



**WOMEN AND GIRLS INTO NON-TRADITIONAL  
OCCUPATIONS AND INDUSTRIES:  
BROADENING CAREER OPTIONS FOR SECONDARY  
SCHOOL STUDENTS**

School-based strategies actively encouraging girls and young women to explore careers in non-traditional occupations.

**Report from  
economic Security4Women**

Based on research by Women in Adult and Vocational Education (WAVE)

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## Acronyms

ABS	Australian Bureau of Statistics
ACER	Australian Council for Educational Research
ARC	Australian Research Council
ASMS	Australian Science and Mathematics School
ATP	The Advanced Technology Project
ATSI	Aboriginal and Torres Strait Islander
ASA	Auto Skills Australia
AWPA	Australian Workforce and Productivity Agency
CALD	Culturally and Linguistically Diverse
CEDEFOP	European Centre for Development of Vocational Training
CICA	Career Industry Council of Australia
CITB	Construction Industry Training Board
CSW	Commission on the Status of Women
CUEOD	Curtin University Equity and Outreach Departments
D2C	Doorways 2 Construction
DECD	Department of Education and Child Development (SA)
DEECD	Department of Education and Early Childhood Development (Victoria)
DEEWR	Department of Education, Employment and Workplace Relations (Fed)
DFEEST	Department of Further Education, Employment, Science and Technology (SA)
eS4W	economic Security4Women
FIF	First member of their family group to attend University
GDP	Gross Domestic Product
Harvard IAT	Harvard Implicit Association Test
HSC	Higher School Certificate (NSW)
ICT	Information and Communications Technology
IWC	Industry Women Central
LLENS	Local Learning and Employment Networks (Victoria)
LSES	Low-socio Economic Backgrounds
MAAP	Mentor/Adviser Apprenticeship Program
MSA	Manufacturing Skills Australia
NESB	Non-English Speaking Background
NCDS	National Career Development Strategy
NWAs	National Women's Alliances
OECD	The Organisation for Economic Cooperation and Development
Ofsted	Office for Standards in Education, Children's Services and Skills
RTO	Registered Training Organisation
SACE	South Australian Certificate of Education
SALT	Supporting and Linking Tradeswomen
SATAC	South Australian Tertiary Admissions Centre
SRC	Southern River College
SSCE	Senior Secondary Certificate of Education
STEM	Science, Technology, Engineering and Mathematics
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VCE	Victorian Certificate of Education
VET	Vocational Education and Training
ViS	VET in Schools
WAVE	Women in Adult and Vocational Education

## Overview

This report identifies components of best-practice career guidance that can lead to expanded opportunities for the participation of women in the workforce and increased participation of women in high-income, in-demand Science, Technology, Engineering and Mathematics (STEM) careers.

It is based on research that explores current models of careers' exploration available to young Australian women, particularly in relation to study and career choices in STEM and other non-traditional occupations and industries.

## What we're doing well

Innovative careers' exploration practices in Australian schools have resulted in good outcomes for girls and young women in STEM. The research underpinning this report demonstrates the value of the following approaches:

- Industry-led schools' partnership strategies that invite and support career exploration by young women, as well as long-term female participation in STEM and non-traditional occupations, careers and industries
- Highly visible female role models and mentors from STEM and other non-traditional occupations and industries are crucial to broadening the career aspirations and expectations of young women
- Promotion of support networks for young women in STEM and non-traditional workplaces are important, whether workplace-based or via networks of women in STEM and non-traditional careers
- Provision of low-stakes' career exploration opportunities for girls and young women to 'taste' and experience non-traditional and STEM roles and occupations prior to and during their senior secondary years of schooling
- Staged career exploration opportunities early in girls' schooling that encourage reflection on their skills and interests, while exploring relevant options in a broad range of occupations, industries and workplaces. This will help young women make informed choices about their future
- Widespread partnerships between schools, educational institutions, industries and communities to assist girls and young women to access non-traditional and STEM study and work placement opportunities that advance their career aspirations.

## What's holding young women back from STEM and non-traditional occupations

Research undertaken for this report, in conjunction with research conducted elsewhere, indicates that a number of significant factors are limiting the subject and career choices of Australian girls and young women. These limitations impact negatively not only on the long-term future of individual women, but also on the Australian economy.

Employment options for young women are limited by factors that range from persistent stereotyping to negative perceptions about and experiences of young women in non-traditional occupations.

Key insights resulting from research for this report include:

- At the Australian Science and Mathematics School in South Australia - where girls are enrolled on the basis of their ability and passion for STEM, and comprise 40 per cent of the school population - girls' enrolments have not advanced past 23 per cent in Physics and 14 per cent in Specialist Maths
- Gender stereotyping and perceptions about subjects and career options 'suitable' for young women are often reinforced in schools and families. Such stereotyping impacts negatively on the career choices of young women and creates barriers to increasing young women's participation in STEM and non-traditional occupations
- Negative experiences and/or perceptions of the adverse nature of male-dominated workplace cultures discourage young women from participating in STEM and non-traditional careers
- It is widely perceived by professionals in the careers' industry that current models of careers' guidance are 'gender blind'. In fact, the statistical reality is that discrimination is inherent in gender-blind careers' programs
- Careers' exploration activities cannot be successful when they fail to respond to existing interests and capabilities of young women.

### **The National interest**

A National Careers' Guidance Strategy that addresses the participation of women in STEM and non-traditional jobs, careers and industries would align nicely with current national commitments to gender equality, women's economic empowerment, their skills development and workforce productivity.

It is worth noting that in the construction, mining, and utilities industries, women account for around 12 per cent, 15 per cent, and 23 per cent of employees respectively. Recent figures suggest that increasing women's employment rates could boost Australia's GDP by 11 per cent (Broderick, 2013).

### **Key proposal**

To advance the ideal of gender equity in the Australian workforce - as well as the long-term economic well-being of Australian women individually and the national economy generally - eS4W recommends that the Federal Government commission the development of models for best practice careers' guidance for secondary school girls, and that this advice build on elements of successful programs from Australia and around the world.

## Executive Summary

This report focuses on careers' exploration practices and programs for girls and young women in Australian schools. It emphasises strategies that promote active exploration of, and engagement with, study pathways in STEM (Science, Technology, Engineering and Mathematics) and careers in non-traditional occupations and industries, and identifies how career choices and long-term economic outcomes can be improved for Australian women.

It includes a range of innovative practices in Australian secondary schools that aim to assist young women to convert their school success to career success in STEM and other non-traditional occupations and industries. Consultations for this research focussed on identifying best practice approaches to careers' exploration for young women.

### So what is the problem?

Young Australian women consistently out-perform their male peers in many of the key achievement indicators in secondary schools. Despite this, young women are significantly less likely than young men to enter employment in the high-income, in-demand fields of Science, Technology, Engineering and Mathematics (STEM) or in employment-based training opportunities in non-traditional industries.

This reflects broader, gender-segregated patterns in Australia's workforce, where in the construction, mining and utilities industries women account for around 12 per cent, 15 per cent and 23 per cent of employees respectively. Under-representation of women in these industries not only undermines gender equality and the economic future of individual women, it impacts negatively on Australia's economy.

This report was commissioned to identify key elements of successful careers' exploration programs and practices for girls and young women, provide insight into why young Australian women continue to make limited career choices and put forward suggestions for how this situation might be proactively and positively addressed.

### 'Careers' exploration'

For the purposes of this report, the term 'careers' exploration' refers to the initial stages in the process of:

1. learning about oneself in relation to the world of work
2. identifying and exploring potentially satisfying occupations and careers
3. developing an effective strategy for realising an individual's goals<sup>1</sup>.

Careers' exploration is a global phenomenon that targets career aspirations, development and pathways. Activity, research, projects and focus in this field have increased significantly during the last decade. It is worth noting that in Australian research literature and policy the terms career advice, career guidance, career exploration, career information and career development, are all used sometimes synonymously. Internationally, careers' exploration is shifting its focus from labour entry-support to education, skills and employment options over a lifetime<sup>2</sup>.

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<sup>1</sup> UC Berkeley, 2014

<sup>2</sup> ILO 2006

In Australia, the majority of such research does not explore the issue of gender. This is a significant oversight, because the implications for national productivity and the economy are substantial. Further, current models of career exploration in Australia not only appear to be unsuccessful for young Australian women, they appear to actively work against broadening the career choices of young women.

This report aims to:

1. address obstacles to girls' and young women's full participation in the career options that best suit their career goals and aspirations, and
2. propose solutions that benefit not only individual women, but also the Australian economy as a whole.

## **Careers' exploration and gender**

Careers' exploration is not a gender-neutral issue. In fact, current careers' exploration programs and practices in Australian schools appear to actively limit girls' choices.

In order to broaden girls' career options, it would be prudent for schools to engage a variety of targeted techniques. These might include organising careers-related activities and events that are relevant to girls and developing partnerships with industry organisations that are initiating change in male-dominated workplace cultures.

As well, stakeholders who participated in surveys for this report identified the importance of mentors and role models in supporting and informing career exploration and decision-making by young women who are considering STEM and non-traditional occupations. Role models and mentors were viewed as effective for ameliorating myths about what girls can or should do.

## **Careers' exploration and schools**

Considerations for careers' exploration in schools include:

- Careers' exploration for girls is best begun in mid-primary school, with staged approaches appropriate to year levels being delivered throughout their senior years
- Research indicates that by Year 9 many young people have already made their career choices, even if by default
- Careers' exploration would ideally be embedded in the school curriculum, with subject specialists charged with responsibility for broadening girls' and young women's awareness of the range of occupation options available to them
- Careers' practitioners in schools should be qualified to meet Career Industry Council of Australia (CICA) standards and be fully conversant with labour market trends and issues, and be particularly familiar with the complexities of gender bias in relation to career options, choices, aspirations and goals
- Schools, educational institutions, industries and communities ought to be encouraged to develop collaborative career exploration partnerships for female students, ensuring the best advice, expert information and real world experience is available and accessible
- Schools encouraged to develop partnerships with local industries and female role models in those industries, to encourage young women to identify with the full range of occupations and opportunities
- The development of individual career pathways for girls and young women at school would go a long way towards encouraging and supporting them to pursue experiences in non-traditional occupations and industries

- Parents and families have enormous influence on the career choices of young women. Consequently, families must be included in careers' exploration programs and advised about how best to support girls who are interested in non-traditional career pathways.

In addition, school-based careers' exploration programs for girls and young women could be part of Australia's national response to the Commission on the Status of Women 55's call for strategies to facilitate the full and equal access and participation of women and girls in education, training, science and technology.

## **Careers' exploration and STEM**

STEM is a complex field that is attracting increasing global policy attention. It consists of a number of subjects - Science, Technology, Engineering and Mathematics - that are grouped into three domains, each associated with differing employment/career paths: Prime STEM, Economic and Allied STEM, and Health and Allied STEM.

Stakeholders surveyed for this report stressed that in order to broaden the career choices of young women, it was important that STEM subjects were made relevant to girls from an early age. As well, they pointed out that many schools and careers' guidance practitioners need guidance in linking STEM subjects to the diversity of related occupations available, including emergent occupations.

It is worth noting that in his recent trip to the US, Prime Minister Tony Abbott visited a Brooklyn school that had partnered with computer giant IBM. The partnership was developed with a focus on delivering best-practice outcomes for students, whilst ensuring the company had a hand in developing the workforce of the future<sup>3</sup>.

## **Careers' exploration and non-traditional trades**

Successive Australian governments have recognised the importance to economic growth and productivity of female participation in non-traditional trades. Nonetheless, the findings of this report indicate that a significant number of schools continue to reinforce the notion that trades are an appropriate career choice only for those who are unsuitable for higher education or professional careers. Consequently, young women are not encouraged to explore trades as a viable career option.

It is evident from the case studies included in this report that partnerships between schools and industries, employers and Registered Training Organisations (RTOs) can be effective strategies for broadening the career choices of young women, and of particular importance for young women's participation in non-traditional trades.

