STEM THE TIDE!

Will the Innovation agenda help achieve gender equality?

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“Women sidelined from ‘STEM’ economy” The Australian, March 31st 2016

THE AUSTRALIAN

THE HEART OF THE NATION

Women sidelined from ‘STEM economy’

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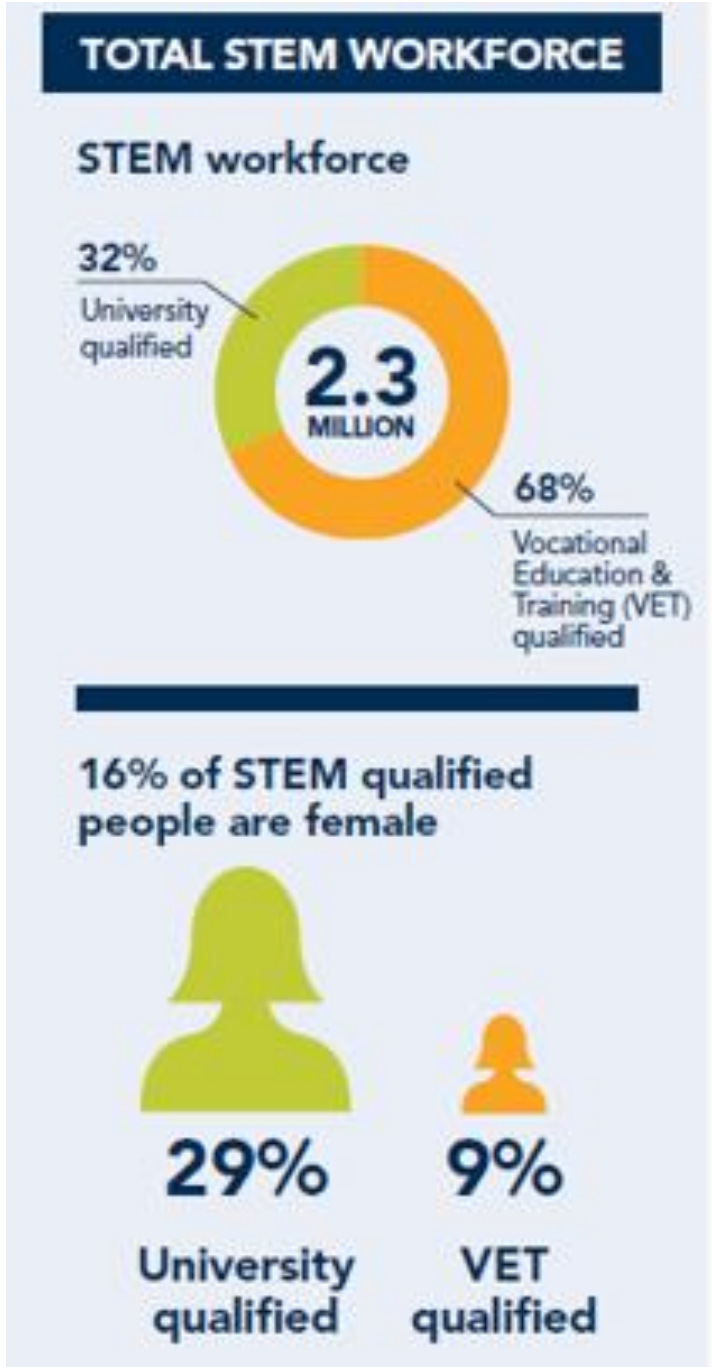
