

3-2013

## Supplemental Research

Helen Shen

National Coalition of Women and Girls in Education and the National Coalition on Women, Jobs and Job Training

Ming-Te Wang

Caralee Adams

Nature

Follow this and additional works at: [https://digitalcommons.usm.maine.edu/women\\_advance](https://digitalcommons.usm.maine.edu/women_advance)

---

### Recommended Citation

Shen, Helen; National Coalition of Women and Girls in Education and the National Coalition on Women, Jobs and Job Training; Wang, Ming-Te; Adams, Caralee; and Nature, "Supplemental Research" (2013). *Women ADVANCE at USM Initiative*. 1.

[https://digitalcommons.usm.maine.edu/women\\_advance/1](https://digitalcommons.usm.maine.edu/women_advance/1)

This Article is brought to you for free and open access by the Institutional Memory at USM Digital Commons. It has been accepted for inclusion in Women ADVANCE at USM Initiative by an authorized administrator of USM Digital Commons. For more information, please contact [jessica.c.hovey@maine.edu](mailto:jessica.c.hovey@maine.edu).

NATURE | NEWS FEATURE

# Inequality quantified: Mind the gender gap

Despite improvements, female scientists continue to face discrimination, unequal pay and funding disparities.

Helen Shen

06 March 2013

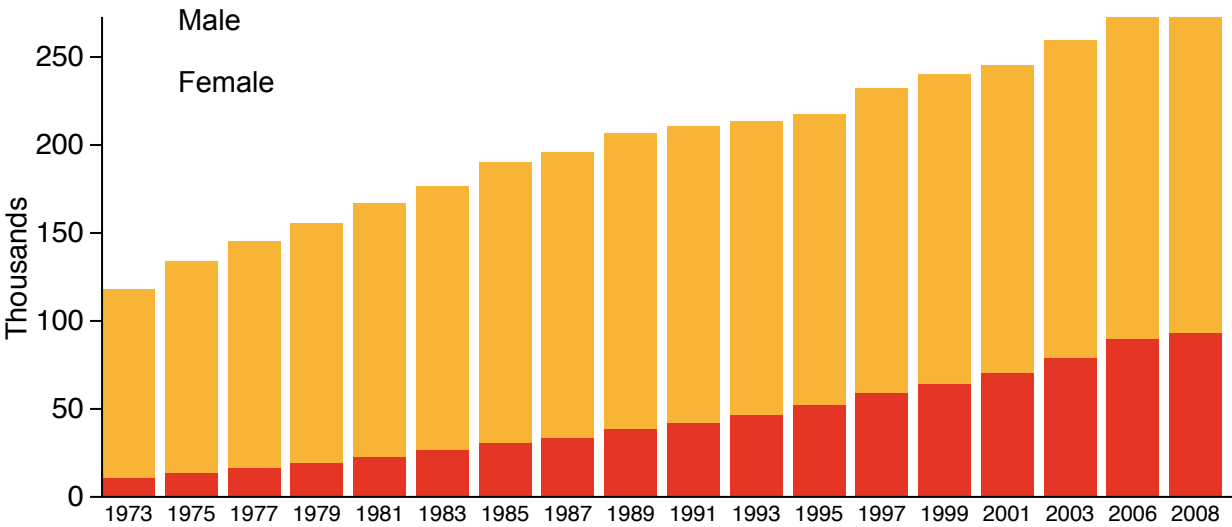
As  
an

## INTERACTIVE: Science's gender gap

Female scientists have made steady gains in recent decades but they face persistent career challenges. US universities and colleges employ far more male scientists than female ones and men earn significantly more in science occupations.

Gender breakdown: 1973-2008      Median annual salary: 2008

### GENDER BREAKDOWN BY FIELD OF STUDY FOR US SCIENTISTS AND ENGINEERS WITH PHDS EMPLOYED IN ACADEMIA



All positions      All fields      Adjust scale: ☐

DATA SOURCE: NATIONAL SCIENCE FOUNDATION [HTTP://WWW.NSF.GOV/STATISTICS/SEIND12/APPEND/C5/AT05-17.PDF](http://www.nsf.gov/statistics/seind12/append/C5/AT05-17.pdf)

aspiring engineer in the early 1970s, Lynne Kiorpes was easy to spot in her undergraduate classes. Among a sea of men, she and a handful of other women made easy targets for a particular professor at Northeastern University in Boston, Massachusetts. On the first day of class, “he looked around and said ‘I

see women in the classroom. I don't believe women have any business in engineering, and I'm going to personally see to it that you all fail'."

He wasn't bluffing. All but one of the women in the class ultimately left engineering; Kiorpes went on to major in psychology.

Such blatant sexism is almost unthinkable today, says Kiorpes, now a neuroscientist at New York University. But Kiorpes, who runs several mentoring programmes for female students and postdoctoral fellows, says that subtle bias persists at most universities. And it drives some women out of science careers.

By almost any metric, women have made great gains in closing the scientific gender gap, but female scientists around the world continue to face major challenges. According to the US National Science Foundation, women earn about half the doctorates in science and engineering in the United States but comprise only 21% of full science professors and 5% of full engineering professors. And on average, they earn just 82% of what male scientists make in the United States — even less in Europe.



**WOMEN IN SCIENCE**  
The gender gap and  
how to close it

Nature special:  
[nature.com/women](http://nature.com/women)

Scientific leaders say that they continue to struggle with ways to level the playing field and entice more women to enter and stay in science. "We are not drawing from our entire intellectual capital," says Hannah Valentine, dean of leadership and diversity at the Stanford School of Medicine in California. "We've got to put on the accelerator to evoke social change."

### Free podcast interview

Uta Frith and Athene Donald reflect on science careers, families, quotas, biases and stereotypes.

One of the most persistent problems is that a disproportionate fraction of qualified women drop out of science careers in the very early stages (see 'Women in science'). A 2006 survey of chemistry doctoral students by the Royal Society of Chemistry in London, for example, found that more than 70% of first-year female students said that they planned a career in research; by their third year, only 37% had that goal, compared with 59% of

males<sup>1</sup>.

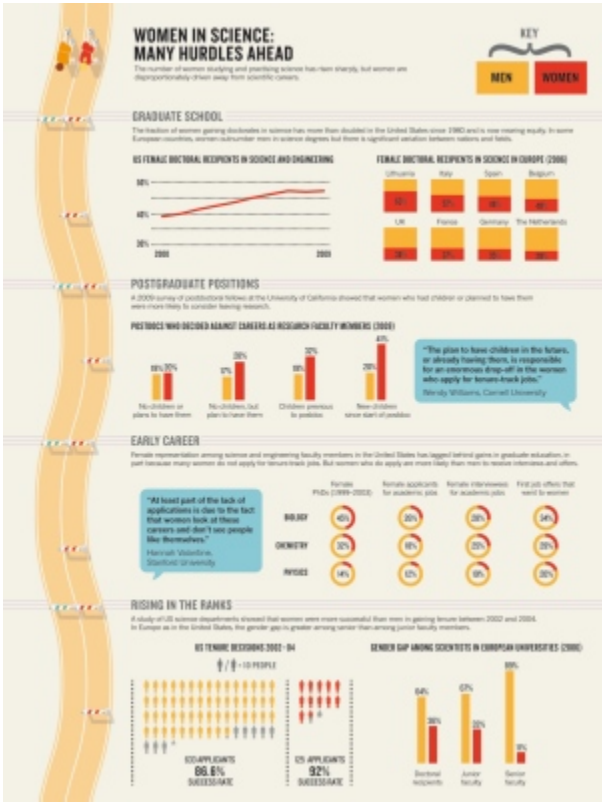
Many experts say that a big factor driving this trend is the lack of role models in the upper divisions of academia, which have been slow to change. The Royal Society of Chemistry has found, for instance, that female chemistry students are more likely than males to express low self-confidence and to report dissatisfaction with mentorship<sup>2</sup>. Female students "conclude consciously and unconsciously that these careers are not for them because they don't see people like them", suggests Valentine. "That effect is

very, very powerful — this sense of not belonging.”

The attrition continues at later stages. In biology, for example, women comprised 36% of assistant professors and only 27% of tenure candidates in a 2010 study by the US National Research Council<sup>3</sup>. “We’re not talking about a lack of talent here. Part of the story is that women leave earlier. In a sense, they give up on an academic career,” says Curt Rice, vice-president of research and development at the University of Tromsø in Norway, who has studied gender equality in US and European universities.