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<sup>3</sup> Australian Financial Review 12<sup>th</sup> June 2014  
[m.afr.com/p/national/education/tony\\_abbott\\_backs\\_us\\_style\\_corporate\\_esnG60ZXK0h8BtMr2lp2TO](http://m.afr.com/p/national/education/tony_abbott_backs_us_style_corporate_esnG60ZXK0h8BtMr2lp2TO)

## Recommendations

eS4W recommends that:

1. The Federal Government commission the development of a model for best practice careers' guidance for secondary school girls, and that this model build on elements of successful programs from Australia and around the world.
2. That highly visible female role models and mentors from STEM and other non-traditional occupations and industries - who are crucial to broadening the career aspirations and expectations of young women - be included in the development of this model.
3. That promotion of support networks for young women in STEM and non-traditional workplaces be recognised as integral to future strategies.
4. The facilitation and development of widespread partnerships between schools, educational institutions, industries and communities to assist girls and young women to access non-traditional and STEM study and work placement opportunities, in order to advance career aspirations, choices and outcomes for Australian women.

*\* NOTE: eS4W recognises that the implementation and delivery of careers' exploration programs in Australian schools is a responsibility of State Governments. Nonetheless, we believe it is in the national interest for a state-of-the-art careers' exploration model to be developed, for adoption by the States.*

# 1 Introduction

eS4W is a National Women's Alliance that aims to inform actions to increase female participation in non-traditional occupations and industries. eS4W is concerned about the impact of gender segregation in the labour force on women's lifetime earnings.

As a result of research undertaken for this report, eS4W has concluded that intervention in the career choices of young Australian women is crucial to achieving better employment outcomes and long-term financial security for individual women, as well as increased gender equity in Australian workplaces.

This report considers:

- current models for careers' exploration and related post-school outcomes for girls and women
- new models for encouraging young women into STEM (Science, Technology, Engineering and Mathematics) study pathways and non-traditional occupations and industries.

## 1.1 Rationale for this report

Despite increased participation rates of women in the workforce, gender segregation remains entrenched in Australian industries. Women represent almost 46 per cent of employees in the labour force, with a 58.5 per cent participation rate (ABS 2014b). Recent figures suggest that increasing women's employment rates could boost Australia's GDP by 11 per cent (Broderick, 2013). However, in the construction, mining, and utilities industries, women account for around 12 per cent, 15 per cent and 23 per cent of employees respectively. This has serious ramifications for the long-term financial well-being of women, as well as for the Australian economy<sup>4</sup>.

Gendered divisions - regardless of individual achievements in secondary education - are perpetuated by the lack of young women entering STEM (Science, Technology, Engineering and Mathematics) and other non-traditional occupations. Such anomalies indicate there is a need for better practice and innovation in the critical field of careers' exploration for girls and young women at school.

A Brisbane forum of female educators, academics, public servants and members of women's organisations, hosted by eS4W in 2013, concluded that careers' exploration for girls and young women was essential for providing strategic pathways for effective transitions from school into adult life. These pathways might incorporate study, employment, parenting, unemployment, underemployment, the development of life skills and combinations of all the aforementioned.

The following suggestions were put forward by the forum for improving careers' outcomes for women during their secondary schooling:

1. Permanent school-based programs to attract young women into better-paying non-traditional jobs and industries. Such programs could capitalise on current successful models for changing and/or raising the aspirations of girls and young women, including RoboGirls, Girls into Trades, Girls into Hard Hats and Supporting Teenagers with Education, Mothering and Mentoring program (STEMM)

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<sup>4</sup> Women comprise 31 per cent of those with university level STEM qualifications and 12 per cent of those with vocational level STEM qualifications (ABS 2014a).

2. School-based programs set in the context of women's long-term economic well-being. Suggested modules might include gender segregation in the labour market, pay and conditions, financial literacy, non-traditional jobs, careers and industries, and introductions to various technologies. As well, awareness about factors that influence career choices could be incorporated, such as family, personal interests and transport availability
3. School-based careers' exploration that is current and broadened to ensure girls are exposed to a range of careers early in their schooling
4. Programs that reflect the different circumstances of girls with Aboriginal, Torres Strait Islander and/or culturally and linguistically diverse (CALD) backgrounds
5. School-based programs that create and maintain links with local employers, Chambers of Commerce and Industry, industry associations, employee associations, non-government organisations, other schools, family, teachers and the wider community, as well as a range of individual women working in non-traditional occupations and industries.

The under-representation of women and girls in non-traditional occupations undermines the economic future of women, as well as gender equality in Australia and the national economy. Consequently, in conjunction with the suggestions outlined above and the desire to identify innovative and gender-inclusive strategies and practices, eS4W commissioned Women in Adult and Vocational Education (WAVE) to provide the research for this report.

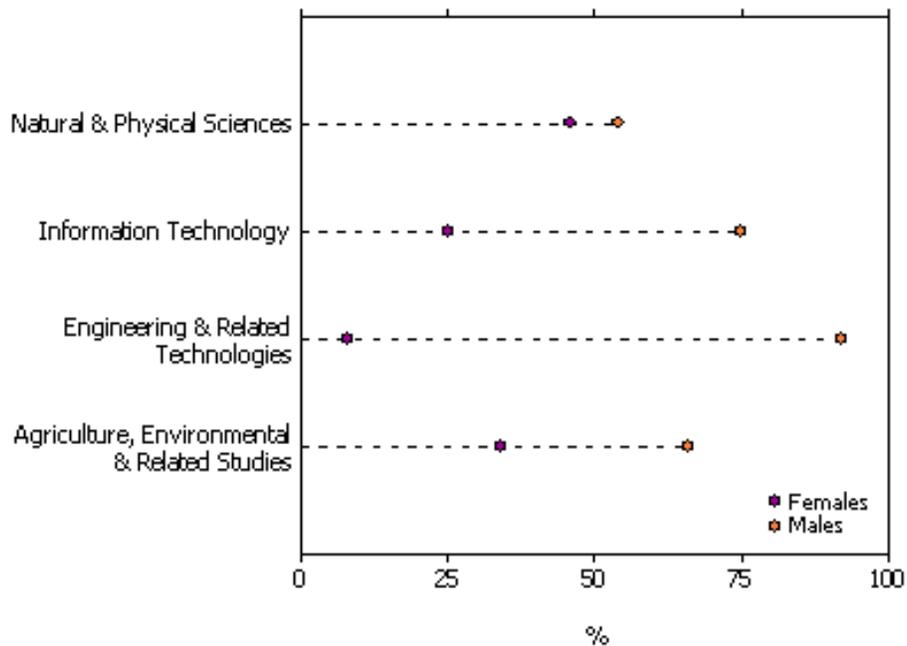
This report, and the WAVE research, contribute to the growing body of knowledge that aims to improve opportunities and outcomes for girls and women interested in non-traditional studies, occupations and emerging industries, and to challenge gender occupation stereotypes that contribute to the gender pay gap in Australia.

## **1.2 Education, training and employment**

Perceived educational advantages of girls over boys during school notwithstanding, significantly fewer young women than young men move from school to employment in the in-demand, high-income STEM fields of Science, Technology, Engineering and Mathematics (Rothman et al 2011, Queensland DET 2011, OECD 2012).

Further, young women are less likely than their male peers to enter employment-based training in non-traditional trades (Rothman et al 2011).

**Figure 1 STEM qualified population, by sex and field, 2010 - 2011**

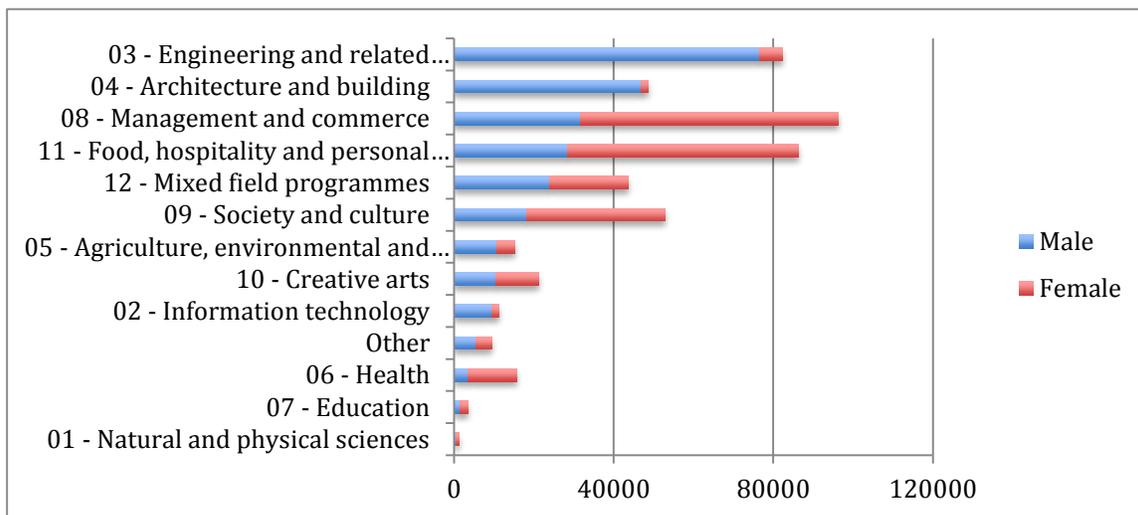


Source: ABS Survey of Learning and Work, 2010-11.

As well, female students aged 15-19 are less likely to enrol in VET (Vocational Education and Training) study in the fields of Engineering and Related Studies (7 per cent) and Architecture and Building (4 per cent).

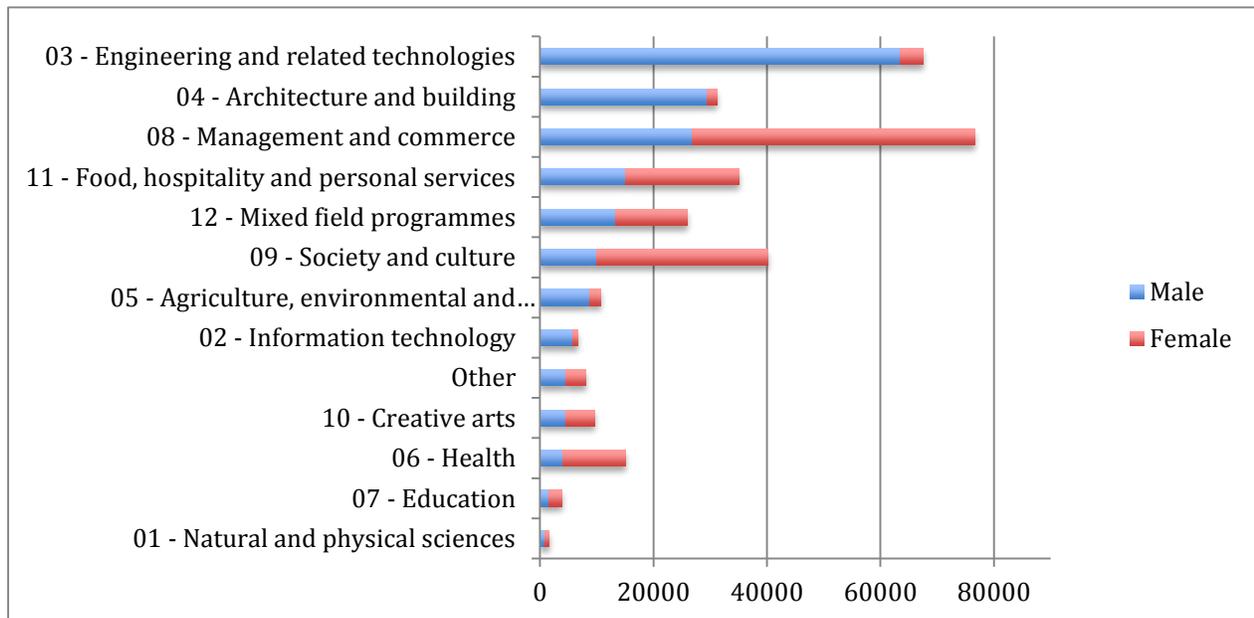
This pattern is reflected for female VET students aged 20-24 years of age (see Figures 1 & 2 below).