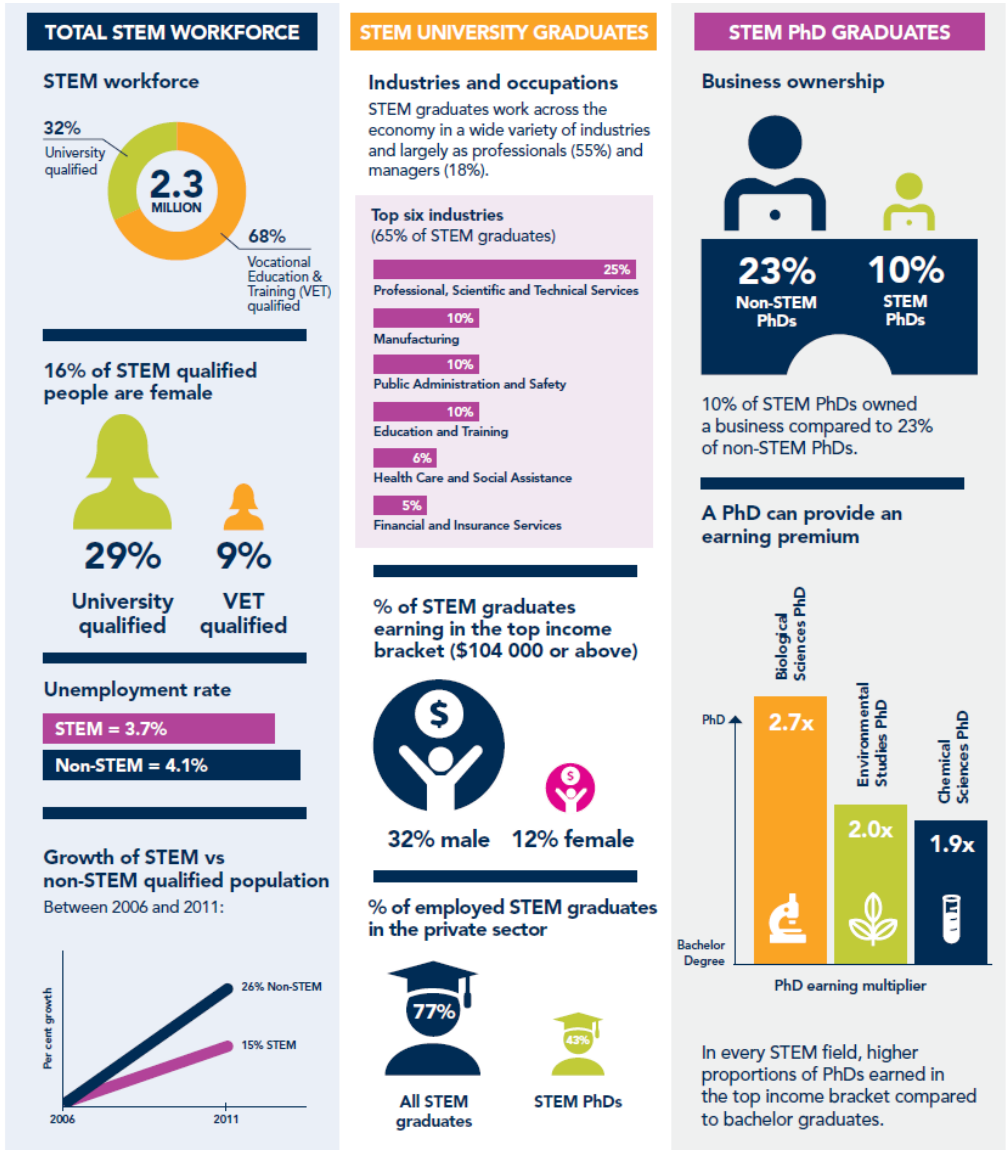
Science, technology, engineering and maths skills have permeated the workforce, with graduates working in anything from mining to wine making, but a new report suggests women are being systematically disenfranchised from the “STEM-powered economy”.