Family values

Many of the UK chemistry students viewed research as an all-consuming endeavour that was incompatible with raising a family. Meeting the demanding schedule of academic research can seem daunting for both mothers and fathers. But family choices seem to weigh more heavily on the career goals of women.



SOURCES: NSF/REF. 12 (GRADUATE); REF. 4 (POSTGRADUATE); NSF/WEBCASPAR (EARLY CAREER); REF. 3/REF. 12

Law professor Mary Ann Mason at the University of California, Berkeley, and her colleagues have found<sup>4</sup> that male and female postdocs without children are equally likely to decide against research careers, each leaving at a rate of about 20%. But female postdocs who become parents or plan to have children abandon research careers up to twice as often as men in similar circumstances.

“The plan to have children in the future, or already having them, is responsible for an enormous drop-off in the women who apply for tenure-track jobs,” says Wendy Williams, a psychologist at Cornell University in Ithaca, New York. Furthermore, women who do become faculty members in astronomy, physics and biology tend to have fewer children than their male colleagues — 1.2 versus 1.5, on average — and also have fewer children than they desire<sup>5</sup>.

In response to these concerns, many universities have taken steps to establish family-friendly policies such as providing child-care assistance and extending tenure clocks for new parents. Shirley Tilghman, president of Princeton University in New Jersey, believes that such initiatives provide crucial support for women, but that other solutions are still needed. “I don’t think there’s a single obstacle,” she says. “I think there’s a whole series of phenomena that add up.”

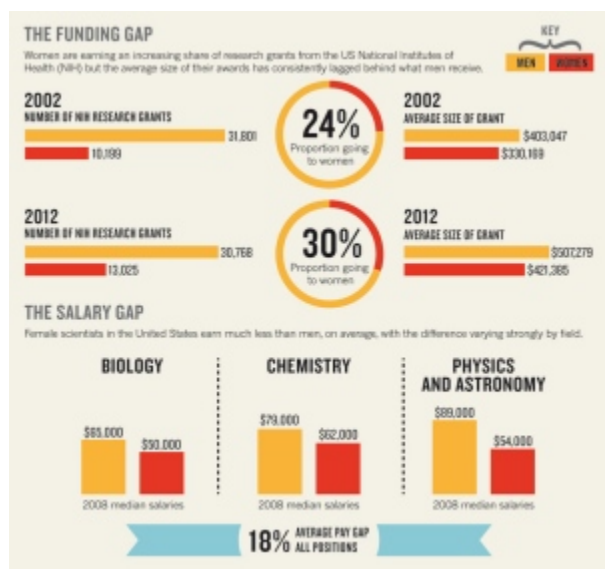
## Live issue

At Yale University in New Haven, Connecticut, microbiologist Jo Handelsman is one of many researchers who think that gender discrimination continues to be a significant part of the problem. In a much-talked-about experiment last year<sup>6</sup>, her team showed that science faculty members of both sexes exhibit unconscious biases against women. Handelsman's group asked 127 professors of biology, chemistry and physics at 6 US universities to evaluate the CVs of two fictitious college students for a job as a laboratory manager. The professors said they would offer the student named Jennifer US\$3,730 less per year than the one named John, even though the CVs were identical. The scientists also reported a greater willingness to mentor John than Jennifer. "If you extrapolate that to all the interactions that faculty have with students, it becomes very frightening," says Handelsman.

Her findings match well with the results of a survey<sup>7</sup> done in 2010 by the American Association for the Advancement of Science. Of the 1,300 or so people who responded, 52% of women said that they had encountered gender bias during their careers, compared with just 2% of men.

Still, other concrete evidence of bias is hard to find. Some measures show female scientists outperforming male rivals in landing interviews and job offers early in their careers. The National Research Council study<sup>3</sup> showed that women accounted for 19% of the interview pool and received 32% of job offers for tenure-track electrical-engineering positions. Women fared just as well as men in tenure evaluations, but female assistant professors in many disciplines seemed less likely to reach tenure consideration compared with men.

Women face even more daunting odds in Spain. Men are 2.5 times more likely to rise to the rank of full professor than female colleagues with comparable age, experience and publication records<sup>8</sup>.



SOURCES: NIH; NSF/SESTAT

Disparities can also be found in grant funding in some countries. In one frequently cited study<sup>9</sup>, Christine Wennerås and Agnes Wold at the University of Gothenburg in Sweden found in 1997 that female applicants for postdoctoral fellowships had to score 2.5 times higher on an index of publication impact to be judged the same as men.

Several groups, such as the UK Medical Research Council and biomedical research charity the Wellcome Trust, have since investigated their grant programmes and found negligible or very subtle effects of gender<sup>10</sup>. The Canadian Medical Research Council found no

differences in success rate in most of its research grant programmes, but reported lower success rates for women in some training grants<sup>11</sup>. In the United States, women are slightly more successful than men in obtaining grants from the National Science Foundation, but the trend is reversed for the National Institutes of Health (NIH). The NIH also gives women smaller awards on average (see 'The funding gap').

Information provided to *Nature* by the NIH through a Freedom of Information Act request indicates that the percentage of women on review panels has improved marginally over the past decade, from 25% in 2003 to 30% in 2012. Those figures roughly parallel the percentage of women applying for and receiving grants in that time.

### Pay problems

The inequalities also extend to salaries. In the European Union, female scientists earned on average between 25% and 40% less than male scientists in the public sector in 2006 (ref. 12). Although the average pay gap is smaller in the United States, the disparity is particularly large in physics and astronomy, where women earn 40% less than men.

For young academic scientists, however, those differences may be fading. The National Research Council found an 8% pay gap at the level of full science and engineering professors but no significant differences among junior faculty members<sup>3</sup>. Some experts argue, however, that the salary gap may reflect other continued trends, such as the fact that a disproportionate share of women move into non-tenure positions or faculty jobs at lower-status universities.

Tilghman says that Princeton and many other universities have grown increasingly conscious of the need to track and rectify gender gaps in salary and other institutional support. "Absolutely, it needs eternal vigilance," she says. "But we're in a much better place."

*Nature* **495**, 22–24 (07 March 2013) doi:10.1038/495022a

### References

---

1. Royal Society of Chemistry *Change of Heart* (RSC, 2008).  
Show context
2. Newsome, J. L. *The Chemistry PhD: The Impact on Women's Retention* (RSC, 2008).  
Show context
3. National Research Council *Gender Differences at Critical Transitions in the Careers of Science, Engineering, and Mathematics Faculty* (National Academies, 2010).  
Show context

4. Goulden, M., Frasch, K. & Mason, M. A. *Staying Competitive* (Center for American Progress, 2009).  
[Show context](#)
5. Ecklund, E. H. & Lincoln, A. E. *PLoS ONE* **6**, e22590 (2011).  
[Show context](#) [Article PubMed ChemPort](#)
6. Moss-Racusin, C. A., Dovidio, J. F., Brescoll, V. L., Graham, M. J. & Handelsman, J. *Proc. Natl Acad. Sci. USA* **109**, 16474–16479 (2012).  
[Show context](#) [Article PubMed ChemPort](#)
7. Cell Associates *Barriers for Women Scientists Survey Report* (AAAS, 2010).  
[Show context](#)
8. Women and Science Unit *White Paper on the Position of Women in Science in Spain* (UMYC, 2011).  
[Show context](#)
9. Wennerås, C. & Wold, A. *Nature* **387**, 341–343 (1997).  
[Show context](#) [Article PubMed ISI ChemPort](#)
10. Grant, J., Burden, S. & Breen, G. *Nature* **390**, 438 (1997).  
[Show context](#) [Article PubMed ISI ChemPort](#)
11. Friesen, H. G. *Nature* **391**, 326 (1998).  
[Show context](#) [Article PubMed ISI ChemPort](#)
12. European Commission. *She Figures 2009* (European Communities, 2009).  
[Show context](#)

## Related stories and links

---

### From nature.com

- **Women in science: Women's work**  
06 March 2013
- **366 days: Nature's 10**  
19 December 2012
- **Nature's sexism**  
21 November 2012
- **How women scientists fare in the Arab world**  
31 October 2012
- **Science gender gap probed**  
07 February 2011
- **Gender stop-gaps**



09 June 2010

- **Does gender matter?**

12 July 2006

- **Nature special: Women in science**

## From elsewhere

- **Women, Minorities, and Persons with Disabilities in Science and Engineering (NSF)**
- **Association for Women in Science**
- **Women in Science, Statistics and Indicators (European Commission)**
- **Curt Rice's blog**

## Author information

---

### Affiliations

Helen Shen is an intern with *Nature* in Washington DC.