**Figure 2 Number of students 15 to 19 years of age, enrolled in Vocational Education and Training (VET) courses, by field of study and gender, 2012**



Source: Vocstats Students and Courses, 2012

**Figure 3 Number of students 20 to 24 years of age, enrolled in Vocational Education and Training (VET) courses, by field of study and gender, 2012**



Source: Vocstats Students and Courses, 2012

A critical mass\* of women at all levels of an organisation, including senior management, has been linked to higher organisational performance, productivity, profitability, employee commitment and retention. According to cumulative Gallup Workplace Studies, organisations with inclusive cultures do better on several indicators than those that are not inclusive (Broderick, 2013).

Given current skills shortages in Australia, attracting and retaining under-utilised sources of talent is essential to economic growth and prosperity (Daley et al 2012). This is particularly true in industries that have traditionally relied on male workers to fill roles, namely construction, mining and utilities.

*\* Critical mass - the normalisation of women in non-traditional jobs, careers and industries by sheer volume of participation - is recognised as pivotal to increasing the interest of girls, and the participation of women, in these non-traditional areas.*

## 2 Key themes

This section outlines key themes that emerged during the review of literature undertaken for this report. These themes in turn framed the development of the online survey (see Appendix 4) and the identification of relevant case studies (see Appendix 3).

### 2.1 Understanding careers' exploration

Why is a deeper understanding of careers' exploration important? In short: to prevent the social and economic exclusion of women generally and to maximise the contribution of all Australians to the national economy.

Effective careers' exploration programs and activities can result in myriad benefits for individuals, organisations and society. Careers' exploration aids "the excluded to gain access to learning and work, thus enhancing social equity" (Cedefop, 2010; Hutchinson & Jackson, 2007). Careers' exploration can increase educational engagement and attainment, strengthen pathways for at-risk young people, increase self-confidence, improve future awareness and goal orientation, promote greater awareness of the labour market, enhance employment outcomes for school completers and expedite greater labour market flexibility and mobility (DEEWR, 2011; Sweet et al, 2009; OECD, 2004; ACER, 2011; Miles Morgan, 2011; Hirsch, 2006; DEEWR, 2013).

Careers' exploration skills are frequently identified as critical to lifelong learning (Sultana, 2010; Hansen/ILO, 2006; OECD, 2004a) and research undertaken by Harris and Ramos (2013) found it is vital for young people to learn career exploration skills early. In a report on guidance and counselling for learning, career and employment (2014), the European Centre for the Development of Vocational Training (Cedefop) adopted the concept of 'lifelong careers' rather than 'lifelong jobs', and the necessity for citizens to possess a range of skills to draw upon in ever-changing employment and training markets. (See Appendix 2 for more detail about Career Exploration).

### 2.2 Careers' exploration and young women

Australia's labour force remains one of the most gender-segregated in OECD countries, both horizontally (by industry and occupation) and vertically (by level of appointments) (WAVE, 2011).

In 2005, gender-neutral or 'gender-blind' approaches to careers' exploration were found to have overtaken a previously strong focus on girl-specific vocational needs and career aspirations. This research, conducted by WAVE for eS4w<sup>5</sup>, also noted that entrenched social conditioning limited girls' and young women's choices about their lives and future careers.

WAVE's research found that girls' career choices tended to be disconnected from employment trends and job availability, and were based on personal preferences uninformed by information about the sustainability of their choices. While the young women surveyed had strong ideas about what career they would choose, an overwhelming majority identified future careers in traditionally 'female' occupations. Despite years of affirmative action in schools, and awareness about gender stereotyping, girls continue to select traditional, or feminised, areas of work where they are at risk of high rates of casualisation and low rates of pay. The data indicated that young women

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<sup>5</sup> WAVE conducted research for eS4W that focussed on girls, VET in Schools (ViS) and implications for potential career outcomes

thought less about economic security when making decisions about their careers and more about a preferred occupation. While many tended to have strong ideas about the nature of the work involved in their chosen career, most had no relevant information on future prospects, job availability or rates of pay in their selected area (Butler & Woolley, 2005).

The challenges facing Australian schools in relation to careers' exploration and related study pathways for young women are not unique to Australia. Research conducted by Ofsted<sup>6</sup> in the United Kingdom found that despite broader ranges of curriculum and training opportunities, young women continue to make education and employment choices along traditional and gendered lines (Ofsted 2011; Hutchinson & Jackson 2007).

### **2.3 Careers' exploration, STEM and gender**

STEM - the study of Science, Technology, Engineering and Mathematics - is a complex field attracting increasing global policy attention (Salvaris/ACOLA, 2013). While unified by the acronym STEM, the subject choices and career pathways that relate to STEM are diverse. STEM consists of a number of subjects grouped into three domains, each associated with differing employment and career pathways:

- Prime STEM
- Economic and Allied STEM
- Health and Allied STEM.

It is important to consider this when mapping STEM-related study and career pathways for girls and young women. The ABS (2014a) reported:

*Women tend to be under-represented in STEM education and training in most countries around the world, and Australia is no exception (Marginson, et al., 2013). Of the 2.7 million people with higher level STEM qualifications in 2010-11, men accounted for around four-fifths (81 per cent). This is in stark contrast to non-STEM fields, where women make up the majority (60 per cent) of those with qualifications at the Certificate III level or above.*

*The gender breakdown varied markedly across the STEM fields. Men made up the overwhelming majority (92 per cent) of those with higher level qualifications in Engineering and related technologies, and the large bulk with qualifications in Information technology (75 per cent). Around two-thirds (66 per cent) of those qualified in Agriculture, environmental and related studies were men, while there was a fairly even split among those qualified in Natural and physical sciences.*

From an international perspective, a policy paper jointly produced by Microsoft, UNESCO, UN Women and ITU states that:

*Gender discrimination impedes women's empowerment and blocks progress at a societal level. Yet governments, NGOs, academics and businesses haven't adopted adequate or holistic strategies that build women's equality regarding ICTs (Information and Communications Technologies) and encourage girls to move towards STEM careers (2013, p. 2).*

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<sup>6</sup> Ofsted: Office for Standards in Education, Children's Services and Skills.

An Ernst and Young report cited in the above-mentioned policy paper claims that the impact of women's full participation on the global economy would be at least as significant as the populations in China or India. Former World Bank chief economist Larry Summers was quoted in the paper as saying: "Investment in girls' education may well be the highest-return investment available in the developing world" (2013, p. 5). Yet, according to the same report, women comprised less than 30 per cent of the Information and Communications Technologies (ICTs) workforce worldwide. This potential economic clout, along with the estimate that nine out of 10 jobs will soon require ICT skills, mean that it is critical for more women to choose ICT study pathways and careers.

Research into engaging Australian students in STEM-related subjects, based on concern about declining numbers, identified a range of factors that impact on student choices. These include but are not limited to students' attitudes, achievements and motivation, teachers' expectations and approaches, and parents' identity and encouragement. Other relevant factors include the school curriculum, societal attitudes and the availability of positive role models.

Given the complexity and inter-relatedness of factors impacting on student choices, Panizzon and Westfield advise that a multifaceted educational strategy that targets change, along with a broad public awareness campaign to increase the relevance and value of STEM in the broader community, is required (2009, p 5).

The proportion of female students undertaking mathematics and science subjects in Years 11 and 12 in NSW fell from 16.8 per cent in 2001 to 13.8 per cent in 2011 (University of Sydney, 2013). From Year 10, girls swing away from Prime STEM subjects to Allied Health STEM subjects (Westwell & Buxton, 2012).

A comprehensive South Australian analysis of female participation rates in STEM for the period 2008- 2011 highlights 'leaky pipe' phenomena - the point at which girls and young women turn away from subjects that previously interested them. This analysis illustrates female preferences for Allied Health STEM subjects and finds that many females studying Prime STEM at senior school levels do not aspire to study in this area when they leave school. An even lower proportion of females who do continue study in these subjects are employed in Prime STEM post-graduation (DFEEST, 2013).

Research by the Australian Workplace and Productivity Agency (AWPA) indicates that schools and workplaces are critical sites for transforming career choices. In its 2013 ICT Workforce study report, the agency recommends that the current Scientists and Mathematicians in Schools program<sup>7</sup> be expanded to include STEM-related professions such as ICT, and that relevant industries develop a suite of targeted careers-promotion products across diverse media and platforms for a variety of organisations and audiences, including women and girls..

The AWPA report 'Manufacturing Workforce Study' (AWPA, 2014) says that success in Australia's new manufacturing environment will require new and higher level skills, particularly STEM skills. This report recommends peak industry groups, relevant Industry Skills Councils and trade unions work together with career development advisory groups, such as the Career Industry Council of Australia, to promote the full range of manufacturing jobs and career opportunities available.

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<sup>7</sup> <http://www.scientistsinschools.edu.au/>

## 2.4 Careers' exploration, non-traditional occupations and gender

Young Australian women are less likely than young Australian men to drop out of school. Nonetheless, research shows that across OECD countries young women are far less likely to set their sights high by pursuing post-school study in scientific and technological fields of education (OECD, 2012). As with STEM, gender stereotyping plays an important role in the decisions made by girls and young women about their employment future.

Girls and women are often deterred from participating in thriving businesses in male-dominated industries because of stereotypes about the nature of 'women's work', discouraging workplace cultures, structural problems and a lack of family role models. Meaningful and well-structured opportunities to explore non-traditional occupations during their schooling years would go a long way towards ameliorating negative perceptions many young women have about STEM and non-traditional career pathways.

That said, a variety of opportunities are offered in secondary schools for girls to consider non-traditional pathways, including early engagement and encouragement in 'tech studies' and/or Technology and Design subjects, work experience programs, VET in Schools (ViS) and mainstream curriculum subjects. Nonetheless, uptake of ViS programs is gender-biased, with debate about its usefulness as careers' exploration for young women (and others) (Butler & Woolley, 2005; Clarke & Volkoff, 2012; Clarke, 2012; Clarke, 2013; Service Skills Australia, 2010; Smith & Green, 2005; WAVE, 2011).

Australia's Sex Discrimination Commissioner Elizabeth Broderick recently launched a toolkit to assist leaders in organisations with developing and implementing sustainable strategies for increasing the representation of women in non-traditional roles in male-dominated industries. During the launch, she said the under-representation of women in industries considered to be male-dominated continues to affect gender equality, industry performance and the national economy (2013).

Feedback from interviews and roundtables with employees in the mining, construction and utilities industries documented in the AHRC toolkit (2013 p4) highlighted that a number of barriers, some of which are historical and cumulative, must be addressed to increase women's representation. These barriers include:

- Lack of family role models

Girls are not exposed to career pathways in the mining, construction and utilities industries as early or as often as boys. Many boys and young men learn about their potential for roles in these industries from their fathers or other male relatives.

- Stereotypes and bias at school

Career decisions are reinforced by the educational choices made during school and post-secondary education. Gender segregation is common in subject choices, with girls far more likely to consider ongoing education and careers in the humanities or social sciences than engineering or technology.

- Negative perceptions and lack of awareness

Even with the 'right' education, relatively few women choose to consider roles in male-dominated industries. One reason is negative perceptions about these industries, which is often based on anecdotal feedback from others who have endured negative experiences.

- Stereotypes and myths about women in the workplace  
Organisations associated with non-traditional industries are not addressing stereotypical assumptions about: the sort of work women can do, have the skills to do, their potential performance or commitment to their careers.
- Workplace culture:  
Male-dominated industries are perceived to have masculine or 'blokey' cultures that are non-inclusive with a high tolerance of behaviours that could be viewed as sexual harassment, bullying and discrimination.
- Perception of - and actual - gender-specific bias  
Non-traditional industries are perceived to have a bias against women in relation to recruitment, development and career advancement. This perception is reinforced by the low percentage of women who work in these industries.
- Structural issues  
Non-traditional industries, particularly mining, have a culture of long hours and often fail to offer flexibility and work-life balance.

