Survey report

Gender equality in New Zealand science: A 2011 snapshot

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The Association for Women in the Sciences (AWIS) recently published a snapshot of Women in Science in New Zealand. This did not provide an in-depth analysis of trends, problems or achievements, but is intended to provide readers – whether involved in scientific research, management, or policy – an overview of the current state-of-play. This article provides a summary of some of the findings.

The education pathway

At the start of their life, male and female students are able to participate equally in science education. Girls have near-equal representation across the early childhood and primary school systems, and perform equally well in science across the curriculum.

During the early secondary school years, the balance of genders in science is equal, when science is a compulsory component of the curriculum. After Year 11, the number of students choosing to take science declines; however numbers of female and male students who continue to enrol in at least one science subject are essentially equal (Figure 1).

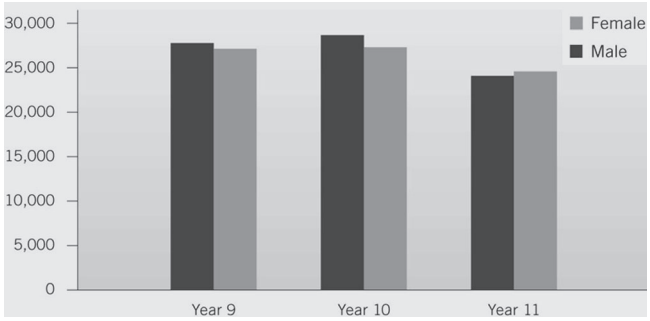

Figure 1. Enrolment in science by gender at the beginning of secondary school. Data from Ministry of Education 2010.

In Years 12 and 13 this trend changes. Students are free to choose to study subjects within different science domains and a gender preference begins to emerge. Female students are over-represented in biology subjects whereas male students are over-represented in physics and calculus (Figure 2). Interestingly, the preference for earth sciences appears to flip, with more males preferring this subject in Year 12 and more females preferring it in Year 13.

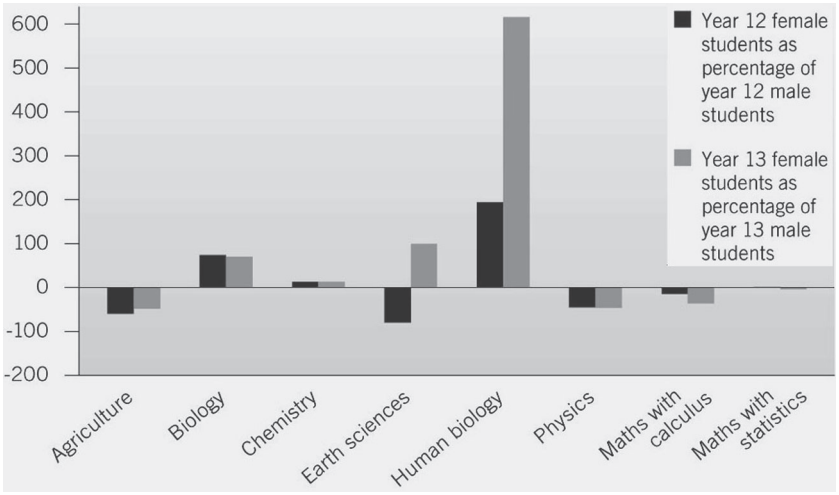

Figure 2. Proportional representation of male and female students by subject, years 12 and 13. Data from Ministry of Education 2010.

The difference in student preferences is echoed in teacher preferences. Overall, there are equal numbers of male and female science teachers at the secondary level. However, there are more males in physics classrooms and slightly more female teachers in biology classrooms (Figure 3). At the lower levels, where science is taught as one subject rather than specialist subjects, gender representation of teachers is equal.