## Comments

---

2013-03-06 06:50 AM

**Tina Iverson said:** As a women in science, I have read so many depressing statistics on women in science, but few of these compilations really address whether there is true bias.

So I did an experiment :-)

I am at a medical school where grant success is important for salary recovery and is the main factor in promotion and tenure.

In year 1, I submitted grants under my full name, and my first name is undoubtedly not gender neutral.

In year 2, I submitted grants using only my initials and my last name. My success rate went up 5-fold. This is an experiment with  $n=1$ , but I didn't want to repeat it.

However, in year 3, the university adopted an electronic grants system that (unbeknownst to me) automatically used my full first name again. In this blind study, my success rate went down 5-fold exactly coincident with changing back to a female name on the cover page of the application.

In year 4, I changed my name with the university to have it only be my initials, thus frustrating the automated system. My success rate went back up 5-fold.

I am the same applicant. The outcome only differed when the reviewers knew that I am female. While the replicates are low, I do not plan to repeat the experiment again...



2013-03-06 07:09 AM

**Cathy Kessel said:** The article above says:

"The plan to have children in the future, or already having them, is responsible for an enormous drop-off in the women who apply for tenure-track jobs,' says Wendy Williams, a psychologist at Cornell University in Ithaca, New York."

It's helpful to know that, for Professor Williams, "tenure-track" generally seems to mean what many others call "tenured or tenure-track."

For example, in an article published last year, she and a co-author note that

"the percentage of female assistant professors in many STEM fields tracks closely with the proportion of recent PhDs in these fields (Nelson and Brammer, 2010)."

See p. 22 of Valla & Williams, 2012 in Journal of Women and Minorities in Science and Engineering, 18(1), <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3430517/>. Nelson and Brammer's statistics concern positions at the top 100 US departments which were tenured or tenure-track.

It's also helpful to know that the 2010 National Research Council study concerned Research 1 universities and that it was not a longitudinal study. The report says:

"In biology and chemistry, the differences were statistically significant. In biology, 27 percent of the faculty considered for tenure were women, while women represented 36 percent of the assistant professor pool. In chemistry those numbers were 15 percent and 22 percent, respectively. This difference may suggest that female assistant professors were more likely than men to leave before being considered for tenure. It might also reflect the increased hiring of female assistant professors in recent years (compared with hiring 6 to 8 years ago). Note, however, that the probability of representation in the tenure pool in a cross-sectional study such as this is completely confounded with time." (pp. 148-149)

2013-03-07 01:21 AM

**Vivien Zapf said:** Juggling family and work need not be a sacrifice. When my children arrived I switched to part time. I thought at the time that my career would be permanently ruined. But by getting off useless committees, removing junk-work from my schedule, delegating and becoming more efficient, I found myself producing just as much science half-time as I had been full-time. When I returned to full-time I was twice as efficient.

Nobody can work 80 hours a day for their entire life. And most people working those hours are not very efficient. And recall that there is a reason sabbaticals are built into the academic career. We all need time to step back, take a break, re-evaluate, and spending time with our children can

provide just this opportunity.

2013-03-07 02:03 AM

**Irene Newton said:** It would be great to see the raw data behind these graphs - for example, one nagging question I have is whether or not the median and the mean reveal the same trends.

2013-03-07 09:54 AM

**James Dwyer said:** There's no question that women have been discriminated against in the past, and most likely are still, at least to some extent, in the present. Technically, however, simply quantifying inequities does not provide indisputable evidence of discrimination. A complete quantitative analysis would require that pay differences be normalized by some reliable measure of job performance – of value to the employer. Likewise, the number and value of research grants awarded should be normalized by the number of applications and, ideally some independent measure of their quality.

I realize this is an exceedingly sensitive issue – I apologize in advance to all those whose sensibilities I've offended – my intentions are purely technical. BTW, I'm a retired information systems analyst, concerned about my very capable granddaughters' future opportunities.

2013-03-08 09:24 AM

**Richard Monastersky said:** Those interested in checking out the data used for the NIH grant graphic can find them at these links: Research grant size by gender

Research grant numbers by gender

Success rates for research project grants

It is important to note that the charts for research project grants and research grants overlap in the categories they cover but they are not identical.

For all awards, here is the gender split in award size

Note that in all categories, women do not receive as much as men.

All these charts come from the NIH Data Book

The most recent NSF data on awards can be found in this report

2013-03-12 12:19 PM

**Kathleen Taylor said:** It's not just science, it's science writing too. As an author of books published by a top university press, I shouldn't lack confidence, but it's hard not to waver when all the top science writers seem to be men. I can't help wondering if my books would have sold better if the name on the cover had been 'K.E.' Taylor rather than the clearly female 'Kathleen'. I chose the latter from sheer obstinacy, and because the status quo's never going to change if women keep taking the rational, self-interested option of making themselves seem more like men.

That's the trouble: it's in researchers' interests to keep their heads down and not rock the system, whether they're male or female.

How do we incentivise people to change the stereotypes? That needs the media, teachers, politicians and so on, as well as scientists.

2013-03-19 01:41 AM

**Raquel Perales said:** I am a PhD math student. I have read some articles like this one and always wonder why female mathematicians are never or rarely mentioned. Is there not enough data about us?

You need to be registered with *Nature* and agree to our Community Guidelines to leave a comment. Please log in or register as a new user. You will be re-directed back to this page.

**See other News & Comment articles from *Nature***

**Nature** ISSN 0028-0836 EISSN 1476-4687

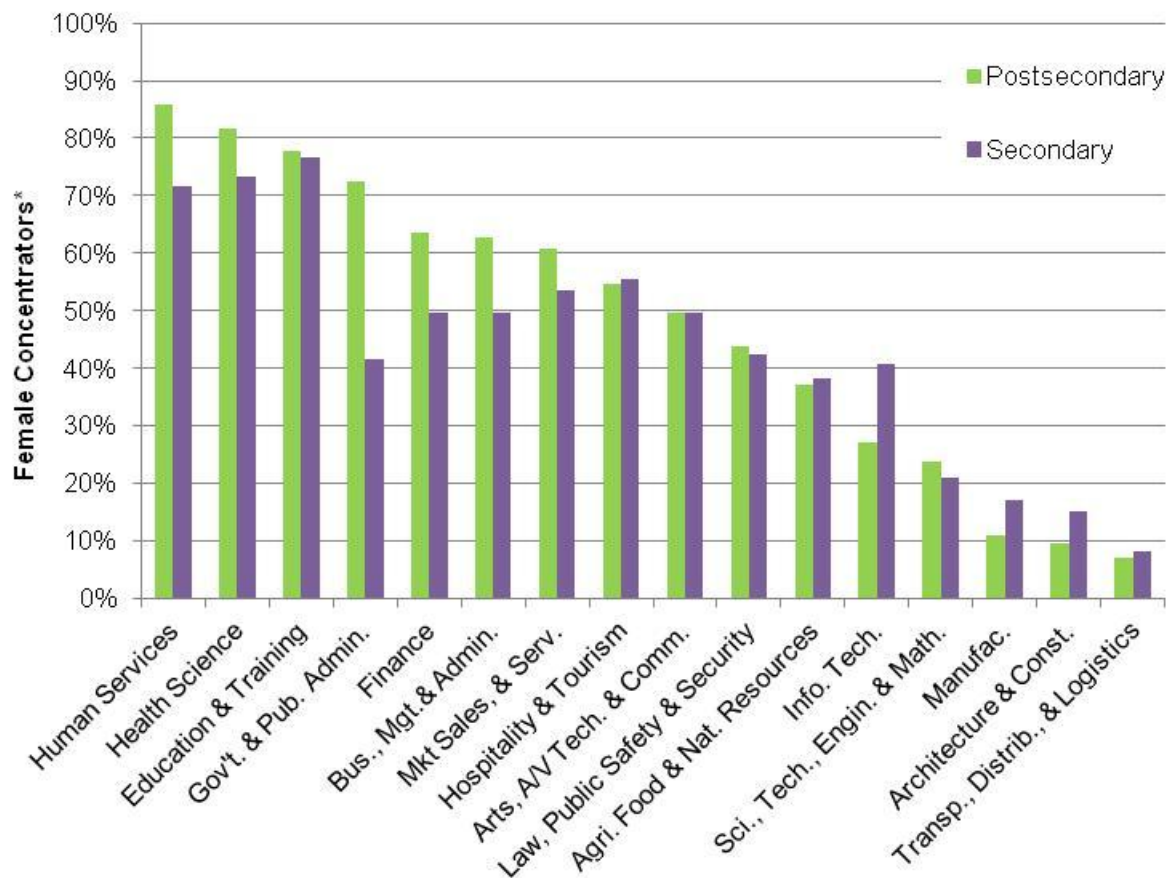
© 2013 Nature Publishing Group, a division of Macmillan Publishers Limited. All Rights Reserved.  
partner of AGORA, HINARI, OARE, INASP, CrossRef and COUNTER

## Education Data Show Gender Gap in Career Preparation

- More than forty years after Title IX outlawed sex segregation in education, women and girls are still sorely underrepresented in Career and Technical Education (CTE) programs that are nontraditional<sup>1</sup> for their gender.