Simon and Bonnici (2014) identified that female teachers, especially in male-dominated trades, are important as role models and mentors for young women undertaking study in these occupations.

## **2.5 Careers' exploration: a general overview of the international context**

International governments, particularly those in OECD and European Union countries, are grappling with strengthening approaches to careers' exploration with a view to increasing uptake in STEM.

Key international insights into first-class careers' exploration for young people include:

- Embedding careers' exploration in the curriculum (Cedefop, 2014), starting with general programs and leading to individualised career support tailored to a pupil's needs in Years 10 and 11 (Davies and Cox, 2014)
- The important role to be played by intermediary organisations in the development and delivery of careers' exploration activities (Cedefop, 2008)
- The workforce responsible for counselling, guidance and advice to students must be trained, skilled, qualified and experienced (Cedefop, 2008).
- Industry's role in underpinning careers' exploration, by providing up-to-date labour market advice and 'real-life' perspectives (AWPA, 2013)
- Approaches to careers' exploration are shifting from supporting pathways at entry to the labour force to supporting skills for effective navigation of education and employment options over a lifetime (ILO, 2006).

## **2.6 Careers' exploration: a general overview of the Australian context**

While schools play a key role in careers' exploration programs and activities, research continues to highlight the influence of parents and/or caregivers, peers, friends and the media (e.g. Gemici et al, 2014) in limiting girls' career choices. To counter this, it is recommended that primary school students be introduced to a wide range of careers and have their horizons broadened early (Urbis Element 2 report for Australia's National Career Development Strategy, 2011).

Those students who have no idea what they want to do when they leave school need help to identify their interests, values, strengths and weaknesses - and to understand how their personal interests and abilities could link to particular career paths.

The 2008 Australian Blueprint for Career Development identifies eleven career management competencies that individuals need to manage their life, learning and work roles, as well as learning resources to support them. These include:

- personal management for building a positive self-image, interacting with others and growing throughout life
- education and work exploration, including lifelong learning to support career goals and understanding the relationship between work, society and the economy
- career building for rewarding work, career enhancing decisions, balancing life and work roles and managing the career building process.

Australian leadership development firm The Nous Group<sup>8</sup>, in its rationale for a National Career Development Strategy (2011), says there is evidence that young people who undertake career planning are less likely to drop out of school. As well, they say career exploration can play an important role in overcoming disadvantage. Their report names other countries with publicly-funded career services, including England, New Zealand, Wales, Germany and France. They identify three important elements for successful career exploration in schools:

- infusion into all subjects, so that academic content is taught in ways that articulate its relevance to the world of work
- inclusion of a subject that focuses on understanding the labour market and planning for transition from school
- experiential components that allow students to experience the world of work in a structured program.

In its 2013 National Workforce Development Strategy, AWPA found that “(currently there is little research or data about career advice, but indications are that access is patchy and quality is variable” (2013:13). The Agency highlights the need for a ‘national brand for career development advice’ (2013:13), improving the co-ordination of career development and advisory services in Australia and to more actively involve industry to ensure labour market information is current.

## **2.7 Careers' exploration: the senior secondary landscape**

It is insufficient to focus solely on the ways in which young Australian women face institutional and individual barriers to pursuing post-school education and employment pathways in STEM and non-traditional careers. An examination of how career exploration initiatives meet the needs of young women must also be considered (Clarke, 2013).

Each Australian state and territory has its own senior secondary certificate of education (Victoria has two). There is significant diversity amongst these certificates, with varying degrees of access to disciplinary, vocational, community-based and employment-based curricula and programs. It is through such programs that young Australians not only complete their secondary schooling but also lay the foundations for their career aspirations and post-school learning and earning trajectories. This diversity complicates the national dialogue about how to strengthen career exploration for young people in schools generally and for young women specifically.

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<sup>8</sup> [www.nousgroup.com.au/](http://www.nousgroup.com.au/)

Movement towards increased school autonomy and pressures on schools to compete within a competitive, choice-based education market further complicate the role of schools in delivering accurate, timely and relevant career exploration services. Evidence from recent research on senior secondary schooling (Clarke and Polesel, 2013; Clarke, 2013) suggests that when university pathways are perceived as the gold standard, and used as a key measure of a school's success, they receive the most attention from career exploration resources.

Current approaches to VET in Schools (ViS) indicate there is a strong policy-focus on traditional trade VET and apprenticeships (Clarke, 2013). Participation data indicates that apprenticeship pathways continue to be relatively strong for both early leaving and school completing young men but weak for young women (DEECD, 2013) - recent figures indicate 16.7 per cent of young Victorian men are entering employment-based education and training pathways, compared with just 5 per cent of young women<sup>9</sup>.

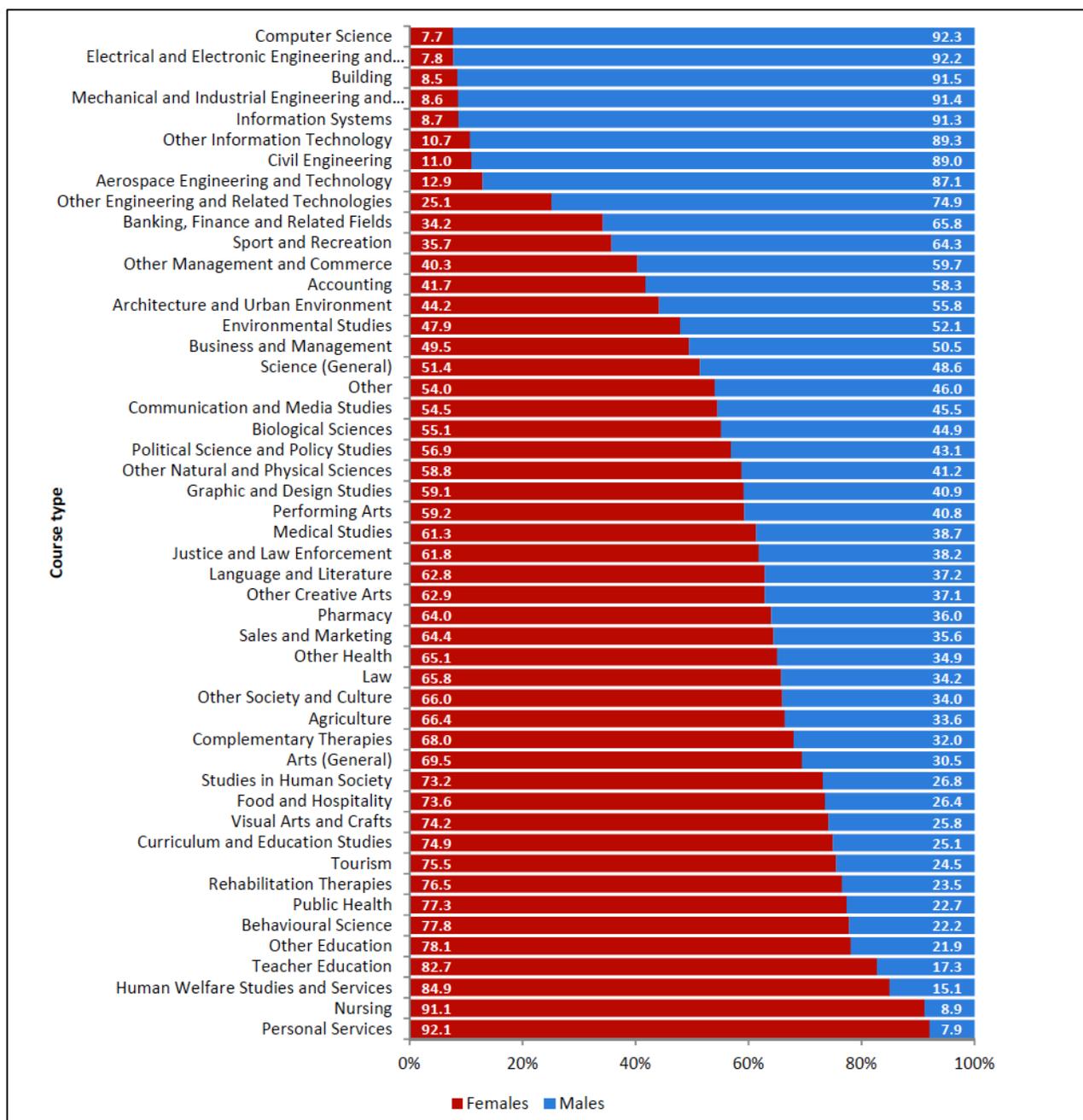
A gender gap has emerged whereby women with low school achievement obtain casual, part-time and often low-skilled jobs and experience in a highly competitive job market, with precarious and/or under-employed working conditions (Spierings, 2005; McMillan and Curtis, 2008).

Gendered patterns of participation are also evident in higher education courses (see Figure 3 below) and post-school VET courses. Female students make up only a small proportion of Victorian school completers enrolled in bachelor level study in Electrical and Electronic Engineering (7.8 per cent), Mechanical and Industrial Engineering (8.6 per cent) and Building (8.5 per cent). The low participation rate of young women in these fields mirrors the limited participation of young women in related ViS programs (see Figure 4 below).

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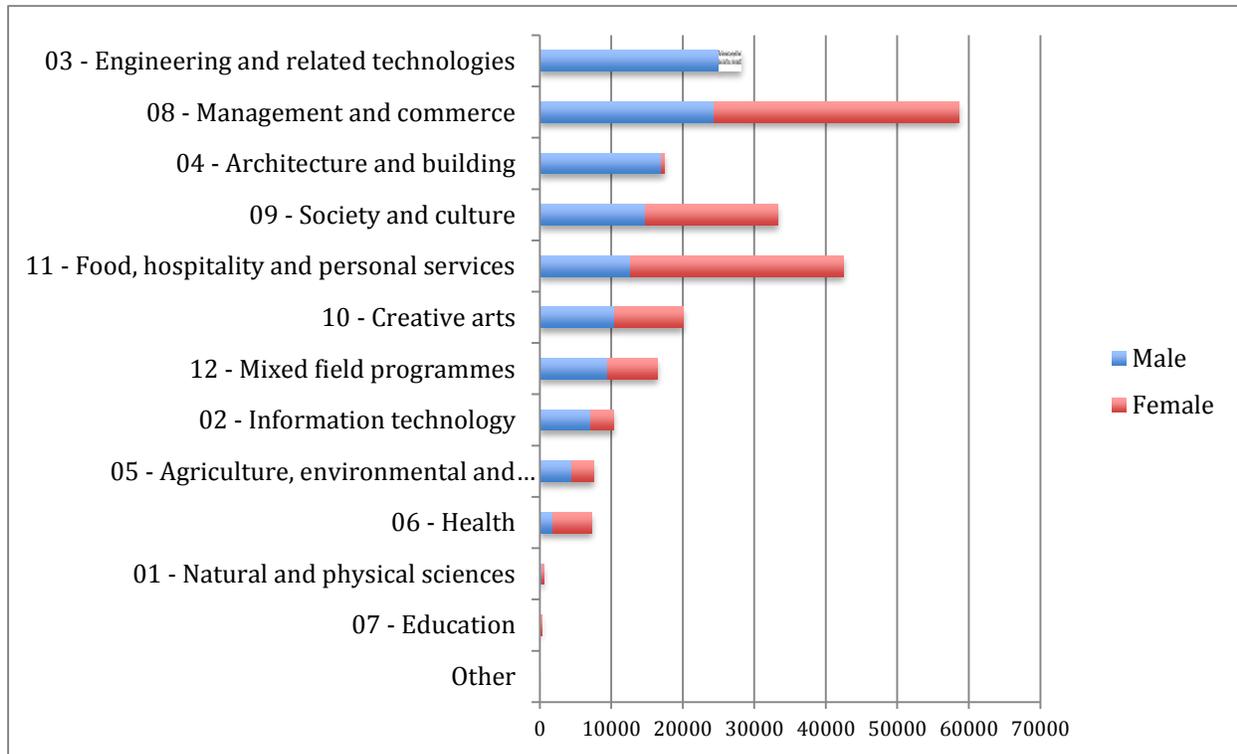
<sup>9</sup> The Victorian *On Track* survey, conducted annually, is the first and largest survey of school completers. In the absence of national data on post-school transitions, the Victorian tracking data is a useful illustration of gendered patterns of entry to apprenticeships and traineeships.

