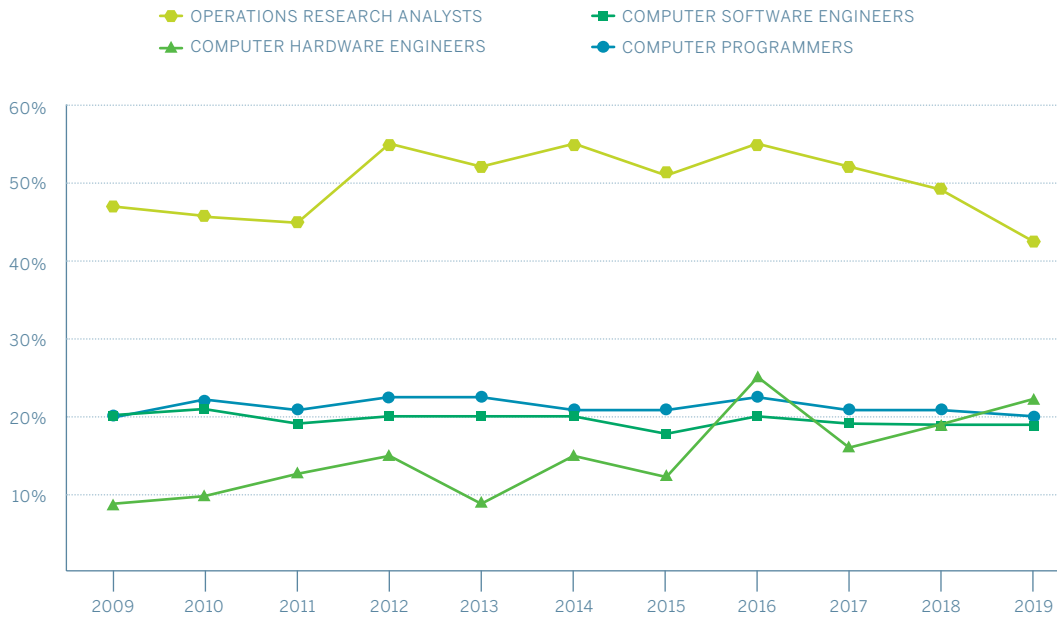

Source: US Bureau of Labor Statistics, Employed and experienced unemployed persons by detailed occupation, sex, race, and Hispanic or Latino ethnicity (unpublished table, 2019)

Include data in your presentations, reports, and proposals to make a stronger case for diversity: ncwit.org/scorecard

Women Exit Technology Fields More Than Other Science and Engineering Fields.

Research suggests that when women leave the tech workforce, they tend to leave the private sector for the public sector. Exploring "stall rates" may shed some light on attrition as well. Across science, technology, and engineering careers, about one-third of Hispanic/Latinx women, Asian women, and White women say they feel stalled at work. Nearly half of African American women in these careers say they feel stalled.

// FOR MORE RELATED DATA, EXPLORE THE EXCEL WORKBOOK TITLED: *GENDER, RACE AND ETHNICITY IN THE COMPUTING WORKFORCE*

Women's Patent Rates Have Increased, and Patents by Mixed Gender Teams Are the Most Widely Cited.

While it is easier to assess how many women are in the field, it is more difficult to measure women's ability to meaningfully participate in innovation. NCWIT is working on more comprehensive measures, but for now we use patent rates as one indicator, and these show some improvement. In 1980, U.S. women's patents accounted for 1.9 percent of all patents. Three decades later, they comprised 7.8 percent of all patents.

FIGURE 7. **Percent of U.S. Women-Invented Patents Over Time**
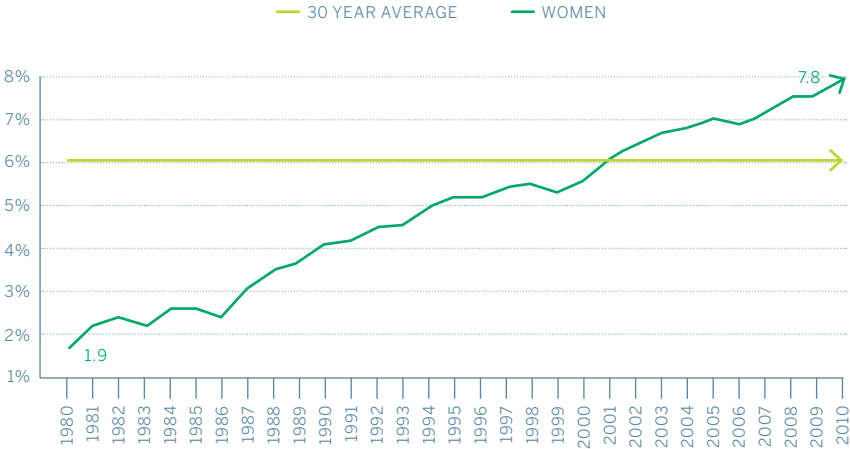
Source: Ashcraft, C. & Breitzman, T. (2012). Who invents IT? An analysis of women's participation in information technology patenting. Boulder: NCWIT.

[1]A career "stall" refers to an individual believing they are no longer getting promoted, being given additional responsibilities, or otherwise not getting ahead at work.