Women and girls make up only a small percentage of students enrolled in the majority of programs funded by the Perkins Act that provide training for jobs in high-paying fields—a pattern that only intensifies in the transition from secondary to postsecondary education.

**Figure 1. Women and Girls Remain Concentrated in Traditionally Female CTE Programs**



Source: Calculations by the authors using 2010 data from Perkins-funded CTE programs provided by the U.S. Dept. of Education.

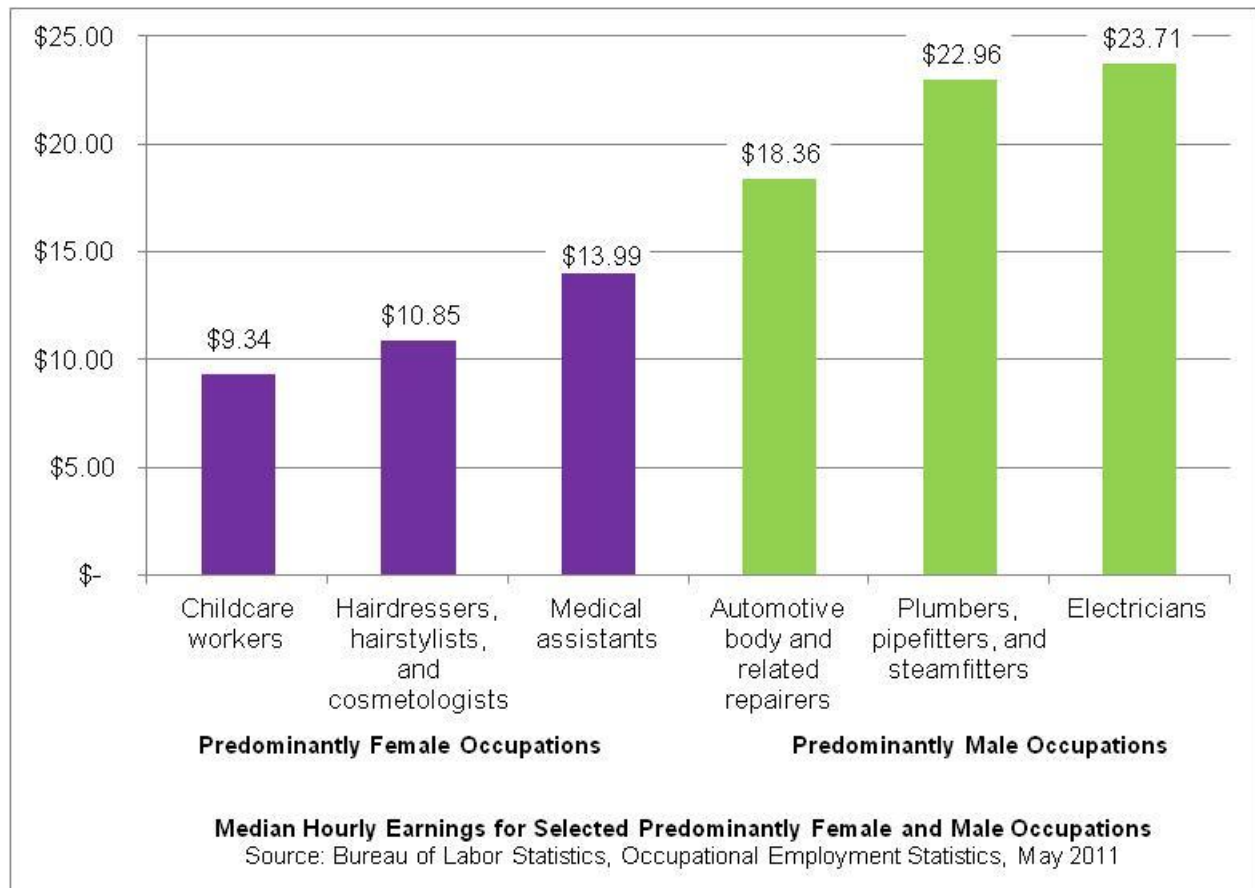
\*Generally, concentrators are secondary students who have taken at least three courses, or postsecondary students who have taken at least 12 credits, in a single CTE program area. For state specific definitions go to <http://cte.ed.gov/accountability/reports/populationdefinitions.cfm>

<sup>1</sup> The Perkins Act defines “nontraditional fields” as occupations or fields of work for which individuals from one gender comprise less than 25 percent of the individuals employed in each such occupation or field of work

- **Women and girls remain concentrated in CTE courses that provide training for traditionally female, low-paying fields (see Figure 1).**

Women and girls account for more than 70 percent of students at the secondary level and more than 80 percent of students at the postsecondary level enrolled in the “Human Services” cluster, which includes training for low-paying jobs such as Childcare Provider and Cosmetologist. In contrast, women and girls make up only 15 percent of students at the secondary level and less than 10 percent of students at the postsecondary level enrolled in the “Architecture and Construction” cluster, which includes training for relatively high-paying jobs such as Energy Technician and Electrician.

**Figure 2. Women Found in Lower Paying Career Preparation Programs than Men**



- **Women and girls’ participation in CTE programs that prepare them for high-skill, high-wage, and high-demand jobs is critical to ensuring their economic security and to closing the wage gap.**

Women are either primary breadwinners or co-breadwinners in 63.9 percent of families with children.<sup>2</sup> The typical woman working full time, year round continues to be paid only 77 cents<sup>3</sup> for every dollar paid to her male counterpart.

- **Traditionally male occupations pay far more than traditionally female occupations. CTE programs prepare too many girls and young women for these low-paying, predominately female jobs (see Figure 2).**

Women’s concentration in these predominantly female jobs is a significant contributor to the wage gap and to women’s economic insecurity.

<sup>2</sup> Boushey, Heather, Ann O’Leary, and Sarah Jane Glynn, 2013. *Our Working Nation in 2013: An Updated National Agenda for Work and Family Policies*. Washington DC: Center for American Progress.

<sup>3</sup> Institute for Women’s Policy Research. 2013. *The Gender Wage Gap: 2012*. Fact Sheet. Washington, DC: Institute for Women’s Policy Research.

- **The upcoming reauthorization of the Perkins Career and Technical Education Improvement Act provides an ideal opportunity to reduce occupational segregation by promoting training for women and girls in high-skill, high-demand and high-wage jobs.**

The Perkins Act has held states accountable for increasing participation and completion rates of students in CTE courses that are nontraditional for their gender. The 2006 reauthorization of the Act included sanctions for noncomplying states and requirements for state and local improvement plans for those not meeting performance measures. Some states report significantly better results than the national average. Seven states had secondary enrolment rates for girls in non-traditional programs that were at least 10 percentage points higher than the national average of 28 percent; ten states had postsecondary completion rates for women in nontraditional programs that were at least 10 percentage points higher than the national average of 27 percent. Many state and local CTE directors count the nontraditional accountability measure and the accompanying provisions in the Perkins Act among the key reasons for their state's success in improving students' participation in and completion of nontraditional CTE programs. The accountability measure challenges educational institutions to address the barriers that women and girls face in entering nontraditional fields, such as sexual harassment in the classroom, bias in career recruitment, counseling, or mentorship, and a lack of access to appropriate tools or facilities.

- **While the nontraditional measure is essential to closing the gender gap in CTE, failures in implementation and enforcement of the data reporting requirement undermine its effectiveness.**

For example, radically inconsistent reporting standards and definitions among states result in wide variations in the quality of data reported. These variations make it extremely difficult to compare different programs and different states. Inaccuracies in data reporting must also be addressed. Finally, the current measure requires states to meet nontraditional performance levels that combine males and patterns and stymies more direct initiatives to narrow the gender gap.