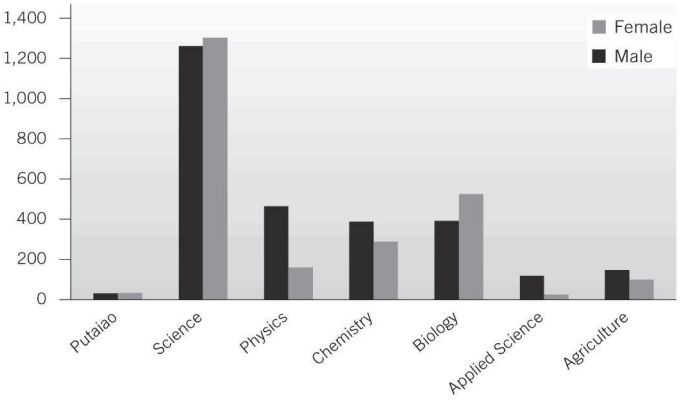

Figure 3. Number of teachers by gender teaching secondary science classes. Pūtaiao = Māori science. Data from Ministry of Education 2004.

Tertiary participation

After high school, 80% of students who complete the National Certificate of Educational Achievement (NCEA) level 3 or higher progress to University. Female numbers in tertiary education are increasing every year, and females are now over-represented in Bachelor of Science courses, with 64% of enrolments

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being by females and only 36% by males (data from Ministry of Education 2009).

However, the subject choices continue to reflect those preferences shown in secondary school (Figure 4). Female students continue to preferentially study biology-based subjects and stay away from IT and engineering, whilst numbers in the natural and physical sciences are beginning to approach equal gender representation.

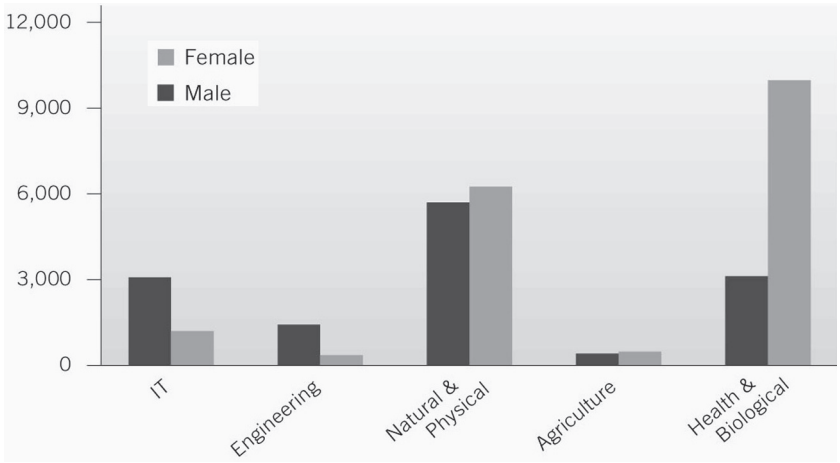


Figure 4. Enrolments in BSc courses by gender. Data from Ministry of Education 2009.

Women in the workforce

Since 1996, women have represented just under 50% of the total scientific workforce. However, when careers relating to medicine or veterinary medicine are removed from the analysis, the picture is quite different (Figure 5). This reflects the pattern that began in secondary school with women showing a preference towards the biological sciences.

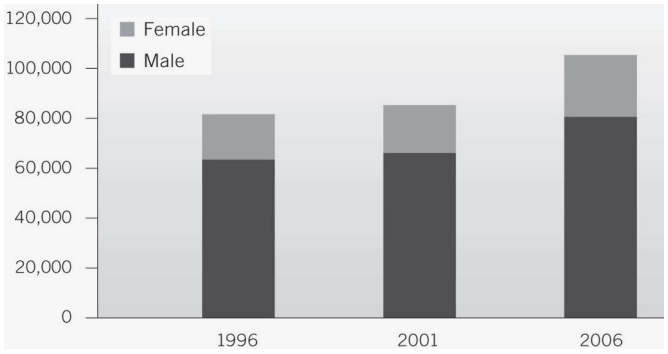
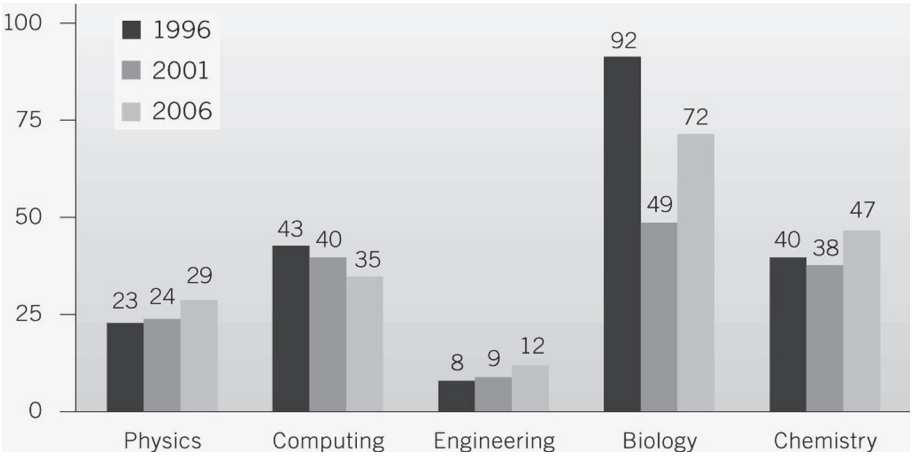