**Figure 6 Percentage of Year 12 completers in campus-based tertiary study enrolled in bachelor degree course type, by gender, Victoria, 2013**



Source: DEECD On Track survey 2013

**Figure 7** Number of students 15-19 years of age, enrolled in Vocational Education and Training (VET) in School courses, by field of study and gender, 2012



Source: Vocstats Students and Courses, 2012

### **3 Observations: stakeholder consultations and case studies**

This report is based on data that demonstrates an ongoing pattern of gender bias in current approaches to career development in a significant number of Australian schools. This in turn reinforces gender-specific occupational outcomes.

This section presents data from the online survey of career exploration stakeholders, and makes reference to case studies that illuminate alternative practices and important principles for strengthening career exploration policy and practice.

Survey respondents came from a range of areas in the career exploration field, including career exploration (n=56), higher education and VET (n=26), VET in Schools or similar (n=21), industry representatives (n=21), government departments and policy making authorities (n=17), school principals and teachers (n=10) and mentors for young women in industry (n=6) (See Appendix 1 for more details of research method).

This breadth of respondents provides insights into the strengths and weaknesses of current career exploration in Australian secondary schools and identifies ways in which such approaches can be strengthened and successful alternative approaches progressed.

Issues raised by respondents include:

#### **3.1 Attention to language**

Several survey respondents (n=19) call for attention to gender-inclusive language within school education policy to articulate the significance of career exploration for girls and young women.

#### **3.2 Career exploration and the curriculum**

Respondents call for the adoption of the Australian Blueprint for Career Development to be mandated and emphasis the need for career exploration experiences for students to focus on increasing curiosity and awareness about opportunities and possibilities.

Respondents describe effective career exploration activities as those that include strong links with existing structured workplace learning, such as ViS programs.

At a policy level, respondents describe a need for greater leadership to integrate and embed career exploration in schools. In the absence of mandated career exploration curricula, respondents describe a need for greater leadership in schools to effectively integrate industry and career exploration within the existing curriculum.

**See [Case Study 8, Australian Science and Mathematics school Appendix 3 Page 42](#)**

#### **3.3 Embedding career exploration as core school business**

A key criticism of current approaches to career exploration is the perceived 'add-on' nature of such strategies. Effective strategies are identified as those that integrate career exploration activity (such as work experience and careers' expos) in the curriculum.

**See [Case Study 14, STEM Scale Up Program Appendix 3, Page 61](#)**

The Nous report on the National Career Development Strategy recommends working with the university sector to embed career exploration competencies into teaching courses (2011). The report also found that young people want face-to-face services (not just online). This was supported by feedback from survey respondents.

**See [Case Study 3, Southern River College Appendix 3, Page 33](#)**

### **3.4 Access to learning opportunities through increased engagement with higher education and industry**

One obstacle to young women accessing STEM and non-traditional career exploration is the lack of access to learning and work experience. Respondents describe the need for university and industry engagement with schools to widen access to career exploration opportunities.

School Business Community Partnership Brokers programs, such as those that exist in South Australia and New South Wales, and the Local Learning and Employment Networks (LLENs) that operate in Victoria, are identified by respondents as important for facilitating the often complex nature of school-university and -industry partnerships.

### **3.5 Early and staged career exploration**

Respondents frequently raise the need for career exploration strategies to be introduced early in secondary school, with some respondents suggesting a need for a coordinated approach to career exploration in the latter years of primary school.

This is in line with research that highlights the importance of early and staged career exploration. Davies and Cox (2014) found that “pupils as young as 12 are engaged in thinking seriously about their careers, but they want more help, more work experience, and more information about local job opportunities, including visits from employers and visits to their sites”. This is of particular concern in STEM subjects and for vocational education for girls, as “there was also evidence that pupils had insufficient knowledge about which careers did and did not have science qualifications as prerequisites”.

**See [Case Study 3, Southern River College Appendix 3, Page 33](#)**

### **3.6 Supporting parents and families to support girls and young women**

Parents and families play a significant role in shaping and informing the career decisions of young women (Karmel et al, 2014; Clarke and Polesel, 2013). Survey respondents describe a need for career exploration that provides support for parents and families of young women, particularly in exploring non-traditional employment opportunities.

The role that parents/guardians play in enabling and/or constraining career development for their daughters is a complex one. Respondents say parents with entrenched views about the suitability of various occupations for their daughters hinder school-based strategies to broaden the interests and pathways of young women. Alternatively, where parents are supportive of potential pathways in STEM and non-traditional fields of employment, they are described as enabling effective strategies for broadening the career choices of girls and young women.

### **3.7 Gender-aware career exploration practitioners**

The lack of time, resources, training and qualifications for careers' exploration staff in schools is a persistent theme among survey respondents.

AWPA notes that careers' exploration advice must be independent, professional and of high quality, and it should be delivered by independent, qualified and well-informed careers' practitioners who are not linked to particular educational institutions.

AWPA identifies the lack of exposure to skilled teachers at critical decision-making points for students as a key reason for the drop in girls and boys studying STEM subjects.

Gender-specific careers' exploration programs need to be evaluated to enable effective models to be duplicated across the sector. Respondents emphasise that careers' information needs to relate to young women's personal needs and, whilst general information is useful for young women, it is described by respondents as being insufficient to promote interest in and engagement with traditionally male-dominated occupations.

### **3.8 Female role models and mentors**

Female role models and mentors are identified by survey respondents as the single most important enabler of effective careers' exploration for young women (n=62). Providing access to successful women in non-traditional occupations was described by respondents as a simple yet highly-effective approach to breaking down gender stereotypes in career decision-making.

**See *Case Study 1, SkillsOne Page 30 Case Study 4 SALT Page 36 and Case Study 10 Girls into Trades Seminars Page 49, Appendix 3***

### **3.9 Opportunities to taste non-traditional and STEM occupations**

Tasters, work experience and work placements are described as key measures for broadening young women's careers' exploration opportunities (n=26) and demystifying gender-biased perceptions of STEM and non-traditional careers.

Respondents emphasise the importance of careful work experience and work placement sites and the need for female-friendly opportunities to explore STEM and non-traditional occupations.

**See *Case Study 7 Robogals Page 39 and Case Study 11 Doorways2 Construction, Page 51; Appendix 3***

### **3.10 Intermediary organisations**

Survey respondents, particularly those from industry and non-government organisations, emphasise the role of intermediary and community organisations in developing and delivering careers' exploration in schools. This is particularly relevant to the delivery of targeted careers' programs for young women, where third-party expertise can bolster school knowledge and understanding.

**See *Case Study 12, Graduate Qualities Strategy. Page 56; Appendix 3:***

Opportunity Hubs are being established in NSW, with the Dubbo Hub to coordinate training opportunities for Aboriginal students. The Dubbo Hub will act as a 'bank', where local employers, universities and TAFEs can deposit opportunities for employment, training, mentoring, scholarships or volunteer work. Such hubs are ideally placed to leverage better careers' outcomes for girls.

### **3.11 Accessibility of information**

Survey respondents identify accessibility to information about STEM and non-traditional careers as important for young women and careers' exploration practitioners. Partnerships and connections with community, business and industry are identified as effective for promoting and enabling access to information vital to informing and supporting effective career exploration.

**See *Case Study 1 Southern River College Page 30 and Case Study 3 SkillsOne-Women in Trades page 33, Appendix 3***

### **3.12 Gender stereotypes, perceptions and stigmas**

A recurring concern expressed by respondents is the impact of gender stereotyping on the careers' exploration aspirations and choices of young women. Gender stereotyping is described as common in careers' programs and respondents have called on schools to adjust their advice and information to ensure they do not inadvertently reinforce gender stereotypes about the suitability of particular jobs and industries for girls and young women.

The Harvard Implicit Association Test (IAT), which tested more than a half million people globally, demonstrated that more than 70 per cent of test takers associated 'male' with science and 'female' with arts. Such implicit beliefs directly influence families' decisions to encourage or discourage girls from pursuing science and engineering subjects and careers. Teachers may tend to reinforce this.

**See [Case Study 6 Digital Divas Page 39](#) and [Case Study 9 MAAP My Future Page 45](#), [Appendix 3](#)**

### **3.13 Career exploration activities irrelevant to young women**

Respondents describe current careers' exploration strategies as not reflective of the interests and needs of young women. AWPA notes that key strengths of successful approaches to career exploration include targeted features for both girls and boys, with strong industry involvement, mentoring and other opportunities for direct contact with professionals. Young people in regional, rural and remote areas report having limited exposure to careers' exploration opportunities.

**See [Case Study 2 Work Inspiration Page 31](#), [Appendix 3](#)**

## **4 Action: paving the way forward**

There is a need for school-based strategies for addressing inequitable career outcomes for Australian girls and young women, and securing the long-term economic future of Australian women.

### **4.1 Systemic leadership**

There is a clear need for leadership in the field of careers' exploration for girls. If better outcomes are to be delivered for the long-term future of both women and the national economy, it would be prudent for schools to be given support for embedding careers' exploration practices and strategies in their curriculum that acknowledge and address gender stereotypes. These activities must be flexible enough to reflect and engage with local economies and industries.

### **4.2 Partnerships are key**

Partnerships between schools and higher education, business and local industries are crucial to effective careers' exploration in schools and particularly necessary for overcoming gender stereotyping. Partnerships are complex to establish, develop and maintain. Schools will need guidance about how, why, when and where to establish and foster such relationships.

### **4.3 Professionalisation of careers' exploration in schools**

In order to achieve equitable career outcomes for adult women, young women need access to competent and accredited careers' exploration practitioners. These practitioners should be:

- aware of the nature and subtleties of gender stereotyping
- familiar with strategies for increasing the participation of young women in non-traditional subjects, study pathways and occupations
- skilled in techniques for delivering best practice in this field
- knowledgeable about targeted learning opportunities and labour markets
- able to impartially support the aspirations and interests of all individuals.

### **4.4 Coherent policy language**

There is a need for clear, explicit and coherent advice on the importance of careers' exploration for girls, as well as models for effective strategies to achieve equity in career outcomes.

### **4.5 Mandated career exploration in schools**

The inclusion of staged careers' exploration programs in secondary schools ought to be supported, with a focus on opportunities that enable young women to explore best-practice options that are relevant, and of interest, in a broad range of industries.

### **4.6 Sustainable resourcing of career exploration programs**

Funding and resourcing of careers' exploration in schools ought to be considered. Effective resourcing should prioritise programs that include:

- female role models and mentors from STEM and non-traditional occupations
- low stakes opportunities for young women to taste and experience non-traditional and STEM-related jobs prior to and during their senior secondary years of schooling
- the expansion and sustainable development of partnership programs and initiatives that support and enhance school-based careers' exploration for girls and young women.

#### **4.7 Young women need visible role models**

Supporting and promoting the visibility of female role models and mentors from STEM and non-traditional occupations is crucial to exposing young women to a broader range of career options. Information and resources provided to schools should include materials that highlight and celebrate women in STEM and non-traditional career roles. These materials should aim to ameliorate career stereotyping.

#### **4.8 Taster and exploration opportunities are crucial**

Young women, like their male peers, often make their subject selection and career pathway choices based on what they know they enjoy and what they have been exposed to in their home, school and community.

Without an opportunity to taste and experience a range of STEM and non-traditional occupations and subjects, young women cannot be expected to make positive, informed choices about pursuing these pathways. Young women need low stakes opportunities to 'taste' and explore STEM and other non-traditional occupations and industries.

