CONSULT AUSTRALIA

INQUIRY INTO SCHOOL TO WORK TRANSITION

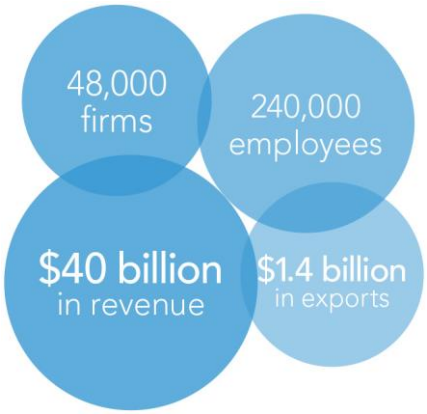
SUBMISSION TO THE STANDING COMMITTEE ON EMPLOYMENT, EDUCATION AND TRAINING

24TH JULY 2017

Inquiry into School to Work Transition

Submission

ABOUT US



Consult Australia is the industry association representing consulting firms operating in the built and natural environment sectors. These services include design, engineering, architecture, technology, survey, legal and management solutions for individual consumers through to major companies in the private and public sector including local, state, and federal governments. We represent an industry comprising some 48,000 firms across Australia, ranging from sole practitioners through to some of Australia's top 500 firms with combined revenue exceeding $40 billion a year.

Some of our member firms include:

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EXECUTIVE SUMMARY

Consult Australia welcomes the opportunity to provide comment to the Standing Committee on Employment, Education and Training on School to Work Transition.

Consult Australia is the peak industry body representing consulting companies that provide professional services to the built and natural environment. These services include design, technology, and management solutions for individual consumers through to major companies in the private and public sector including local, state, and federal governments.

Consult Australia represents over 270 companies, from large multidisciplinary corporations to small niche practices, collectively employing over 50,000 staff. We represent an industry comprising roughly 48,000 firms across Australia, ranging from sole practitioners through to some of Australia's top 500 firms. Collectively, our industry is estimated to employ over 240,000 people, and generate combined revenue exceeding $40 billion a year.

It is well known that Australian cities and regions face a building and infrastructure challenge, with significant spending required over the next 30 years. Demand for improved public infrastructure in our cities due to population growth is just one example of that challenge. It is clear that Australia is going to need a strong supply of Science, Technology, Engineering, and Mathematics (STEM) skills to design, develop, and deliver the ambitious infrastructure strategies that have been announced across Australia.

The skills shortage in engineering and related professions has been well documented, and a range of engineering and technology skills have been included on the Australian Skills Shortage list for over a decade.

Australia's ageing population will see more engineering professionals retire from the workforce over the coming years. Meanwhile, the proportion of people studying engineering and related technologies is in decline. The number has decreased from 12% of those enrolled in 2008 to 8.8% in 2016[1].

STEM statistics also consistently show that women are largely under-represented in engineering and related professions. A survey of the workforce in 2015 showed that only 9% of the engineering workforce is female[2].

It is critical that there are a range of measures to support students to prepare for post-school education and training in STEM subjects, and that they are mapped to the future demand for these skills in the workforce. Without measures to encourage school leavers (particularly women) both into the profession and back into the workforce, the shortage is only set to continue and the potential for it to worsen is significant.

[1] Australian Bureau of Statistics 6227.0 - Education and Work, Australia, May 2016

[2] The Institution of Engineering and Technology, Skills & Demand in Industry 2015 Survey

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STARTING EARLY

Developing an interest in STEM, and ultimately a seeking career in STEM, is a seed that needs to be planted early. Consult Australia has long advocated that experiential and experimental learning is key to developing a passion for STEM. However, many teaching methods adhere to traditional approaches, which is reinforced by assessment that involves testing at low levels of reasoning and problem solving. This is particularly the case in primary schools where teachers may not have specialised in STEM during their own education. This can result in a lack of confidence to develop the STEM curriculum in their school beyond what is required for assessment.

In addition to having a strong STEM curriculum taught by an appropriately qualified and engaging teacher, students need the right access to technology and tools at school. These tools need to address problem-solving, critical thinking, creativity, and inquiry-based learning (which all correlate to employability skills identified by Australian employers).
While there has been a focus by the Government in recent years to encourage students into STEM professions, Consult Australia submits that early intervention is needed to ensure that students are inspired to keep up their STEM studies and pursue a related career.