In 2012, the U.S. Department of Education issued its *Blueprint for Transforming Career and Technical Education* and expressed concerns about the need to ensure that states and localities are accountable for closing equity gaps and improving opportunities and outcomes for *all students* in CTE programs. The blueprint did not go far enough in addressing the closing of equity gaps in CTE. Therefore, the CTE Task Force makes these additional recommendations for reauthorization of the Perkins Act.

## **Key Recommendations for Accountability in the Perkins Act Reauthorization**

### **→ States should continue to be held accountable**

Maintain the requirement that states continue to set negotiated performance levels and report on the number of students who participate in and complete CTE programs that are nontraditional for their gender. Congress should retain and strengthen current provisions requiring improvement plans and authorizing sanctions for states that do not meet performance measures. Congress should include provisions in the bill that give the U.S. Department of Education, Office of Vocational and Adult Education (OVAE) the explicit authority to hold states accountable.

### **→ Disaggregate information about participation and completion**

Disaggregating data by gender, race, disability, parental status, income status, and English learning status is critical to providing an accurate understanding of how women and girls are faring in CTE, as well as to identifying whether more progress is being made for some groups of women and girls but not for others. Reporting separately for male and female students would also facilitate the development of specific strategies to recruit and retain both women and men into nontraditional fields.

➔ **Encourage continuous improvement at the state and local level**

Currently, nontraditional performance levels are negotiated between the Department of Education and state education agencies and between state education agencies and local education agencies. This process should build meaningful continuous improvement over time from valid and consistent baseline data.

➔ **Provide specific funding to states for services that prepare students for nontraditional fields**

Congress should raise the state leadership set-aside from 10 to 15 percent with the direction that the additional 5 percent would be used to close equity gaps, especially gender gaps in CTE programs that lead to occupations with family-sustaining wages.

➔ **Correct inconsistencies in state data reporting**

Require states to use clear and consistent definitions when reporting state data. Currently, there are significant inconsistencies in data standards and reporting among states. Some states use varying definitions and reporting methods that make comparisons difficult. In other instances, reported rates were radically inconsistent with performance in previous years or in other areas. Irregular data should trigger further investigation and technical assistance by the Department of Education. Consistent reporting is critical so that states can learn from one another about how to improve outcomes.

➔ **Launch challenge grants**

Provide challenge grants to states to identify and address the main barriers to students' participation in CTE programs that are nontraditional for their gender. Challenge grants can be awarded to states to promote innovative policies and practices in teacher professional development, student support programs or career counseling, and assessment methods that expose students to all career options.

➔ **Require the Department of Education to identify and build on the success of high-performing states**

Some states have demonstrated success in promoting and providing training for women in nontraditional occupations and should serve as models for other states to follow. For example, Missouri, Connecticut, the District of Columbia, and New Mexico all have state-wide rates of female participation in nontraditional fields above 40 percent in some fields. Congress should require the Department of Education to research relevant state-level policies and programs for increasing the number of students in nontraditional CTE programs, identify best practices, and provide technical assistance to other states to implement similar practices.

➔ **Reinstate the position of Gender Equity Coordinator for CTE programs**

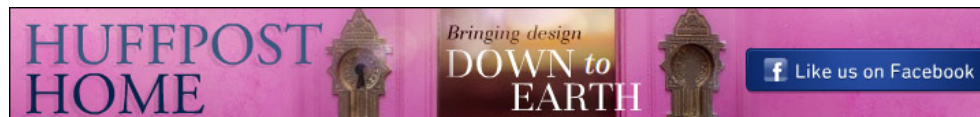
Congress should reinstate the position of Gender Equity Coordinator for CTE programs, which was part of the Perkins Act prior to reauthorization in 1998. State Gender Equity Coordinators are vital to ensuring that the gender equity measures in Perkins are implemented consistently and effectively throughout all states.

➔ **Require better coordination between OCR and OVAE**

Congress should require the U.S. Department of Education's Office for Civil Rights and the Office of Vocational and Adult Education to better align their processes for investigating and remedying gender-based inequities in CTE programs, including by jointly providing technical assistance to states and conducting periodic compliance reviews.

\* This report was prepared as a summary of an analysis by the Institute for Women's Policy Research, the National Alliance for Partnerships in Equity, the National Women's Law Center, and Wider Opportunities for Women, under the auspices of the National Coalition of Women and Girls in Education and the National Coalition on Women, Jobs and Job Training.





April 1, 2013



## What Exactly Is Drawing Young Women Away From STEM Fields?

Posted: 03/27/2013 8:09 pm

We consistently hear about the need to educate and recruit more young Americans for careers in the science, technology, engineering, and mathematics (STEM) fields. Young women and girls are failing to follow STEM pathways in the same numbers as young men and boys, and the million dollar question is: Why?

Numerous research studies have tried to explain the dearth of women in these fields. Some suggest that women simply aren't as able as men when it comes to mathematics. Others suggest that women don't identify with mathematics, have a lack of interest in mathematics, or hold different lifestyle values. Although insightful, these studies do not offer a clear understanding of what it is that is pushing capable young women away from secure and potentially lucrative STEM careers.

The [research we've done](#) at the University of Pittsburgh and University of Michigan suggests that there is a pre-existing pool of individuals with both high math and high verbal abilities. Unfortunately, these individuals seem to be more likely to choose careers outside of science because their combination of skills provides them with more career options to choose from. Notably, we found this group to contain more females than males.

We studied 1,490 senior high school American students who were college-bound, evaluating them based on SAT scores, motivational beliefs, and other values such as family needs and how much passion they had for a career. These same people were interviewed again at age 33 once they were settled into the workplace.

Perhaps unsurprisingly, we found that certain mathematically skilled students let classroom success guide them into their future careers -- landing themselves in STEM occupations that tapped into these skill-sets. However, we found that these were primarily students who had high math and only moderate verbal skills. These students self-identified with math over verbal domains, and their careers followed suit. This was especially the case when compared to those with the combination of high math and high verbal abilities.

According to our research, females are more likely than their male counterparts to find themselves in the fortunate position of being able to consider multiple career paths. This leaves us wondering: what exactly is drawing young women -- specifically those with the combination of high math and high verbal skills -- away from STEM fields?

Previous research suggests that STEM fields are perceived by women as being object- or thing-oriented, male-dominated, and not family friendly -- issues that have yet to be addressed on a meaningful level. Educators and policy makers tend to focus on strengthening girls' math ability at earlier ages. However, this may be missing the point. Instead, we need to consider tapping into the already-existing potential of those females who are both mathematically and verbally skilled. One way might include increasing math- and verbal-capable women's self-identification with mathematics. Likewise, we need to ensure that females are well informed as to the diverse range of options available in various STEM careers. For example, it is important to convey to young people, particularly females, that math and science careers have a beneficial impact on wider society and do allow one to work with other people. This would allow math-competent females to better evaluate the utility and cost of these careers in terms of their personal goals and values. Exposing math- and verbal-capable females to STEM role models during secondary school may also combat attrition from STEM fields due to misinformation or stereotypes.

Finally, we suggest that it is time to reframe the STEM gender debate. Instead of focusing on what girls don't have when it comes to mathematics, we need to focus on what they do have, and how to tap into it. It is up to educators, policymakers, and employers to make the STEM pathway, at all stages, more welcoming to women and girls. Until this happens, we cannot be surprised that millions of math-capable females continue to opt for non-STEM careers, in which they are equally able to excel.

EDUCATION WEEK

TEACHER

DIGITAL DIRECTIONS

INDUSTRY & INNOVATION

TOPSCHOOLJOBS

SHOP

ADVERTISE

Search

ADVANCED SEARCH

April 1, 2013

Current Issue

TOPICS

BLOGS

REPORTS & DATA

EVENTS

Welcome, Site Licensee

Full Premium Access!

NEW! FOR SUBSCRIBERS ONLY

Digital Edition of Education Week

Daniel Pink on How Teachers Can 'Sell' More to Students



THE DRIVEN CLASSROOM: New Strategies to Motivate and Engage Students A Three Part Series

EDUCATION WEEK PD WEBINARS

ADVANCING ONLINE LEARNING FOR EDUCATORS

WINTER PRICE BREAK!