#### **4.9 Schools cannot work in isolation**

While a greater emphasis needs to be placed on the role of careers' exploration in secondary schools, schools alone cannot achieve successful outcomes for girls. Intermediary organisations, including community organisations, partnership brokers and peak industry bodies, have an important role to play in broadening career options for young women.

#### **4.10 Start early, explore often**

Careers' exploration in school should start early (i.e. at least by Years 7 or 8) and continue in staged approaches throughout the secondary school years. By the time young women make their senior secondary certificate subject selections or apply for tertiary places, foundations for their aspirations have already been laid - it is too late to start broadening their careers' exploration options.

#### **4.11 Workplace cultures must adapt**

Negative experiences of and/or perceptions about male-dominated workplace cultures and industries significantly discourage young women from participating in STEM and pursuing non-traditional careers. Changes to careers' exploration programs in schools must run parallel with the need to address cultural changes in industry. It is incumbent upon employers to consider how their industries perpetuate negative workplace cultures that dissuade young women from participating and to promote positive opportunities for exploration by young women.

## Appendix 1 – Method

A mixed method approach has been used to collect the data for this report. Methods employed are:

- An electronic literature search and review of international and national sources, including relevant academic literature, research and project reports, policy documents and electronic media articles and announcements
- An online survey (see Appendix 4) open for the period 26<sup>th</sup> February – 28<sup>th</sup> March 2014. Survey details were circulated nationally to key stakeholders and networks, the National Women's Alliances (NWAs) and their networks, and posted on eS4W's website home page. Details of the survey were also made available via social networks, in particular relevant LinkedIn and Facebook professional group postings. The distribution of the survey was widened using a snowball approach.
  - Interviews were conducted by phone and in meetings with stakeholders selected on the basis of their survey responses
  - Case studies selected to address the main areas of this report's focus. An overview of case studies is provided in Appendix 3

The survey attracted 217 respondents representing a broad range of stakeholder types (see Figure 6 below) and geographic locations (see Figure 7 below)

**Figure 6 - Survey respondents, by stakeholder type (%)**

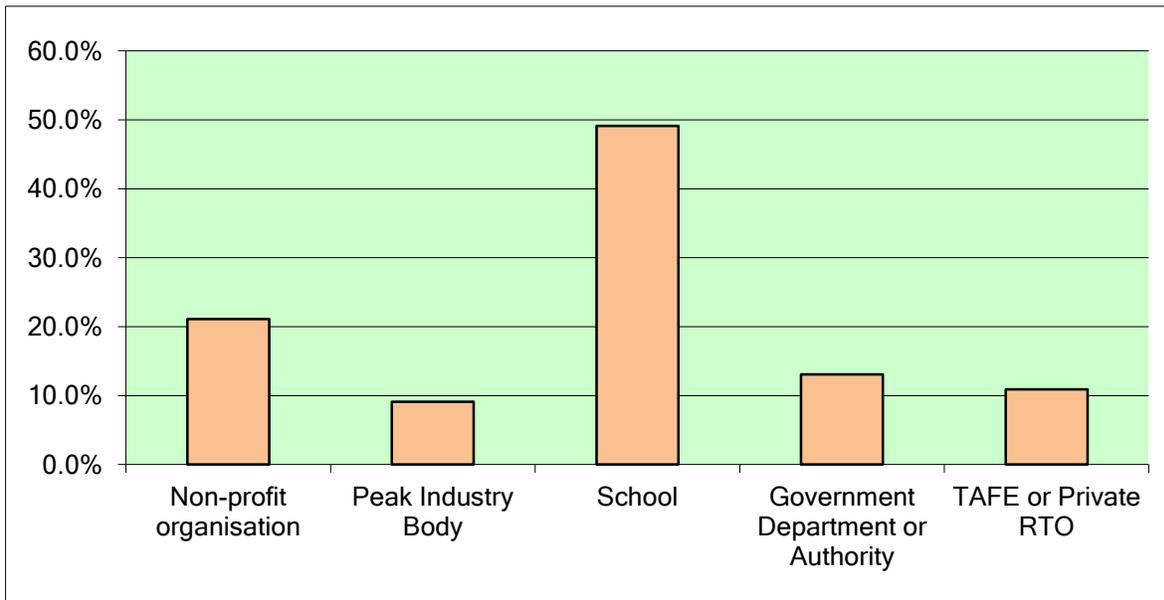
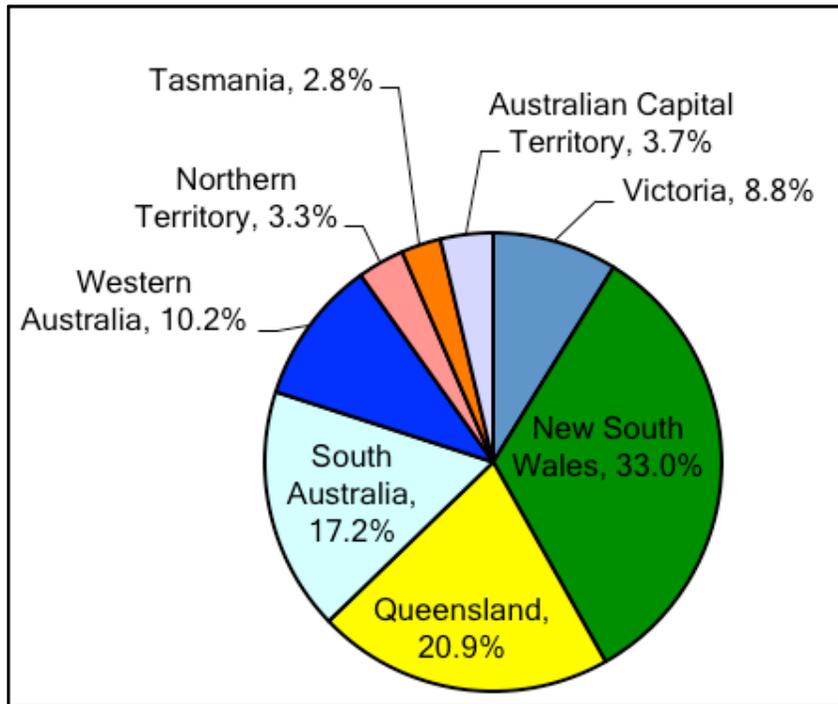


Figure 7

Survey respondents, by jurisdiction (%)



Respondents held a range of positions and roles relevant to career exploration. Respondents include career education and career guidance practitioners (n=56), practitioners and researchers within the higher education and VET sector (n=26), VET in Schools and/or Pathways Coordinators (n=21), industry representatives (n=21), representatives from government departments and policy making authorities (n=17), school principals and teachers (n=10) and respondents who were playing a mentoring role of young women in industry (n=6). The breadth of respondents to the online survey provided insights about the current strengths and weaknesses of career exploration in secondary schools and identified ways in which current approaches could be strengthened.

In addition to the feedback provided through the stakeholder survey, case study consultations have identified a range of best practice approaches that are useful illustrations of the type of practices that were described by survey respondents. These are included as illustrations.

## Appendix 2 – What is careers' exploration?

For the purposes of this report, careers' exploration is the process of:

1. learning about oneself in relation to the world of work
2. identifying and exploring potentially satisfying occupations
3. developing an effective strategy for realising an individual's goals

(UC Berkeley, 2014).

Whilst careers' exploration can be a “continual process that requires gathering information about yourself and information about careers” and “understanding the world and your place in it” (Cornell University n/d), this report uses the term to describe the early and initial stages of the career development process.

Careers' exploration is one aspect of a complex, multi-faceted and rapidly growing field of practice, increasing in significance globally as well as in Australia (OECD, 2004a; Sultana, 2008; Hansen, 2006; McMahan & Haines 2006).

The language used throughout policy and research in this field varies significantly (e.g. NZ Ministry of Education, 2012; Watts 2013, 2002) and is contested (Hughes et al, 2005).

Australian research literature and policy use the terms career advice, career guidance, career exploration, career information and career development, sometimes synonymously.

Different advice, guidance, exploration and information activities are considered necessary to support and inform effective career development. This conceptualisation views careers' exploration as the complex process of managing life, learning and work over a lifespan (Miles Morgan, 2003).

This report draws from and supports work completed by the OECD in 1996 (, 1996), which identified key features of effective transition systems. They included:

- Open and coherent learning pathways and qualification frameworks designed and developed in a lifelong learning perspective
- Extensive opportunities for young people to participate and learn in real work settings while they are students
- The provision of a broad range of vocational and technical skills, together with general education and personal skills, for young people not continuing into higher education
- Attractive and accessible information, guidance and follow-up services for all young people integrating educational, labour market and social counselling.

## Appendix 3 - Case Studies

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## Case Study 1: SkillsOne: Women in Trades Channel

Issue: Careers' information resources

**SkillsOne** is a television channel - SkillsOne - and website - [www.skillsone.com.au](http://www.skillsone.com.au) - commissioned to raise the profile and status of trades, skills and related educational opportunities. The project includes a dedicated station called *Women in Trades Channel*.

This channel was launched in 2009 and profiles women in a variety of industries and trades. The SkillsOne website is a valuable resource hub for women and girls, providing pointers about how to start and where to connect with various trades.

### Context

Showcases career pathways and opportunities for boys and girls and resources for teachers and careers' practitioners.

### Aims

SkillsOne is an integrated communications platform. It comprises SkillsOne television and a website, [www.skillsone.com.au](http://www.skillsone.com.au), and was developed to raise the profile and status of trades and skills, as well as to showcase and promote careers, pathways and opportunities in vocational education.

### Background

SkillsOne is a one-stop, central destination for careers' advisers, students and parents seeking information about trades, skills and training. SkillsOne television is broadcast on Foxtel and Free-to-air TV4ME daily.

### Programs

One of SkillsOne's dedicated stations is the *Women in Trades Channel*, which has received more than 700,000 video views. This channel was launched in 2009 and profiles women in hospitality, tourism and services; women in agriculture, rural and farming; women in metals and engineering; women in manufacturing; women in mining; and women in building, construction and property services. It facilitates access to a range of other websites relevant to women and girls, and gives individual profiles of males and females in these occupations. These profiles often provide pointers about how to start and where to connect with the trade.

SkillsOne takes advantage of National Skills Week and International Women's day to highlight work-based issues relating to women and girls. This year's National Skills Week theme is the *Magical Mystery Tour of Skills*, and one of its signature events will be a Theatre Showcase, at the National Institute for Dramatic Arts (NIDA), in Sydney on August 25. This event aims to attract some 400 career advisers from NSW, plus school principals and VET in School (ViS) teachers. The event will be filmed and used as a webinar for careers' advisers in regional and rural areas. For more information visit [www.nationalskillsweek.com.au](http://www.nationalskillsweek.com.au)

## Case Study 2: Work Inspiration

Issue: Work experience and work placement

**Work Inspiration** is an Australia-wide, employer-led campaign that aims to transform work experience into Work Inspiration. It provides support and resources to Australian workplaces seeking to invigorate their work experience program/s.

Work Inspiration was originally developed in the United Kingdom by Business in the Community. It was launched in Australia as a partnership between The Smith Family, the Foundation for Young Australians and the National Australia Bank.

Work Inspiration is developing resources for schools so that the program might be integrated with the school timetable. This will be trialled with careers' advisers. Work Inspiration is developing strategies that focus on career pathways for girls.

### Context

Work Inspiration is a work experience program for school students that has been adapted from a UK program.

### Aims

Work Inspiration is an Australia-wide, employer-led campaign that transforms work experience into Work Inspiration. It provides support and resources to Australian workplaces interested in reinventing their work experience program/s for young people.

### Background

Work Inspiration affirms the vital role of employers in schools and was originally developed in the UK by Business in the Community. In launching the program in Australia, a partnership was formed between The Smith Family, the Foundation for Young Australians and the National Australia Bank to drive a new nationwide work experience campaign. The expansion of Work Inspiration has seen new partnerships between develop between local employers and schools.