Figure 5. Numbers of men and women in the scientific workforce (excluding medical and veterinary sectors). Data from Statistics New Zealand 2006.

Indeed, men continue to dominate careers related to physics, computing and engineering. Women are gaining ground on chemistry-related careers, and biology-related careers remain popular (Figure 6). There is a downward trend for women working in computer science areas.

Figure 6. Percentage of women working in different science sectors. Data from Statistics New Zealand 2006.



Women continue, on average, to earn less than men, despite having equal qualifications. The average annual income for male BSc graduates is around $70,000 but for women is closer to $40,000 (data from Statistics New Zealand 2006).

When salary band data is analysed, women are over-represented at the lower end of the salary scale while men are over-represented at the higher end (Figure 7). This trend is true for both BSc and PhD qualifications, although the differences are less pronounced with the higher degree (Data analyse all PhD graduates, not just science subjects). The number of female BSc holders who are not earning is three times the number of male non-earners, although there is no way to know if this is by choice or circumstance.

Women remain under-represented in research staff at all universities and Crown research institutes, particularly at the higher levels (Figures 8, 9).

Female representation across the science system is low – although the new Ministry of Science and Innovation (MSI) has a 50% representation on the Senior Management Team, the constituent boards of MSI have less than 25% representation (Figure 10). This trend continues in the management of the Marsden Fund (Figure 11), and in the grant review panels of the Health Research Council (Figure 12).

Conclusions

Female representation in the sciences in New Zealand should be a cause for concern. From the point where secondary school students are required to choose, there is an imbalance of gender representation, which becomes more pronounced at higher levels of the science system.

More research is required into whether this imbalance is due to choice or circumstance. However, AWIS believes it is important that women are fully represented in all areas of science, not only due to a fundamental belief in equality but also for the ultimate health of the nation as a whole. The future economic growth and wellbeing of New Zealand is intrinsically linked to our success in the science and technology fields. In tough economic times, such as those being faced around the world currently, it makes sense to have the best brains on the job, regardless of gender, race, age or religion, and diversity brings an important variety of skills and solutions into a