SUBSCRIBE NOW

TECHNOLOGY COUNTS

DIPLOMAS COUNT

QUALITY COUNTS

Tuesday, April 9, 2013 • 2 to 3 p.m. ET

Featuring Daniel Pink

Recommend this on Google

Education Week's blogs > College Bound

COLLEGE Bound

An exploration of the issues affecting access to higher education

READY... SET... GO

Caralee Johnson Adams has worked as a journalist for nearly 25 years, covering education, health, parenting, and other issues. She received her journalism degree from Iowa State University and her master's degree in political science from the University of New Orleans.



Caralee Adams

« Carnegie Report Outlines Principles for High School Redesign | Main | Early-College High Schools

Show Promise »

STEM Career Programs Lack Female Participants, Study Says

By Caralee Adams on March 22, 2013 12:02 PM

Women and girls are sorely missing from programs that prepare students for lucrative careers in the STEM fields—science, technology, engineering, and mathematics—as well as other high-paying skilled trades.

Female students comprise fewer than one in four students in STEM career and technical education programs, and fewer than one in six students in CTE programs related to manufacturing, architecture, and construction, according to research released today prepared by the Institute for Women's Policy Research, along with the National Coalition of Women and Girls in Education and others.

The participation of females in these fields of study traditionally dominated by males varies by state.

Seven states had high school enrollment rates for girls in nontraditional programs that were at least 10 percentage points higher than the national average of 28 percent. Another 10 states had postsecondary completion rates for women in nontraditional programs that were at least 10 percentage points higher than the national average of 27 percent, according to data from the U.S. Department of Education.

It's not that women and girls are opting out of CTE programs. They are just more likely to pursue other occupations, such as child-care workers or hairdressers. The report says 80 percent of students at the postsecondary level enrolled in "human services" CTE programs.

As a result, the wage gap by gender continues. For instance, a hairdresser makes about \$10.85 per hour, compared with \$18.36 for someone working in an automotive body and related repair field. Advocates note that getting more women into these higher-paying jobs is an issue of economic security.

"It is important that training for higher-paying occupations includes women and girls, and that girls are introduced to nontraditional careers, particularly in STEM fields, at a young age," said Barbara Gault, vice president and executive director of the Institute for Women's Policy Research, a member organization of the NCWGE, in a press statement. "To secure strong futures for girls we need to address obstacles to high-paying careers, such as sexual harassment in the classroom or unintentional bias in mentoring or advising."

The report suggests that efforts to diversify CTE programs under the federal Perkins Career and Technical Education Act is making a difference. The law promotes gender equity in training

48

Tweet

RECENT ENTRIES

New Efforts Introduced to Manage Student Loans

Budget Cuts Impact California Community College Students

Early-College High Schools Show Promise

STEM Career Programs Lack Female Participants, Study Says

Carnegie Report Outlines Principles for High School Redesign

MOST VIEWED ON EDUCATION WEEK

Math Teachers Strive to Bring Core...

Study: Middle School Algebra Push Y...

Court Rejects School Search of Stud...

Popular Curriculum Targets Element...

Glenn Beck Takes on the Common Core...

RECENT COMMENTS

ARCHIVES

Select a Month...

CATEGORIES

academic performance (11)

ACT (13)

Advanced Placement (2)

assessments (3)

career planning (37)

College Admissions (109)

college and career readiness (43)

college applications (66)

college benefits (32)

College Board (12)

College Completion (98)

college experience (29)

College experience in high school (30)

College faculty (7)

College Graduation Trends (45)

college life (6)

college persistence (1)

FOLLOW THIS BLOG

RSS via Reader

RSS via Email

Follow on TWITTER

Advertisement

WINTER PRICE BREAK!

Save 20% or more

SUBSCRIBE NOW



EXECUTIVE DIRECTOR, Vida Charter School

Vida Charter School, Gettysburg, PA

Licensed Teacher

CCSD, Las Vegas, NV

programs and holds states accountable for female student participation. The report includes several recommendations to improve the effectiveness of the Perkins Act when it is next reauthorized by Congress.

Tags: [CTE](#) , [Perkins Career and Technical Education Act](#) , [STEM](#)

Print

Email

BOOKMARK

Tweet

48

Like

You must be logged in to leave a comment. [Login](#) | [Register](#)



**Ground Rules for Posting**  
We encourage lively debate, but please be respectful of others. Profanity and personal attacks are prohibited. By commenting, you are agreeing to abide by our [user agreement](#).  
All comments are public.

**SECURITY WARNING:** Please treat the URL above as you would your password and do not share it with anyone.

**SECURITY WARNING:** Please treat the URL above as you would your password and do not share it with anyone.

- College Preparation (78)
- college rankings (12)
- college readiness (16)
- college reforms (56)
- college retention (13)
- college scholarships (10)
- College Search (52)
- college transfer (2)
- college transfers (3)
- College Transition (58)
- college trustees (2)
- college visits (7)
- Common Application (11)
- Community Colleges (66)
- data collection (7)
- data collectiono (1)
- developmental education (9)
- Dropouts (1)
- dual enrollment (1)
- early college (1)
- economy (23)
- education reform (13)
- Enrollment Trends (35)
- FAFSA (7)
- financial aid (52)
- For-Profit Colleges (23)
- gender issues in education (1)
- global collaboration (1)
- Graduate School (7)
- HBCU (1)
- high school counseling (20)
- High School Graduation Rates (17)
- high school rankings (2)
- high school reforms (1)
- High School Standards (16)
- international higher education (3)
- international students (1)
- Job Market (30)
- latino students (5)
- learning in college (9)
- minority and low-income students (22)
- Net price calculators (1)
- online learning (2)
- parenting (1)
- Paying for College (136)
- Pell grants (32)
- placement tests for community college (1)
- private student loans (5)
- Regulation and Legislation (54)
- remedial education (1)
- research (3)
- SAT (14)
- scholarships (14)
- social media (4)
- state funding for higher education (10)
- state legislation (3)
- Student Employment (3)
- student loans (17)
- study abroad (3)
- tax credits (5)
- technology (1)
- transfer (1)
- value of college (2)
- workforce and career training (30)
- workplace partnerships (4)

**Head of School**  
Willow Hill School, Sudbury, MA  
**ELEMENTARY SCHOOL PRINCIPAL**  
H. B. RHAME ELEMENTARY SCHOOL, Columbia, SC  
**SUPERINTENDENT - McComb Public Schools**  
McComb School District, McComb, MS  
**Virtual Career Fair for Educators**  
TopSchoolJobs eXPO, US  
  
[MORE EDUCATION JOBS >>](#)  
[POST A JOB >>](#)

ACCOUNT MANAGEMENT	CONTACT US	POLICIES	ADVERTISE WITH US	EPE INFO	EDUCATION WEEK PUBLICATIONS
<ul style="list-style-type: none"><li>• Register or Subscribe</li><li>• Online Account</li><li>• Print Subscription</li><li>• Manage E-Newsletters/ Preferences</li><li>• Site Licenses</li></ul>	<ul style="list-style-type: none"><li>• Help/FAQ</li><li>• Customer Service</li><li>• Editor Feedback</li><li>• Letters to the Editor</li></ul>	<ul style="list-style-type: none"><li>• User Agreement</li><li>• Privacy</li><li>• Reprints</li></ul>	<ul style="list-style-type: none"><li>• Display Advertising</li><li>• Recruitment Advertising</li></ul>	<ul style="list-style-type: none"><li>• About Us</li><li>• Staff</li><li>• Work@EPE</li><li>• Mission and History</li></ul>	<ul style="list-style-type: none"><li>• Education Week</li><li>• Teacher</li><li>• Digital Directions</li><li>• Industry &amp; Innovation</li><li>• PD Directory</li><li>• TopSchoolJobs</li></ul>

© 2013 Editorial Projects in Education  
6935 Arlington Road, Bethesda MD 20814 301-280-3100 1-800-346-1843

**NATURE | NEWS FEATURE**

# Women in science: Women's work

**A special section of *Nature* finds that there is still much to do to achieve gender equality in science**

06 March 2013



VIKTOR KOEN

Science remains institutionally sexist. Despite some progress, women scientists are still paid less, promoted less, win fewer grants and are more likely to leave research than similarly qualified men. The reasons range from overt and covert discrimination to the unavoidable coincidence of the productive and reproductive years.



In this special issue, *Nature* takes a hard look at the gender gap and at what is being done to close it. A survey of the data (see page 22) reveals where progress has been made and where inequalities still lie, from salary to tenure. A News Feature (see page 25) reveals a particular dearth of women in some commercial spheres, such as on the scientific advisory boards of biotechnology firms, and an article by historian Patricia Fara (see page 43) traces the wearying stereotypes perpetuated by the biographers of women scientists.