The Smith Family, in response to this report's survey, said: (we support) “a lifelong perspective on career development, however strongly recommend that any strategy, including associated funding ensures that the provision of intensive career development support should be prioritised for young Australians who are most at risk of not making successful transitions into the labour market... Foundation programs help disadvantaged women and girls to broaden the range of life and career options that they see as being available to them, set themselves positive life goals and aspirations and develop the foundation knowledge and skills they need to pursue those goals. Similarly we support extension programs that work at an individual and organisational level to help disadvantaged women and girls build on their skills and develop capabilities and networks to develop their careers and take up employment and leadership roles.”

Even though Work Inspiration is a general careers' development program, it helps The Smith family focus on the needs of disadvantaged young people

## Program

Work Inspiration is a flexible program that recommends the following strategies for the delivery of engaging work experience programs:

- **all about me:** discover the talents, passions and interests of your new recruits through a 'personality quiz' style conversation that will build rapport and trust with your employees.
- **behind the scenes:** present an interactive outline of what the organisation does and why, to give your new recruits a better understanding of where they are.
- **careers happen:** hold an interactive session where young people interview staff members about their career journey, from their early teenage years up until now.
- **student-led projects/presentations:** give young people a project that they must complete during their program

The program is developing a resource package for schools to integrate Work Inspiration into the school timetable, to enable students who participate to capitalise on their learning. They will trial this resource with careers advisers. Work Inspiration is now looking at strategies that focus on building career pathways for girls.

## Case Study 3: Southern River College, WA

Issue: Industry engagement - school curricula

**Southern River College** is a secondary school in Western Australia committed to providing a career pathway and qualification for every student. SRC hosts WA's first Minerals and Energy Academy. The school's comprehensive career exploration and development program focuses on expanding the career options of girls.

### The Mining Game

The school works with local primary schools to introduce students to the minerals and energies sector. The Mining Game is a partnership between Southern River College and Curtin University Equity and Outreach Departments.

### STEM

SRC's STEM program seeks to raise the aspirations of students from a variety of backgrounds. It includes exposure to 'non technical' sectors within industry, thus allowing students who may not have a direct interest in the hard technologies to experience alternative opportunities such as human resources, media, marketing, finance and health and safety.

### Context

Southern River College is a secondary school in Western Australia that is dedicated to providing a career pathway and a qualification for every student. It is host to WA's first Minerals and Energy Academy. SRC has a comprehensive career exploration and development program and focusses on expanding the career choices of girls, particularly in relation to STEM subjects and mining occupations.

### Aims

The school aims to provide genuine careers' opportunities for students via focussed programs and pathways. It has introduced technology that facilitates high-value learning and encourages students to seek collaborative local solutions to a range of real-world problems.

### Background

Southern River College has enjoyed a 100 per cent graduation rate, six years in a row. It is classed as one of the top 50 vocational education schools in WA. This school has a multi-pronged approach to career development: it engages students and businesses in school-based learning and work-based learning; it provides opportunities for teachers and students to gain practical experience in local industry; and it provides businesses with opportunities to learn about the educational sector. The program aims to ensure mutual benefits for the school, local industry and business.

## **Programs**

### **The Gosnells Education Training Industry Link**

The Gosnells Education Training and Industry Link is a dynamic partnership program that seeks to develop effective partnerships between Southern River College, the City of Gosnells and local industry. The aim is to instil in young people a realistic understanding of employers' expectations and needs, while employers play a valuable role in assisting skills development and performance standards. Positive outcomes include: students who are work-ready and employable through pre-skilled programs; businesses that are recognised as potential hosts for pursuing chosen careers; and a seamless transition from school to work that is meaningful and provides value for both employers and employees.

### **Pathways Model**

SRC's Pathways Model provides something for every student:

- Pathway 1: Professional Academic Extension – SRC's Minerals and Energy Academy and university. This pathway empowers female students' career choices by liaising with Women in Mining and Women in Industry.
- Pathway 2: Paraprofessional Technologies – focusses on university or VET.
- Pathway 3: Trades and Work Readiness Apprenticeship pathway.

## **STEM**

SRC attempts to make its curriculum relevant to the 'real world' by integrating mining with sciences and maths. The school offers immersion classes and extension courses after school. It also works with local primary schools to introduce students to the minerals and energy sector. A partnership between SRC and Curtin University Equity and Outreach Departments developed The Mining Game, which SRC uses to prepare students from all educational backgrounds for entry into various fields related to the minerals and energy sector.

## **General**

SRC exposes students to 'non technical' sectors within the mining industry, allowing those who may not have a direct interest in the hard technologies to experience alternative opportunities in areas as diverse as human resources, media, marketing, finance, health and safety, administration and corporate leadership.

SRC actively targets a range of traditionally marginalised groups, including Aboriginal and Torres Strait Islanders, students from low socio-economic backgrounds and non-English-speaking backgrounds, students with disabilities and women.

From Year 8, SRC students develop networking skills by participating in industry showcases. The Year 9 Beacon program profiles every student and immerses them in a range of careers to broaden opportunities.

### **For girls**

Girls at SRC are encouraged to participate in such diverse non-traditional fields as Minerals and Robotics. They participate in the Women in Resources Breakfast, which is made possible through the strong relationship that has been forged between the WA Chamber of Minerals and Energy and SRC's Minerals and Energy Academy. This opportunity broadens young women's networks and links to industry.

SRC hosts the INSPIRING Women in LEADERSHIP program for girls, through which the school's emerging female leaders are given the opportunity to connect with women in leadership.

For example, 11 SCR students met the Federal Shadow Minister for Education and Childcare, The Hon. Kate Ellis MP. Ms Ellis shared her experiences as a female leader in Australia, outlining the pressures and challenges she faced as the youngest woman elected to the Federal Parliament and as the youngest woman to be inducted as a minister in a federal cabinet.

Students discussed their career goals with Ms Ellis, and shared concerns about embarking on their careers. Questions to Ms Ellis ranged from the role of women in society and the gender pay gap to marriage equality and the future of education.



***CAPTION:*** SRC's INSPIRING Women in LEADERSHIP participants with Federal Shadow Minister for Education and Childcare, The Hon. Kate Ellis MP.

## Case Study 4: Supporting and Linking Tradeswomen (SALT)

Issues: Industry engagement; mentoring and role models.

**SALT** is a program that aims to support girls and women as they transition into non-traditional occupations. Its objectives include developing networks and promoting women in trades to industry and the general public.

SALT was founded by Fiona Shewring and is run by volunteer tradeswomen. The organisation has initiated a number of proactive programs for young women and its schedule includes meetings, mentoring and support for women in non-traditional trades.

### Aims

SALT aims to:

- Provide support to tradeswomen in Australia including apprentices and women seeking work in trades
- Provide avenues for women to meet other tradeswomen (including apprentices) and share experiences
- Promote women in trades to the general public and industry
- Advocate for change to attitudes to women working in the trades
- Campaign for changes which enable women to train and work in trades
- Promote diversity and acceptance for all people in trades.

### Background

SALT was founded by painter and decorator Fiona Shewring and is run by a group of volunteer tradeswomen. According to Fiona, about 1.7 per cent of those working in skills-shortage areas of the automotive and engineering trades are women. She said these figures could be lifted significantly if do-it-yourself dads encouraged their primary-school-age daughters to tinker in the shed, the same way they often encourage their sons.

### Programs

As well as providing membership, meetings and support, SALT undertakes a number of programs, including the 2014 launch of Skill Women – a key initiative that aims to expose young women to the tools used in various trades, including carpentry and painting and decorating. Together with Women NSW, SALT has developed the Try-A-Trade Trailer, a mobile workshop that visits schools and learning facilities to engage with young women interested in learning more about careers in trades.

## Case Study 5: Industry Women Central

Issue: Industry engagement - promoting access to information.

**Industry Women Central (IWC)** is a website - [www.constructmycareer.com.au/industry-women-central](http://www.constructmycareer.com.au/industry-women-central) - designed to encourage girls and women to enter the construction and property industries. IWC is an information hub that aims to break down barriers to women entering the construction and property services industries workforce. IWC also provides resources and support for teachers and careers' practitioners.

IWC provides access to education scholarships, mentor programs, speaking opportunities, award programs, career advancement, board and committee opportunities, participation in programs and much more.

IWC has a range of partners that provide services to women in various trades and continues to develop worldwide partnerships and networks that benefit women and non-traditional industries.

### Context

Industry Women Central (IWC) was established as a careers' resource hub for girls and women. Specifically, it aims to encourage girls and women to enter the construction and property industries and provides access to resources and support for teachers and career practitioners.

### Aims

Although IWC focuses on women in the construction and property services industries, it aims to expand its reach into industries such as mining, agriculture, manufacturing and forestry.

This resource hub provides access to education scholarships, mentor programs, speaking opportunities, award programs, career advancement, board and committee opportunities, and more. It aims to develop individual benefits for women, including assisting women to develop the resilience and communication skills they need to thrive in non-traditional environments. IWC aims to assist with the visibility and promotion of women who are inspiring, emerging or elite leaders in non-traditional occupations and industries.

IWC has a series of partners that provide services to women in industry-specific trades and will continue to develop global partnerships and networks for the benefit of women and non-traditional industries.

### Background

Industry Women Central was launched in 2014. Its purpose is to break down barriers for women in the construction and property services industries.

The website can be accessed from the Construction and Property Services Industry Skills Council's careers website Construct My Career: [www.constructmycareer.com.au/industry-women-central](http://www.constructmycareer.com.au/industry-women-central) or directly via [www.industrywomencentral.com.au](http://www.industrywomencentral.com.au)

IWC was initiated by Buildmore ([www.womenintobuilding.com.au](http://www.womenintobuilding.com.au)) in August 2009, to elevate awareness and acceptance of women carving out successful careers in the building and construction industries, and to provide mentors for young women.

The lack of interest generated through the Women into Building website was of concern to Buildmore. With community and industry identifying Buildmore as advocates for women in non-traditional industries, as evidenced by the broad range of enquiries the organisation received on a daily and growing rate, it was clear there was an urgent need for women across the nation, no matter how remote, to have access to information, resources and organisations committed to gender diversity. This led to the foundation of IWC.

### **Programs**

Industry Women Central is connected to Construct My Career, a website that provides fact sheets about jobs, pathway charts and stories about men and women in relevant industries. It provides young people with a personalised 'Construct my Career' website. Fact sheets feature women and girls in the industry and a set of posters and videos are also available. The websites contain specific resources for careers' advisers and teachers and provide information for young women about developing career pathways in the range of education and training options available.

## Case Study 6: Digital Divas

Issues: School-based curriculum integration and taster opportunities

**Digital Divas** was a collaborative Victorian secondary schools program launched in 2008, giving teenage girls access to ICT (Information and Communications Technology) in an all-female class. The program involved three universities: Swinburne University of Technology, Monash and Deakin.

Digital Divas was based on research that indicated ICT stereotyping intensified as students progressed from Years 8 to 12. Via this program, female ICT university students acted as mentors, or 'Expert Divas', helping teachers conduct classes for girls in Years 8 to 10. Swinburne also invited young women from industry to engage with students as role models.

The project is no longer active, but its resources are still available online.

### Context

The Digital Divas program and website - [www.digitaldivasclub.org/vic/](http://www.digitaldivasclub.org/vic/) - was developed by a group of academics and funded through an Australian Research Council Linkage Scheme. The Digital Divas website is no longer updated, but the resources and reports remain accessible.

### Aims

Women comprise less than 20 per cent of the Australian ICT (Information and Communications Technology) workforce. Research shows a steady decline in interest in ICT as a career choice among teenage girls in Years 8 to 12 due to negative stereotyping.

Digital Divas was a school-based program developed to build girls' ICT skills and confidence, increase girls' motivation to continue studying ICT and enter the ICT workforce. Digital Divas aimed to increase the percentage of women studying ICT degrees to 30 per cent of enrolments.

### Background

Girls' lack of interest in ICT is evident by senior secondary school. Short-term initiatives have failed to change girls' attitudes.