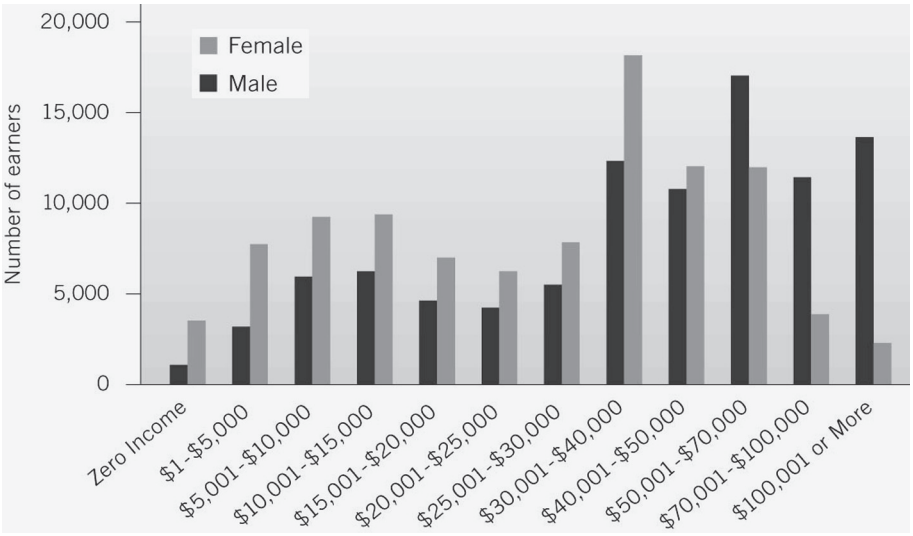
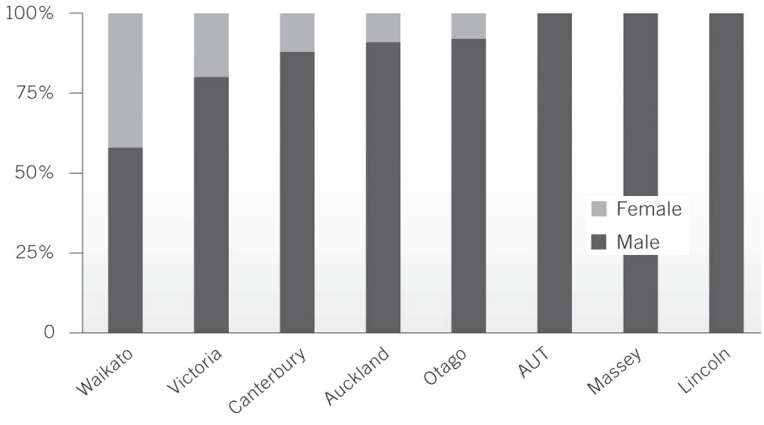


Figure 7. Income distribution for BSc graduates. Data from Statistics New Zealand 2006.

Figure 8 (below). Proportion of female Heads of Departments (Science) at New Zealand universities. Data from New Zealand university websites.



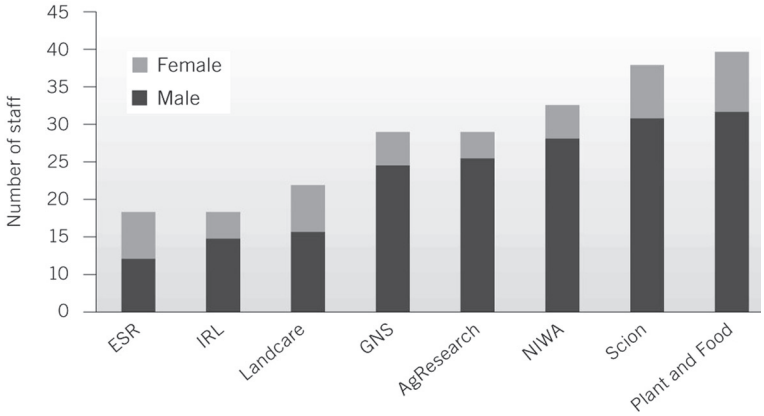


Figure 9. Number of male and female staff in senior positions at Crown research institutes (CRIs). Data from CRI websites 2011.

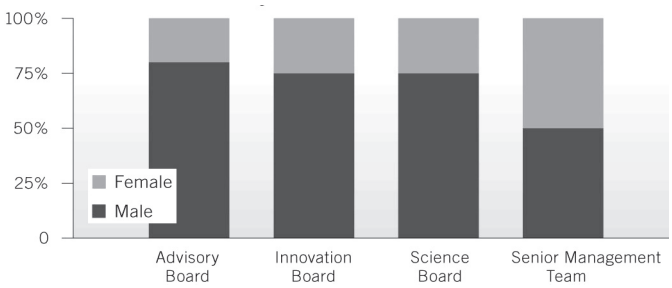


Figure 10. Proportion of female staff at the Ministry for Science and Innovation (MSI). Data from MSI website 2011.

workplace. Understanding the issues facing women in the sciences in New Zealand is vital in addressing the imbalance in gender equality at every level, allowing our science system to be better placed to meet the needs of our nation.