In the United States, solo men inventor or men-only inventor teams account for the vast majority of technology patents, but mixed-gender teams have produced the most widely cited technology patents in all subareas. However, women inventors were cited less than men for their technology patents in all subareas.
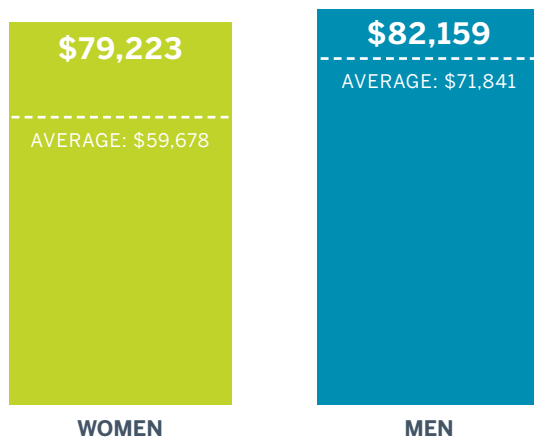
// FOR MORE RELATED DATA, EXPLORE THE EXCEL WORKBOOK TITLED: *GENDER, RACE, AND ETHNICITY IN COMPUTING WORKFORCE*

JOB GROWTH AND CAREER STABILITY IN COMPUTING

Women Should Pursue Computing Because it is a High-Growth, High-Status, High-Pay, and High-Creativity Sector, With Applicability To Many Other Fields.

The computing field is appealing for many reasons: steady job growth, high pay, creativity, and applicability to many other areas of interest. Computing professions are some of the fastest-growing and highest-paid STEM fields. Job growth in computing is expected to continue, which is good news for women – and men – who are considering the field. Compared to all U.S. occupations, which are projected to grow 5.2 percent by 2028; and STEM occupations, projected to grow by 8.8 percent; computing-related occupations are projected to grow by 12.7 percent. Even new graduates in computer science have a higher median salary than the STEM average (CS: women—$79,223, men—$82,159; STEM average: women—$59,678, men—$71,841). Better yet, computer science has the smallest difference in median earnings between men and women.

Even recent graduates in computer science have a higher median salary than the STEM average:

$79,223
AVERAGE: $59,678
WOMEN

$82,159
AVERAGE: $71,841
MEN

Source: NCWIT Scorecard, Job Growth-Career Stability

// FOR MORE RELATED DATA, EXPLORE THE EXCEL WORKBOOK TITLED: *JOB GROWTH AND CAREER STABILITY IN COMPUTING*

Dig deeper into the statistics behind NCWIT's By the Numbers by going to the data files in the NCWIT Scorecard.

ncwit.org/scorecard
ncwit.org/bythenumbers

Changing the Face of Computing

The data in the NCWIT Scorecard reflect the systematic exclusion of minoritized groups at every level of computer science in the U.S., despite the labor by advocates to diversify the field. It is clear from the data on post-secondary degrees and workforce that women have made important inroads, but not to a point of parity. Social scientists suggest that this is due to the masculinization of the computing field, which happened as a result of many different societal forces converging over time (e.g., Misa, 2010, Ensmenger, 2010). In order to diversify computing, we must not only increase the number of individuals from historically underrepresented groups, but also change the culture of the field so that it becomes a career that welcomes and incorporates minoritized individuals.

Caveats to Note About This Report

// These data are not comprehensive indicators for how the diversity of the computing ecosystem is/is not progressing. But taken together, they do show trends in the computing sector and the level of girls' and women's participation in computing in the U.S.

// Because the data come from different sources, use different methodologies, and are collected in their original form for myriad reasons, they do not always tell a clear story of the gendered and racialized landscape of participation, or status, in the computing ecosystem, nor do they provide explanations for *why* the current state of affairs exists. (See the NCWIT Facts reports—www.ncwit.org/thefacts and www.ncwit.org/thefactsgirls—for a summary of the key barriers to women's participation in technology.)

// The *NCWIT Scorecard* is a living document; therefore, as new data become available, the online *NCWIT Scorecard* Excel files will be updated. So, check back regularly.

How Do I Use the data in The NCWIT Scorecard?

Integrate the *NCWIT Scorecard* Statistics to Make a Case for Diversity.

Data can be powerful levers for making the case for diversity and inclusion efforts in your organization. NCWIT encourages you to use these data freely.

// You can use our simple charts and captions, or make your own.

// Include data in your presentations, reports, and proposals to make a stronger case.

// Please cite the *NCWIT Scorecard* as your primary source.
Citation: DuBow, W. & Gonzalez, J.J. (2020) NCWIT Scorecard: The Status of Women in Technology. Boulder, CO: NCWIT.

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[2]Misa, T., Ed. (2010). *Gender Codes: Why Women are Leaving Computing.* IEEE Computer Society. New Jersey: John Wiley & Sons.
Ensmenger, N. & Aspray, W. (2010). *The Computer Boys Take Over.* MIT Press.

How Can I Learn More?

Other Resources Can Help You Contextualize These Statistics.

TO LEARN MORE ABOUT...

...why women are historically underrepresented in computing, go to the AAUW report, *Why so Few?*

www.aauw.org/research/why-so-few/

...the importance of diversity in computing, read the NCWIT blog, *Why Does Broadening Participation in Computing Matter, and What Can You Do to Help?*

www.ncwit.org/WhyBPCMattersBlog

...how to make a business case for diversity, use the NCWIT executive summary, *What is the Impact of Gender Diversity on Technology Business Performance?*

www.ncwit.org/businesscase

... how to make academic departments and classrooms more inclusive, go to NCWIT 101: Introduction to Diversifying Undergraduate Computing Departments
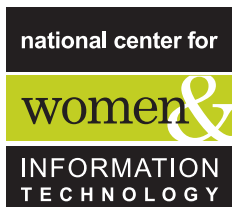
www.ncwit.org/Course1_UGPrograms

... how to make corporate cultures more inclusive, go to Chapters 5 and 6 of the *Women in IT: The Facts* **report**

www.ncwit.org/thefacts

Download pre-made charts and captions, or the data themselves to make your own infographics:

ncwit.org/scorecard