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
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
16% of STEM qualified people are female

29% University qualified
9% VET qualified

Unemployment rate

STEM = 3.7%
Non-STEM = 4.1%

Growth of STEM vs non-STEM qualified population
Between 2006 and 2011:

 Industries and occupations
STEM graduates work across the economy in a wide variety of industries and largely as professionals (57%) and managers (18%).

Top six industries (60% of STEM graduates)
- Professional, Scientific and Technical Services: 25%
- Manufacturing: 12%
- Public Administration and Safety: 11%
- Education and Training: 8%
- Health Care and Social Assistance: 5%
- Financial and Insurance Services: 5%

% of STEM graduates earning in the top income bracket ($104,000 or above)
- 32% male
- 12% female

% of employed STEM graduates in the private sector
- 77%

Source:
STEM reports

- Federal Government – Restoring the focus on STEM in schools initiative (2016)
- AiG – Lifting our Science, technology, Engineering and Maths (STEM) skills (2013)
- AiG – Progressing STEM skills in Australia (2015)
- Australian Mathematical Science Institute – Engaging more women and girls in mathematics and STEM fields (2014)
- 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