The full publication *Women in Science: A 2011 Snapshot* can be found on the AWIS website at www.awis.org.nz

Reference sources

Crown research institute websites

www.agresearch.co.nz
www.esr.cri.nz
www.gns.cri.nz
www.irl.cri.nz
www.landcareresearch.co.nz
www.niwa.co.nz
www.plantandfood.co.nz
www.scionresearch.com

Health Research Council of New Zealand website

www.hrc.govt.nz

Ministry of Education (all years)

http://www.educationcounts.govt.nz

Additional data from: *Trends in year 5 science 1994–1996*, published by the Ministry of Education.
Education Statistics, historical data in printed form, published by the Ministry of Education.

Ministry of Science and Innovation wesbite

www.msi.govt.nz

Ministry of Research, Science and Technology (2004)

MoRST response to OECD questionnaire 'Women and Scientific Careers' published by MoRST 2005

New Zealand Association of Scientists website

www.scientists.org.nz

New Zealand university websites

www.auckland.ac.nz
www.aut.ac.nz
www.canterbury.ac.nz
www.lincoln.ac.nz
www.massey.ac.nz
www.otago.ac.nz
www.victoria.ac.nz
www.waikato.ac.nz

Figure 11. Proportion of women administering the Marsden Fund. Data from the Royal Society of New Zealand website 2011.

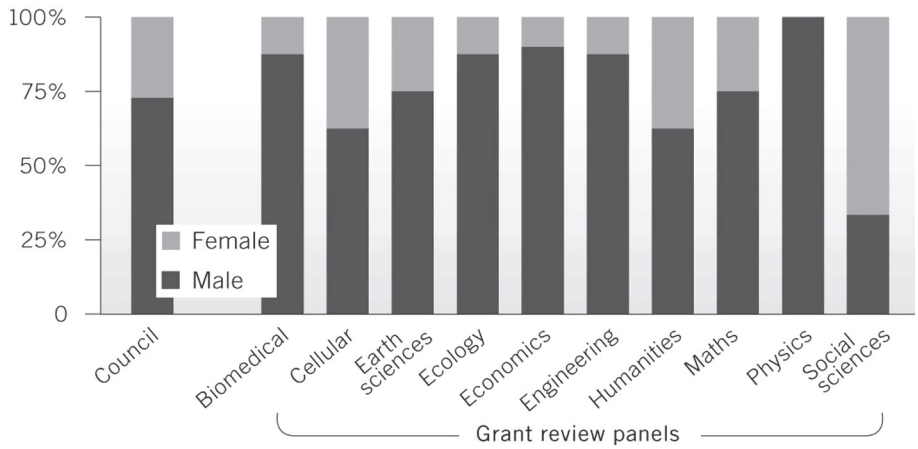
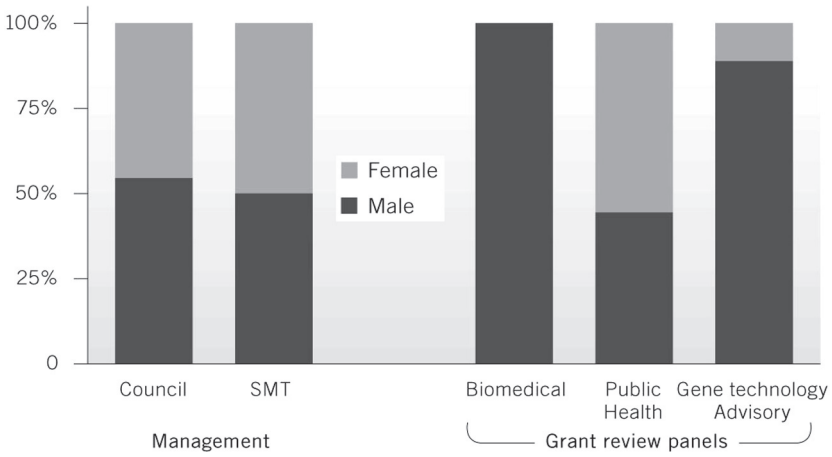


Figure 12. Proportion of women administering Health Research Council grants. Data from Health Research Council website 2011.



Statistics New Zealand (all years)
http://www.stats.govt.nz

Tertiary Education Committee (2006)
http://www.tec.govt.nz
Additional data from: Human Resource Trends in the Tertiary Academic Workforce published by the Tertiary Education Committee 2008

The Prime Minister's Science Prizes website
www.pmscienceprizes.org.nz

The Royal Society of New Zealand website
www.royalsociety.org.nz