Australian Government's Innovation agenda (NISA)

- *Culture and capital, collaboration, talent and skills, government as an exemplar*
- *Extra $12m. to increase uptake of STEM in schools – innovative Maths curriculum, computer coding in schools, pathways in technology, summer school girls/disadvantaged*
- *$13m. over 5 years to support women pursue careers in STEM – Expanding Opportunities for Women in STEM and Entrepreneurship initiative – Ast Minister for Science said it is targeted at girls and women in schools, universities, research sector, STEM-based industries*
- *Curious Minds – for girls – 6 month learning and mentoring program – years 8-10*
- *Expansion of Science in Australia Gender Equity (SAGE) pilot*
- *New initiative under Male Champions of Change*
- *Partner with private sector to celebrate female STEM role models*





http://www.chiefscientist.gov.au/wp-content/uploads/Australias-STEM-workforce_infographic.pdf_Source: Australian Bureau of Statistics, Australian Census of Population and Housing, 2006 and 2011

STEM reports

- *Federal Government – Restoring the focus on STEM in schools initiative (2016)*
- *Office of the Chief Scientist – Science, Technology, Engineering and Mathematics in the National Interest – A Strategic Approach (2013)*
- *Office of the Chief Scientist – STEM-trained and job ready (2015)*
- *AiG – Lifting our Science, technology, Engineering and Maths (STEM) skills (2013)*
- *AiG – Progressing STEM skills in Australia (2015)*
- *Professionals Australia – The Slower Track – Women in the STEM Professions Survey Report (2015)*
- *Australian Mathematical Science Institute – Engaging more women and girls in mathematics and STEM fields (2014)*
- *A Smart Move – PriceWaterhouseCoopers (2015)*
- *Securing Australia's Future – Australian Council of Learned Academies (2013)*
- *Hard hats, robots and lab coats: Broadening the career options of young women – WAVE (2014)*

STEM THE TIDE!

- *44% (or 5.1m) jobs are at risk from digital disruption*
- *Innovation and STEM education are key to future growth*
- *$57.4bn increase in GDP if we shift just 1% of our workforce into STEM roles (A Smart Move PwC 2015)*
- *75% of fastest growing occupations require STEM skills and knowledge (AiG 2015)*
- *45% of employers expect their workforce requirements for STEM-qualified employees to increase 5-10 years*
- *70% employers think STEM staff most innovative (AiG 2015)*

What do the reports suggest we do!

- *A national strategy – a social compact*
- *Make STEM a focus in education – from school level up*
- *Reform curricula so that it encourages curiosity and reflection*
- *Enduring partnerships between employers and education providers*
- *Funding for skilling and reskilling the workforce*
- *Integrate innovation system with STEM enterprise*
- *Raise the STEM participation of women, disadvantaged and marginalised groups*
- *Increase STEM teaching workforce*
- *Incentives to employers and students in STEM apprenticeships/traineeships*
- *Supportive groups including Girls in Tech and DigiGirlz – International Girls in ICT day – 4th Thursday in April every year*
- *Steminists*

Women and STEM

- *1987 women were 20% STEM workforce, 22% in 2015 (PA)*
- *Fewer than one third STEM university graduates are female*
- *9% with STEM qualifications in VET sector are women (OCS 2016) Men hold 91% of qualifications, mostly in engineering. While men are relatively well-paid tradesmen or technical workers, women were clerical workers*
- *With VET STEM qualifications, 6.3% women unemployed compared to 3.3% men*
- *33% of girls studying STEM, compared to 76% China, 69% India, 60% Singapore (GiT)*
- *37% said lack of interest, 32% difficulty of subject, only 3 in 10 know a female working in STEM (GiT)*
- *Participation of girls in STEM at school – 45% years 7-8, 31% years 9-10, 20% years 11-12*
- *Female professionals are deserting science and technology because of macho cultures and inflexible work practices*
- *Passing through STEM career pathways women drop out remarkably more often than men – "leaking pipeline"*

Women and STEM – What needs to change

- *Pay equity*
- *Discrimination, harassment and bullying*
- *Workplace culture*
- *Part time work arrangements – balance of work and family*
- *Career breaks (PA)*
- *Nature and organisation of STEM fields of study and employment*
- *Stereotypical viewpoints about the nature of STEM careers and what is considered 'women's work'*
- *Negative perceptions of particular career types*
- *Poor direction from parents and teachers*
- *Small pool of role models including teachers*

Is VET there?

- *Report from Office of the Chief Scientist mentions VET in passing – only group consulted with a possible VET interest was AiG*
- *29.9% of all VET EFT enrolments in STEM disciplines (ACOLA)*
- ***Largest area of STEM skill shortages identified by employers was technicians and trade workers** (AiG 2015)*
- *Some states are funding scholarships (NSW) and innovative programs (SA) to support women and girls in VET*
- *Federal funding targeted at schools and universities eg. SAGE not involved with VET*

What did we learn from the interviews?
We asked about:

- *Programs they were currently undertaking*
- *Why they thought women and girls were not engaging in STEM related careers*
- *What they thought was the impact of such decisions*
- *Whether their programs were helping to address the problems*
- *How the Australian Government's Innovation agenda was creating effective programs to build these STEM skills*
- *Whether these programs would lead to women and girls choosing from a broader range of jobs*

Their views

Current programs:

- *Outreach program with schools – young undergraduates talking of experiences, work with industry partners including mentoring*
- *I'm putting my hand up for women 25-30 to change the IT conversation – need women to design for women*
- *Jobs of tomorrow scholarships in NSW – for STEM related areas in VET at Diploma level (not specifically for women)*
- *Awards for women and girls in manufacturing – Women in Aviation*
- *A web resource for women interested in STEM – mentoring and support networks, and how to address stereotypes*
- *Funding for programs such as STEM Sista and the Edith Dornwell Scholarships for women - SA*

Why women and girls are not engaging in STEM

- *Social norms and biases – cultural issues*
- *Messages through schools, media and social media*
- *Lack of friendly workplaces – flexible hours, career development, gender pay gap*
- *Repeating approaches that fail*
- *Peer pressure and family including peers at school – need to challenge girls as to why they can't*
- *Many don't see manufacturing as an environment that is a place for women*
- *Stereotyping – what is considered "women's work"*
- *Lack of public role models – girls can't be what they can't see*
- *Lack of understanding around STEM careers*
- *Girls are turned off by the time they get to high school – early interventions needed*

What might be the impact of women and girls not taking up STEM careers

- *Economic impact – 75% of the fastest growing occupations require STEM skills*
- *Labour market shortages in STEM / un- or under employment of women as jobs are replaced by technology*
- *Lack of gender equality - better paid jobs in male dominated employment – more STEM without women means greater wage gap*
- *Women entrepreneurs find it more difficult to get finance – often in casual jobs – need to secure their economic future*

Why do we NEED women and girls in STEM

- *The way we design things – more feminine thinking is needed for tools for both sexes – experiences and needs unique to women may be overlooked*
- *Decision making and lives directed by IT – women and girls must be involved*
- *STEM careers give opportunity to engage in most exciting realms of discovery and technological innovation*
- *Research needs diversity – women and girls have a different set of problem solving skills – need to maximise innovation, creativity and competitiveness*
- *Companies with diverse teams are more successful and improve innovation*

Success of current programs

- *Exposing young women to possibilities of STEM careers*
- *Actions to change stereotypes of what a scientist or engineer looks like – role models*
- *A STEM specialist teacher in primary schools – SA*
- *Teachers obtaining real world experiences*
- *School-business partnerships*
- *Targeting harder to reach students who may have never pictured themselves in STEM careers*
- *Scholarships help students stay in STEM fields*

Australian Government policies – impact?

- *Effective answers need to be systemic*
- *Can provide funding to research girls STEM subject choices – low SES schools*
- *Funding organisations such as Gender Economics for gendered implications – their research around why women were not engaging in the finance industry showed how women looked at the personal and changing life for the better*
- *Increase the scope and reach of programs so that they reach under-represented cohorts*
- *Need to tackle national issues including use of the ATAR and curriculum content*
- *Programs that enable links between industry, parents, the community and teachers*

Will the programs lead to jobs?

- *Many current jobs are disappearing so many women and girls need a broader skill set*
- *Commodification of jobs in IT makes it difficult – women currently end up in communication side of jobs – pushes their wages down*
- *Men talk a specific language that doesn't encourage women*
- *Need more STEM teachers*
- *Need men to lead change and leave it up to the few female champions*
- *Employers need to be challenged to combat sexism and discrimination*
- *Need to plug the leaks, i.e., reduce female attrition, in the STEM pipeline*
- *More women and girls involved in robotics – last world championships – 30% girls*
- *National programs are often targeting those already interested in STEM careers – the challenge is to influence those who cannot see themselves in a STEM career*

What does this mean?

- *A general understanding that women and girls need greater inclusion in the innovation and STEM agenda*
- *Agreement about the issues that prevent many from taking up or remaining in a STEM career*
- *The Government's new innovation agenda does not address most of these issues*
- *The VET sector has not received the same funding that other educational sectors have, despite a need to train more specialists at the technician and para-professional level*