A series of Comment articles looks at possible solutions. Neuroscientist Jennifer Raymond (see page 33) calls on both sexes to recognize and reduce their biases against women in science, and eight researchers from around the world offer their prescriptions (see page 35), from equalizing the retirement age in China, to liberalizing travel restrictions in Saudi Arabia, to boycotting conferences that lack female speakers. We catalogue some of the ambitious moves being made in Europe to get more women into top positions (see page 40) and explore some surprising statistics about mandatory quotas (see page 39). Finally, profiles of four successful 30-something women (see page 28) show how ambition and talent can trump obstacles.

This special issue is dedicated to the memory of Maxine Clarke. In the 28 years that Maxine spent championing the highest scientific standards as an editor at *Nature*, she was all too often the only one to ask, "Where are the women?"



**WOMEN IN SCIENCE**  
The gender gap and  
how to close it

Nature special:  
[nature.com/women](http://nature.com/women)

*Nature* **495**, 21 (07 March 2013) doi:10.1038/495021a

## Related stories and links

---

### From nature.com

- **Sexist attitudes: Most of us are biased**  
06 March 2013
- **Inequality quantified: Mind the gender gap**  
06 March 2013
- **Laboratory life: Scientists of the world speak up for equality**  
06 March 2013
- **Research policy: Only wholesale reform will bring equality**  
06 March 2013
- **Research management: Quotas are questionable**  
06 March 2013
- **Women in biotechnology: Barred from the boardroom**  
06 March 2013

- **Women in science: Weird sisters?**  
06 March 2013
- **From the frontline: 30 something science**  
06 March 2013
- **Nature special: Women in science**

## Comments

2013-03-06 03:34 AM

**Helen Knob said:** As an Associate professor at a high ranking university and a mother of two young children, I see female grad students and post docs in my lab run in fear from academia. They see what I am doing and think it is too hard. Maybe the grass is always greener. Since this is what they know and see, they assume that other jobs will not be that difficult. People in my lab who have worked previously for male scientists of equal or higher positions have decided that I am far busier in a day-to-day basis than my male counterparts. It is true that I am on way too many committees and perhaps spend too much time serving the university, teaching, and helping students that are not in my lab. Sometimes I wonder how we can have maybe 15% female faculty yet up to 50% female representation on many program and university committees. It is, in fact, much harder than I imagined to do this at this point in my career. Many of my colleagues who are successfully balancing work and life have stay-at-home spouses or full time nannies, and I do not have the luxury of either. I imagine that in all professions, running a business or having lots of responsibility is challenging when you are a mother and working full time, especially when "full time" used to be almost every waking minute. It is very hard to do both well. In this profession, and in this funding climate, there are no concessions for reduced publications and productivity during the years that you had children, and as such, future funding, and then future productivity, also suffers. Investment in current faculty at the mid-career stage, particularly when trying to balance family and work, would provide a boost to get people thru and make the process smoother and more attractive to the next generation. When my female trainees say they have no desire to "do what I do", I no longer try to convince them otherwise, and that is the unfortunate consequence of feeling overworked and pulled in two different directions.

2013-03-06 03:39 AM

**Erin Osborne said:** Is anyone else troubled by the fact that in an article promoting women in science, the striking woman in the image is unnamed? Instead, the caption 'Victor Koen', which I just looked up, is the photographer. But who is this mystery lady? And what did she just blow up in the background? And why is she touching her nitrile gloves to her nice dress?

2013-03-07 06:53 AM

**H R said:** Jennifer Raymond states: "70% of men and women across 34 countries view science as more male than female."

hmmm maybe that's because >90% of ground breaking discoveries are made by men?!

Who can name three female scientist/engineers/physicians who made paradigm shifting discoveries or inventions without having to refer to Wikipedia? Marie Curie is the only one that springs to mind and she was able to make her discovery at a time when women were actually disadvantaged not only by nature due to child bearing but by the laws of society. Today laws are actually favoring women with many special programs to promote girls in school, not having to do military service in many countries while men do etc. Also, today, well educated women get kids in their 30ties leaving them with as much time to focus on their PhD and Postdoc work as men. That the difference in scientific output stems solely from gender bias is feminist propaganda, nothing more nothing less.

2013-03-07 09:03 AM

**Luisa Marti said:** People need to get educated on several issues, there's plenty of written material out there that will teach H R and others that:

-while Marie Curie certainly was a brilliant scientist, she is not alone and there are and have been other brilliant women scientists who have made important scientific discoveries and breakthroughs. People like H R just don't know them. However, it is indeed true that their number and their fame is less than in the case of men, and that is a consequence of rampant past and present sexism. There's plenty of evidence that evaluations of women's achievements are biased and sexist, and until that changes, they will not be perceived as positively as they should, hence also not remembered

-simply having laws that favor women in science is not sufficient to change their situation, there has to be a society behind them that believes in them and that enforces them. And the laws and programmes that we do have (in the countries that have them) are by no means sufficient (sometimes, they don't even do what they are supposed to do).

-ever heard of the production and reproduction problem? Women scientists in their 30s are supposed to be establishing their research programme (after finishing their Ph.D and their postdoc) and publishing at a maddening rate but at the same time those are the years when they will have children. Without a culture in the workplace that acknowledges this conflict, brilliant women scientists cannot make progress in their careers and be mothers at the same time. The difference in scientific output and visibility does stem from gender bias, at least in part



2013-03-07 12:06 PM

**Steve Pribut said:** With the status of women in society of years gone by and the persistence of lingering vestiges of sexism still rampant in Western civilization (and more hostile and overt globally) it is no wonder that "ground breaking" discoveries by women appear to be fewer than men. The ground breaking discoveries of Galileo, Newton, and Einstein took place years ago before women could even vote. But none-the-less women have been discoverers and contribute greatly to science.

Besides Madam Curie, winner of two Nobel prizes, the scientist Rosalind Franklin comes to mind. She is responsible for the images that led Watson-Crick to propose the structure of DNA. Many feel she also should have been included in the Nobel Prize for that discovery. Mary Leaky had many of her early discoveries attributed to her husband Richard Leakey but their work together on early human forms and evolution is significant.

Barbara McClintock did significant genetic work including transposition of chromosomes affecting genetic inheritance. Helen Taussig in medicine found that Thalidamide was responsible for significant congenital deformities and devised surgery for "blue babies". Margaret Sanger spread information on birth control although it was illegal to do so. Margaret Mead contributed significantly to Anthropology. Clara Barton altered medical care around the world by founding the Red Cross. Jane Goodall's work as a primatologist is unparalleled. And Rita Levi-Montalcini is the discoverer of Nerve Growth Factor.

Women are there, but apparently unseen by those who desire to be blind to their presence and their contributions. More women are now present in PhD programs, medical programs, and sciences and mathematics than ever before. As Luisa Marti said, we need to find ways to accommodate and understand that women have multiple roles to play at the same time, and child bearing is one of them. In office child care facilities could greatly help keep women contributing and enhance their speedy return to the workplace. Education for both men and women of the lingering problems is critical.

Feminism should not have the negative connotations that have persisted and perhaps even worsened over the past few years. Feminism fights bias and inequity in the workplace, home and in society. It is something to be encouraged, not looked down upon. It was quite shocking to hear that the head of Yahoo, who was wealthy enough to build her own "day care" facility within the workplace, did not consider herself to be a feminist. She also needs to learn what is feminism, how and why it developed, and how, yes, even she is a feminist.

2013-03-07 01:09 AM

**H R said:** Dear Luisa & Steve,

Nobody disputes that there are women who contribute significantly to their field. But for every women scientist you listed (did NÃ¼sslein Vollhart slip your mind? :)) one can name ten male scientists of equal significance.

More importantly, how many women have actually started a new field? E.g. who came up with the new DNA sequencing technologies and microarrays? Who founded Apple, Microsoft, Facebook, Google, Youtube? Who is pioneering brain computer interfaces? And so on...

2013-03-07 02:33 AM

**Steve Pribut said:** (H.R.:)

Let's start with the beginning of computing. Everyone in the field is familiar with Charles Babbage and his calculating machines. If you are in the field you also may have heard of Ada Lovelace. Ada Lovelace worked with Babbage and predicted more of the broad future of computing science than Babbage did. She also translated documents, making a file called "notes". These notes are said to include what is the first program or set of computer instructions. We could say she is the first computer programming scientist.

