Research Trends

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Women in science - perception and reality

Research Trends Editorial Board

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literature is decreasing *(5)*. In Larivière's view, "Evans' conclusions reflect a transient phenomenon. The best example of this can be seen in the field of astrophysics, where the authors did observe a decline in the average age of cited literature at the beginning of the open access movement in the 1990s. However, by the beginning of the 2000s, when almost 100% of the papers were available, the average age started to rise again and has not stopped since."

In fact, while online publishing may have initially narrowed science, as online searching becomes more efficient and researchers learn how to use this wealth of data to greater effect, they are certainly browsing through and reading, if not actually citing, a wider range of materials. In time, we may well see reading and citations broaden further as researchers come across a wider range of readings in the online world.

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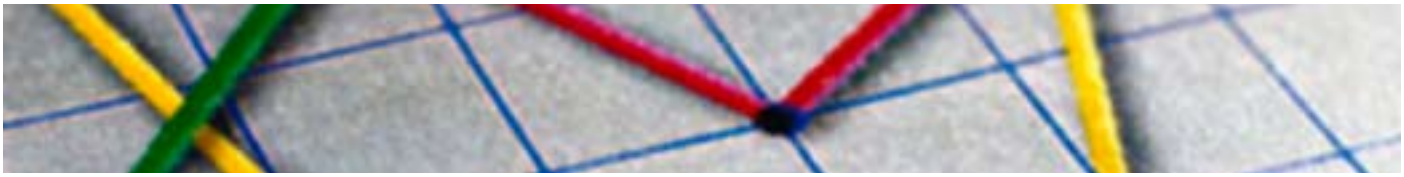

Women in science – perception and reality

As gender equality in science moves further to the forefront of policy agendas, we are seeing more discussion on the perceived challenges facing women in research careers. But what is the reality of the relative output and quality of the science produced by men and women?

In a 2003 EU report entitled *Gender and Excellence in the Making,* the EU Commissioner for Research asserted that "the promotion of gender equality in science is a vital part of the European Union's research policy," and called for public debate informed by research into the mechanisms by which this inequality has emerged *(1)*. Part of the problem can be encapsulated in terms of two apparent conundrums: the Productivity Puzzle and the Impact Enigma (see box).

New research challenges long-held perceptions

Against this backdrop of perceived gender differences, recent research has cast doubt on the validity of the underlying assumptions about productivity and impact *(2)*. An analysis of the published research of 254 Spanish Ph.D. graduates showed no statistically significant gender differences in output (or lack thereof), degree of collaboration or citations per article. The individuals analyzed came from a range of scientific disciplines, but all were awarded their doctorates between 1990 and 1995, and so were of a similar scientific "age", suggesting that previous differences in output and impact were artifacts of a skewed distribution of women across academic grades.

In keeping with this, a study of radiation oncologists at US academic institutions showed that the ***h*-index** (determined for each individual in Scopus) was lower for women than men (mean 6.4 versus 9.4), but that when the results were adjusted for academic ranking, the gender differential almost disappears.

Gender and productivity

Elba Mauleón and Maria Bordons of the Institute for Documentary Studies on Science and Technology (IEDCYT)

A puzzle and an enigma

The Productivity Puzzle is the phenomenon whereby women publish fewer articles than men. This observation has been confirmed repeatedly over recent decades, and several reasons have been put forward to explain it. These include sociobiological factors, such as the need for women to balance career with family obligations, and sociopolitical factors, such as systematic gender bias in the process of peer review for journal publication and competitive grant funding.

The Impact Enigma stems from the observation that women have higher citation impact (citations per article) than men. It has been suggested that this might be because women have a publication strategy that emphasizes quality over quantity or that they participate more in collaborative work, resulting in more robust study design and execution.

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at the Spanish National Research Council (CSIC) in Madrid have studied the effects of gender on scientific and technological activity in their own institution.

In Mauleón and Bordons' recent study in Life Sciences *(3)*, no differences by gender were found in productivity, impact factor of publication journals or number of citations received. According to Bordons, "productivity of both men and women increased with professional rank, and inter-gender differences within each rank were not observed.

"Interestingly, among the youngest scientists with less than ten years at CSIC, women were more productive than their male counterparts, whilst the inverse relation holds for intermediate levels of seniority. Further longitudinal studies will tell us if this means that new generations of women are more competitive or if women change their publication strategy over the years as a response to personal, social or economic reasons."

While there is clearly a long road ahead until we begin to see truly proportional gender representation in science, it may be that with the aid of objective bibliometric tools, it is already possible to demonstrate that the reality is moving further away from perception all the time.

Useful links

European Commission research: Women and science – Gender difference, gender equality
European Commission: Women and Science. Statistics and Indicators. She Figures 2006
UK Resource Centre for Women in Science, Engineering and Technology
Athena SWAN

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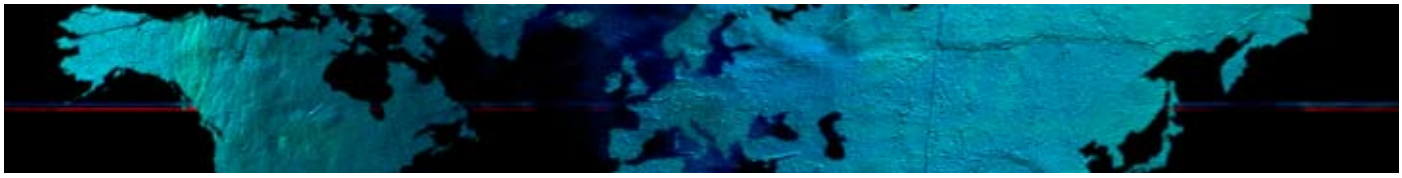
Country trends



THE rankings – a country view

Last year, we discussed the annual Times Higher Education (THE) rankings and their relevance to UK institutions. In October 2008, the updated 2008 THE rankings were published and show that many institutions have increased their performance and, consequently, their ranking. This year, we focus on the countries where the institutions are based to try to identify potential reasons for good performance.

If data for the institutions in the top 200 places is collected and grouped by country, some interesting facts emerge. Table 1 illustrates the positive net change in position for all institutions within countries, along with the total number of institutions from that country that appear in the rankings.

As expected, in terms of institutions in the Top 200, the rankings continue to be dominated by the global leaders in research performance: the United States, Germany, the United Kingdom, Japan and Australia. The US has an impressive 58 institutes in the rankings, which have seen an overall net increase of 158 places. The

Country	Net change in rank*	Number of institutions in top 200
India	248	2
Netherlands	230	11
Switzerland	217	7
Israel	194	3
United States	158	58
South Korea	83	3
Sweden	80	4
Denmark	75	3
Ireland	73	2
Argentina	67	1
Thailand	57	1
Greece	48	1
Russia	48	1
Mexico	42	1
South Africa	21	1
Norway	11	1
Finland	9	1
Spain	8	1
Hong Kong	4	4

Table 1 – Country analysis of THE rankings 2008
*Institutes that had no position or were outside of the top 200 in 2007 have not been analyzed in the net change in rank data.

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