This is particularly important for encouraging female students to consider a career in engineering or a related field. Demystifying what a professional with STEM skills looks like must begin early if we are to encourage take-up. This needs to happen both in the classroom as well as in the family home, to ensure that students are not discouraged to study STEM subjects.

It has been the prevailing view for some time that the disciplines with the greatest prospects for ongoing employment and high salaries are banking, law, and medicine. The message to students regarding careers in engineering and related STEM disciplines should be clear:

- Choosing to study and work in STEM provides an opportunity to shape and influence the built and natural environment like no other;
- There is a skills shortage in STEM disciplines, so there are ample exciting job openings and opportunities, including significant international opportunities;
- The shortage of skills means that the graduate starting salaries are some of the highest paid across the professions, it was recorded in 2015[3] that:
  - **a)** In the Australian government sector, engineering graduates earned the highest median starting salary at $64,100;
  - **b)** Engineering and economics/business graduates earned the highest median starting salaries in the state government sector ($60,400 and $60,000 respectively); and
  - **c)** In the industry and commerce sector, earth sciences and engineering graduates earned the highest median starting salaries ($61,900 and $61,500 respectively).

[3] Graduate Salaries 2015: A report on the earnings of new Australian graduates in their first full-time employment, Graduate Careers Australia

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Consult Australia notes that the New Zealand Government, from this year, will require tertiary education providers to publish information on the employment status and earnings of their graduates[4]. The information will focus on the outcomes of young people, which government agencies will then publish to help students decide what and where to study. This will also give providers a better understanding of their own performance, and will help the public understand how its spending on tertiary education is contributing to New Zealand's development.

Consult Australia believes that this could be a helpful approach in Australia, but recommends that the data also looks at industry demand forecasts. For example, mapping the demand for engineering skills driven by the forward projects for infrastructure work across Australia. This would give students a more complete picture about the ongoing demand for their skills. Such a projection of demand would also tie-in with the critical need for governments to create long-term, transparent infrastructure plans, and to give industry confidence to invest the required human and financial resources to deliver for Australia's future.

GENDER BIAS

Participation at a school level is where the imbalance must be addressed. A report prepared for the Australian Mathematical Sciences Institute found that "only 6.6% of all female year 12 students in Australia in 2013 studied an advanced level mathematics subject, while 17.5% took intermediate level mathematics in the same year"[5], a participation rate much lower than males.

Further evidence shows that women face other hurdles in the classroom that may further impact on their participation in traditionally male dominated industries later in lifer. For example, A recent OECD study found find that less than 5% of 15-year-old girls in OECD countries contemplate pursuing a career in engineering or computing, while 20% of boys do. The report goes on to suggest that this may be because women have less confidence in their abilities in mathematics and science, and are more anxious towards mathematics, than boys[6].

Indeed, the same report suggests that the under representation of women in these STEM careers is in part due gender biases. For example, parents are more likely to expect their teenage sons rather than their daughters to work in STEM occupations despite their daughters performing just as well as male students.

The Massachusetts Institute of Technology (MIT), is a private research university in Cambridge, Massachusetts often cited as one of the world's most prestigious universities. MIT have developed a programme, named the Women's Initiative that targets middle school and high school girls and aims to visit nearly every state in the country.

[4] New Zealand Department of Education: Publishing provider-level information on Employment Outcomes of Tertiary Education

[5] Engaging more women and girls in mathematics and STEM fields: The international evidence Report prepared for the Australian Mathematical Sciences Institute, Kelly Roberts, May 2014

[6] The ABC of Gender Equality in Education Aptitude, Behaviour, Confidence. OECD Report 2015

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The Women's Initiative came about because in the United States *"High school girls are taking high level math and science courses-with the exception of physics and engineering-at similar rates as their male peers; however, gender disparities begin to emerge at the undergraduate level, where men outnumber women in many STEM fields. Women receive only 18.2% of bachelor degrees awarded in computer science, 19.1% in physics, and 19.2% in engineering"*[7].

Further, Harvey Mudd College that specialises in engineering, science and mathematics has seen the Ratio of Women in Computer Science Increase from 10% to 40% in 5 Years. The College boasts a gender ratio of 46 percent female to 54 percent male, an impressive figure for a college focussed on educating engineers, scientists, and mathematicians.

The college highlights that to achieve these successes they must first remove the "macho effect" of science, technology, and maths, provide role models, and share what works, both in academia and in industry.