More recently MOOCs (massive open online courses) have come to the fore. Coursera was an early startup, which is revolutionizing online education. While it has been clear for 20 years that the Internet would be useful for information resources and education, it has only been recently that courses could be set up with the capacity to handle 30,000-100,000 people taking a class simultaneously. The new style classes are from some of the best institutions and have video, multiple choice questions, short essays, longer essays, discussion areas, and in depth explorations of topics.

The co-founder of Coursera is Diane Koller. Koller is a full professor of Computer Science at Stanford University. I'm looking forward to taking an online course with her titled "Probabilistic Graphical Models" which covers Bayesian and Markov network representations over stable and changing domains. This has implications for many different types of systems in diverse disciplines. Dr. Koller has been on the faculty of Stanford since 1975. Her courses there are considered among the toughest in the computer science department. But, you can see her clear teaching style at Coursera at no charge. Dr. Koller is also committed to making certain that the hundreds of courses at Coursera remain free and do not charge even \$1. (That is for non-credit courses which in some cases courses may be offered simultaneously for credit or with a special certificate with a fee.)

There are a few other popular educational sites (beginning with MIT's open courseware – which did not present and offer an entire class), EdX (another excellent site) and Kahn Academy (a fine one person show).

It is estimated that fewer than 12% of computer science degrees are granted to women. This is a drop from the 1980's. It is always hard for those in a distinct minority who are subject to discrimination to have high numbers at the top of any field. While we can nitpick disciplines all day long, the fact of discrimination remains. This issue of Nature has adequate information for anyone who can read and can think to see there are problems. One article discusses even a woman who realizes that she, herself has an anti-female bias. For all of us this is another case of the answer lies within. Ad hominem arguments against women will not alter the facts.

2013-03-08 04:23 AM

**FRANCESCO ELIA MARINO said:** I think the problem is the idea of female and male in the family context. if you decide to have a family and you are a female of course you will have to face more problems like pregnancies and maternity leaves so you have a slow down in your career but if you have a good partner you can do everything together so this does not mean anymore you have to sacrifice a significant part of your career for your family. from another perspective we can't change the biology, a female will always be more attached to child and family. Some people decide to not have a family because they want to dedicate completely to their career, I suppose it is a little bit difficult to have everything in the life.

2013-03-08 06:16 AM

**Luke Jostins said:** If we were talking history of computing, don't forget that Grace Hooper developed the first (open source!) compilers, and was one of the founders of modern machine-independent programming.

Also Marie Curie founded the field of radioactivity (as in not just made an invention, laid down the principals and institutions that guided radiation studies and radiology for the entire 20th century). Why are we dismissing her again?

2013-03-08 02:56 AM

**Maya Capelson said:** HR,

Women have been disadvantaged by child bearing and rearing since the beginning of time, so the reason you can name 10 male scientists to 1 female scientist of equal significance is because women have been busy propagating the human species. Before things like antibiotics, C section, diapers, formula and birth control, women were constantly dealing with being pregnant, dying from childbirth, breastfeeding and attending to their infants and young children. Men, for the lack of a better word, had nothing better to do than concentrate on inventing things. And of course it is great that they did, but that does not mean anything about female ability to invent the same

things.

There have been 15 Noble Prize women winners in the Sciences, 10 of which are in Medicine and Physiology (and yes, all the other ones in Med and Phys have been male for the 112 years). If you are given a Noble Prize, I say you by definition have started a new field, so those 15 clearly did. Interestingly, out of 10 Med and Phys Noble Prize women, 6 never had children, and 3 had them later in life, after their major Noble-Prize discoveries and near or after tenure. In biological sciences, many women have started new fields, so at the very least, just look at faculty lists at the top 10-20 research institutions.

I do not understand what you mean by linking women having children in their 30s to having as much time to concentrate on science as men. 30s to early 40s is usually time for postdoc and early professorship, so very intense. A woman having children during that time is at an enormous disadvantage relative to her male colleagues, especially those without children. There was a study (sorry cannot remember the citation) showing that childless women do just as well as men in academic research positions, in terms of publications, grants, awards, tenure, etc. But women with children do on average worse than men or childless women.

On average, you can say that women are biologically driven to be around their babies. If that drive did not exist, we probably would not survive as a species. But again on average, being a nurturing mother comes at a cost of not being able to succeed as much in other areas of life. Of course there are exceptionally brilliant women like Curie that did both, but they are a tiny proportion. Men on the other hand, especially in the past, only had to worry about one thing, so they did not have to be as exceptional as Curie to achieve. They just had the time.

Also, a colleague shared this with me. Anyone who took biochemistry in college has heard of Michaelis-Menten equation for enzyme kinetics. But almost no one knows that Menten was a woman, Maude Menten. She did other amazing things like was one of the first people to ever use gel electrophoresis to separate proteins and invented the chemical reaction for the entire field of histology. She incidentally never had children. But it makes you wonder how many other inventions and basic discoveries have been actually done by women.

2013-03-08 06:26 AM

**H R said:** Dear Maya,

The real problem lies in the fact that feminists want to introduce affirmative action to get the number of women up in academia. This is a slap in the face of every hard working and better qualified man.

In your second paragraph you confirmed what i said. 44 female noble prize winners out of a total of 860. Is part of that due to child bearing and restrictive laws in the early 20th century? Certainly.

But for last 50 years, laws have been equalized and thanks to men who invented contraception, women can choose freely whether to have kids or not.

As Steve stated, the number of women in computer science is actually declining and is going nowhere in physics and chemistry despite all the efforts to get girls interested in technology. So don't blame the fact that there simply are a lot more extremely focused, inventive, and entrepreneurial male than female technofreaks on sexism.

2013-03-09 10:56 AM

**Maya Capelson said:** Dear HR,

It sounds like it is a waste of time trying to convince you otherwise, but since this is a public forum, I will make my point for the sake of argument.

It is important for people to understand that it is child bearing and not innate ability that creates most of the difference in achievement between men and women. This is still true TODAY.

Women without children, and some with, ARE as focused, inventive and entrepreneurial as men. But many women have children, and once they do, it becomes more difficult for them to put in the same effort as many men to rise to the top of their fields.

Women can choose freely whether to have kids or not, but what exactly are you proposing would happen if all women chose to be over achieving professionals instead of having kids? Raising the next generation does not impact just the individual, it is in the best interest of YOU and society that mothers as well as fathers do a decent job raising their kids to become the next productive generation of inventive and focused technofreaks.

And physics and computer science just are not that interesting to many women. Women who are good at math still tend to gravitate towards medical or life sciences. There was a study about this too. I was a top math student all through school and college, but I still chose biology as a career. There is nothing inherently more important or inventive about tech sciences relative to medicine and biology. I could argue that the explosion of biological sciences in the last 40 years exactly coincides with allowing women to enter graduate schools.

2013-03-11 12:36 PM

**S L said:** You will have to forgive HR. He most likely comes from a part of Germany where they believe that a woman's place is to be barefoot and pregnant in the kitchen. The use of the German umlaut and the reference of Nuesslein Vollhart leads me to believe he is from Baden-Wuerttemberg, probably the southern part of the state. The ignorance and sexism in the area is more than just perverse and prevalent. Imagine the US in the 50's. The attitudes are that any

woman with a child is incapable of have a productive scientific career. Since she is the primary care giver, and not the father for whatever reason, she will have to sacrifice instead of the father. Why a father does not have the same problems as the mother is completely beyond me, but that is their logic.

Europe is significantly behind the US when it comes to sex equality. As progressive as the continent is supposed to be, it is actually a disaster. The article on the ERC numbers shows a disturbing problem. Better yet, the same article, written by a women, says we do not need quotas in order to change the sexist environment, despite the fact that quotas have been very successful in the US. I simply do not understand the lack of progress in Europe, nor do I understand how they can still sit back, acknowledge a problem, and do nothing productive about it.

2013-03-18 07:13 AM

**Ruth Oulton said:** Erm, did anyone else notice that there is a job advert presently on this page advertising for a MALE physics instructor? In Rhiyad....hmmm...the irony, Nature, perhaps you'd better think about your policies first, eh?

You need to be registered with *Nature* and agree to our Community Guidelines to leave a comment. Please log in or register as a new user. You will be re-directed back to this page.

**See other News & Comment articles from *Nature***

**Nature** ISSN 0028-0836 EISSN 1476-4687

© 2013 Nature Publishing Group, a division of Macmillan Publishers Limited. All Rights Reserved.  
partner of AGORA, HINARI, OARE, INASP, CrossRef and COUNTER