Beyond education, in Australia, there is still a culture of the male breadwinner. Although this is beginning to change there is still an underlying stigma of the female secondary income earner. A study led by the University of Queensland's Professor Janeen Baxter concluded that "a clear pattern of a 'traditional' gender division of labour was typical for a substantial proportion of couples".[8]

THE GOVERNMENT'S ROLE

It is critical that Australian educational institutions maintain a strong curriculum in STEM subjects. The curriculum should nurture and inspire students to learn, and ultimately work in STEM related disciplines. This requires two things:

- A curriculum which makes STEM subjects engaging and practical; and
- Teachers that specialise in STEM subjects, that are respected as professionals and appropriately rewarded for performance and professional development.

This requires leadership from the Australian Government the following areas:

- A robust and world-class STEM curriculum;
- Incentives for teachers to specialise in STEM, and elevating the standing of teachers to that of other recognised professional groups (e.g. doctors, lawyers, accountants, engineers etc);
- Appropriate levels of funding for equipment in schools to ensure that experiential and experimental learning underpins STEM subjects.

[7] http://web.mit.edu/wi/index.shtml

[8] University of Queensland, PPL Evaluation: Final Report, November 2014, Janeen Baxter et al

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EDUCATOR'S ROLE

In 2015 the Education Council of Australia published a National STEM School Education Strategy, which sets out guiding principles for schools. Consult Australia believes all schools should adopt the guiding principles as follows:

1) Create a school culture where the importance of STEM is recognised and valued, and there are high expectations for all students to engage with STEM education opportunities.
2) Expose students (and their teachers) to a wide range of career options and information early to help increase STEM aspirations and engagement, ideally in primary school and continuing throughout high school, and involving parents and school communities where possible.
3) Build on students' curiosity and connect STEM learning to solving real world problems, including through collaborative and individual learning experiences that are hands-on and inquiry-based and support the achievement of deep knowledge.
4) Recognise that STEM education approaches work best when supported by a whole-of-school collaborative effort.
5) Encourage teachers to prioritise STEM content knowledge when determining their professional learning needs, given the rapidly changing nature of science and technology.
6) Use school demographic data and the local context to guide choices about partnership and outreach programs, and consider how best to target student cohorts less likely to do STEM subjects or see the relevance of STEM-related skills.
7) Consider how to evaluate new partnerships and learning approaches as part of program design, to determine whether change has occurred in student attitudes to STEM, and whether this translates into greater STEM achievement.[9]

Consult Australia believes that these guiding principles must be underpinned and supported by the Government's education policies, providing schools with the support needed to achieve them.

INDUSTRY'S ROLE

There is anecdotal evidence to suggest that it is difficult for students to aspire to a profession of which they have no experience.

For example, it's tough to imagine yourself as a scientist in a laboratory if you have never been in a laboratory or met a scientist. Some surveys have found that nearly two-thirds of teenagers said that they may be discouraged from pursuing STEM careers simply because they either do not know anyone who works in these fields or they do not understand what people in these fields do. It is vital that educators and industry work together to demystifying what STEM professions do and what these professions look like.

[9] National STEM School Education Strategy: Guiding Principles for Schools to Support STEM Education December 2015

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Consult Australia believes that industry can play a key role in providing insight and resources for schools to assist them in better understanding the roles and careers that utilise STEM skills.

Several Consult Australia member firms have engaged in mentoring and encouraging students to study engineering. This has helped break down the stereotype of an engineer, and has been particularly successful in encouraging females to pursue STEM tertiary studies.

Additionally, Consult Australia believes that programs, summer schools or internships for STEM students, or students interested in these subjects, may help to increase the number of students, and in particular females in undertaking further studies in this field.

CONCLUSION

Initiatives such as programs designed to target primary, secondary, and tertiary education school students along with industry partnerships should be enhanced to ensure our profession is best placed to encourage more students to STEM professions.

Greater accuracy in data collected about students entering the workforce, their wages, and industry forecasting would assist students, and provide useful skills mapping data.

The Australian Government's commitment to restore the focus, and increase student uptake of (STEM) subjects in primary and secondary schools across the country along with the national innovation and science agenda is a positive step to promoting STEM careers. This is a goal that needs long term commitment across all levels of Government, educators, industry, and the Australian community.

NEXT STEPS

We would be pleased to discuss further the issues raised in this submission, and to work with the Committee as you consider in detail the response to your Terms of Reference.

Contact

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