The Digital Divas project was funded from 2009-2011 through the Australian Research Council Linkage Scheme and was undertaken by Professor Julie Fisher, Faculty of Information Technology Monash University, Associate Professor Catherine Lang, Faculty of ICT Swinburne University, Associate Professor Helen Forgasz, Faculty of Education, Monash University and Associate Professor Annemieke Craig, Faculty of Business and Law, Deakin University.

Research indicated that the effect of ICT stereotyping intensified as students progressed from Years 8 to 12. "There's an attrition of interest. By the time students reached Year 12, not one student mentioned ICT unless prompted and it did not even enter the radar as a possible career path," said Dr Lang.

Dr Lang said the research also highlighted the fact that chance often played a decisive role in girls opting for careers in ICT. "It might have been a teacher or a school visit, but most of the girls studying ICT at university made their decision at the last minute," she said.

Digital Divas attempted to counter ICT's image problem by changing girls' impressions of ICT at both tertiary and professional levels. "In the 21st century, ICT is not just sitting there programming, drinking Coke and eating pizza while being locked to a computer screen," Dr Lang said. "But that stereotype is alive and well in secondary schools."

The project is now complete and resulting research has shown that the program was able to change girls' perceptions of IT as a career for women. The girls who participated in the program reported increased confidence in using IT and they found the materials exciting and engaging.

## **Programs**

Digital Divas was a collaborative Victorian secondary schools program launched in 2008, giving teenage girls' access to ICT in an all-female class. The program involved three universities, Swinburne University of Technology, Monash and Deakin universities.

Under the program, female ICT university students acted as mentors, or 'Expert Divas', helping teachers conduct classes for girls in Years 8 to 10. Swinburne also invited young women from industry to engage with students as role models.

Swinburne student and Expert Diva Katherine Woods said her choice of ICT at tertiary level was mainly influenced by the encouragement she received from a female teacher in Year 12. "I think it's important to start early – I wouldn't have considered ICT as a career if I didn't study it at secondary school," she said.

In contrast to her experience studying ICT at school as one of five girls in a class of 25, Katherine Woods said the program's all-female atmosphere and content made a difference.

The Digital Divas website provides course materials for students and teachers. The modules include creating a digital diva identity and logo, creating a movie, designing and creating an online system, creating a magazine cover, researching careers, 3D software programming, web technologies and vBug. The resources seek to educate girls about countering female stereotypes in magazines, providing videos of girls in IT careers and referring to other websites, such as the Queensland-based program 'Techgirls are chic! Not just geek!'

## Case Study 7: Robogals

Issues: Industry engagement - mentoring and role models.

**Robogals** is a student-run organisation that aims to engage girls in engineering, with the long-term goal of increasing female enrolment in engineering, science and technology courses at universities.

The primary activity of Robogals is facilitating student volunteers from universities to visit girls in primary and secondary schools to run LEGO robotics workshops and mentor teams in LEGO robotics competitions. An important goal of the program is to have a positive impact both on the girls and the university students.

### Context

Robogals is a student-run organisation. Its website is [www.robogals.org](http://www.robogals.org).

### Aims

Robogals aims to engage schoolgirls to take an interest in engineering from an early age, with the long-term goal of increasing female enrolment in engineering, science and technology courses at universities. An important goal of the program is to impact positively on the girls and the university students involved.

### Background

Undergraduate engineering student Marita Cheng from the University of Melbourne founded Robogals. As of 2012, it has chapters at the University of Melbourne, University of Queensland, Australian National University, Tokyo Institute of Technology, Columbia University, University of Arizona and the Imperial College London.

### Programs

Robogals' co-ordinates a program whereby university students visit girls in primary and secondary schools to run LEGO robotics workshops and mentor teams in LEGO robotics competitions. The university students are provided with the necessary training to teach LEGO robotics.

They also run robotics competitions, a mass robot dance, a t-shirt design competition, and assist girls in the Robocup Junior competition. Future plans include incorporating rural and regional schools into the program. Robogals workshops are being held at UNSW for school students in Years 4 and above, to learn more about science and engineering during school holidays.

A teacher at a school involved said: "It was wonderful to see students so enthused about learning to use ICT in a fun and practical program. The girls grew in confidence and many of them have shown increased interest in using our Lego 'dacta' kits and in using ICT in general."

Another said: "The girls loved building the robots and using the computers to program them. The day opened up discussions about engineering as a career."

## Case Study 8: Australian Science and Mathematics School

Issues: School integrated curriculum and work exploration

**The Australian Science and Mathematics School (ASMS)** is a co-educational public senior high school for students in Years 10–12. It is located on the campus of Flinders University in Adelaide, South Australia.

ASMS is a senior secondary school established to promote excellence and innovation in the teaching of STEM subjects, including new and emergent subjects such as nanotechnology, aquaculture, biotechnology, photonics, genomics, polymer science, robotics and communication technologies.

Through its curriculum ASMS offers interdisciplinary studies and inquiry-based activities alongside, and integrated with, a mathematics and abstract thinking program. In this way the school is ideally situated as a case study for improving the uptake of study in STEM, especially for girls.

### Context

The Australian Science and Mathematics School (ASMS) is a co-educational public senior high school for students in Years 10–12, established in 2003. It is located in South Australia, on the campus of Adelaide's Flinders University. ASMS was established to promote excellence and innovation in teaching STEM subjects, including new and emergent subjects such as nanotechnology, aquaculture, biotechnology, photonics, genomics, polymer science, robotics and communication technologies, all of which are incorporated into the school curriculum.

In 2013, ASMS enrolments numbered 366, with international students comprising approximately 30 per cent. ASMS offers inquiry and problem-based, self-directed and collaborative learning experiences that are often based in 'deep learning' personal projects. ASMS integrates curriculum areas and applies science and maths topics to 'real world' situations. ASMS also offers a range of professional development programs for educators. It also follows a 'graduate capabilities' approach, whereby students demonstrate their ability to operate scientifically, operate mathematically, communicate effectively, work autonomously and collaboratively, demonstrate personal and social enterprise and demonstrate critical literacy.

ASMS is a statewide focal point for teaching and learning, professional development and research aimed at fostering improvement, innovation and reform in science and mathematics education. ASMS is intended as a resource for every school in the state - students and teachers from across South Australia are encouraged to engage in individual and group visits to ASMS outreach, exchange and vacation programs.

Teachers from around the state are able to work alongside ASMS staff in the ongoing development of the curriculum and teaching and assessment strategies.

## **The ASMS:**

- Responds to current and future interests and needs of its students
- Provides a cutting-edge learning environment in science, mathematics and technology
- Is an agency for change in science and mathematics education
- Prepares young people to be creative, critical, informed and motivated about professional, personal and social issues<sup>10</sup>
- Increases participation and success of senior secondary students in science, mathematics and related technologies
- Transforms students' attitudes to science and mathematics as career paths.

Enrichment and extension studies are provided through university studies, supplementary studies in South Australian Certification of Education (SACE) and workplace studies, including VET packages.

ASMS is ideally situated as a case study for improving the uptake of study in STEM, especially for girls.

## **Girls in STEM**

Currently, young women comprise approximately 40 per cent of the ASMS school student population. This year (2014), for the first time, ASMS appointed a Girls in STEM coordinator. Karen Palumbo is an award-winning teacher previously engaged in the Eastern Adelaide Region Career Exploration Project.<sup>11</sup>

In an interview for this report, Ms Palumbo advised that despite students at ASMS applying for entry to the school based on their ability and passion for STEM, girls' enrolments in some related subjects was low. For example, just 23 per cent of students enrolled in Physics are girls and 14 per cent of Specialist Maths students are girls. These numbers are reinforced by very low enrolments of girls in Computer Programming. Girls are favouring health and life sciences, a preference that mirrors enrolments in STEM higher education and occupations in the labour force.

Moreover, Ms Palumbo's interview confirms the notion of 'leaky pipe'<sup>12</sup> phenomena, whereby girls retreat from high-level STEM subjects (and careers) at every transition point:

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<sup>10</sup> ASMS School Context Statement 2013

<https://www.asms.sa.edu.au/school-information/context-statement/> &/or <http://www.asms.sa.edu.au/wp-content/uploads/2013/07/School-Context-Statement-2013.pdf>

<sup>11</sup> Robogals is an international, student-run organisation that aims to increase female participation in Engineering, Science and Technology through fun and educational initiatives aimed at girls in primary and secondary school. <http://www.robogals.org>

See Case study: Graduate Qualities As An 8 – 12 Career Strategy (Eastern Adelaide Region)

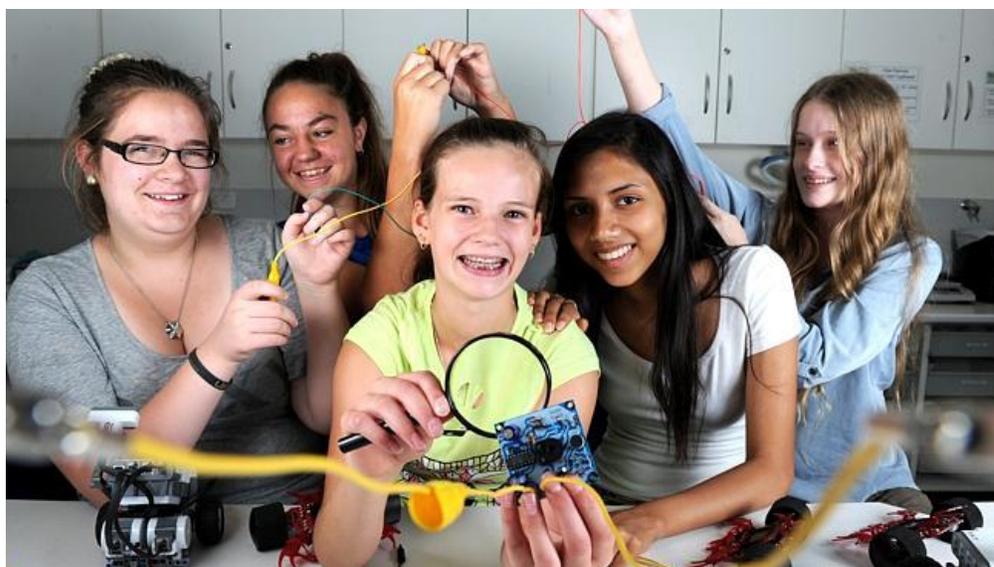
<sup>12</sup> See: <http://mobile.news.com.au/finance/work/women-in-stem-industries-time-to-fix-the-pipeline/story-fnkqbb3b-1226873381168>

Nobel prize winner Carol Greider explained that the issue is not just a deficit of women entering the STEM pipeline. Rather, she says, the key challenge is that the pipe is leaky. Once women have entered STEM, at every subsequent stage of their career they run a gauntlet of subtle, practical, psychological and social holes in the way of their promotions, appointments to boards and other indicators of seniority.<sup>13</sup>

Data collected in South Australia 2008–2011 confirms the above, with the study reporting that:

- Many females studying Prime STEM in secondary school do not aspire to study Prime STEM at university
- Females have a better enrolment to graduate ratio than males in Prime STEM degrees
- In Prime STEM, the proportion of females employed is lower than the proportion of female graduates<sup>14</sup>.

Ms Palumbo contends that single sex classes provide an environment that builds confidence and encourages girls to take an active role in lessons. She has instigated a 'girls only' class for eleven Year 10-11 girls in robotics. This has been questioned by some of the male students, which Ms Palumbo welcomes. She says such queries are invitations to conversations about gender stereotyping and the need for change in exclusive workplace cultures.



**CAPTION:** ASMS Girls in STEM students, from left, Isabelle Williams, Bethany Thompson, Chloe Dancer, Krystal Rosario and Brianna Smith. From *The Advertiser*, 5 March 2014.

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<sup>13</sup> McCay L 'Women in STEM Industries: It's time to redesign the pipeline' *Huffington Post* April 3 2014  
[http://www.huffingtonpost.com/dr-layla-mccay/women-in-stem-its-time-to\\_b\\_5076711.html](http://www.huffingtonpost.com/dr-layla-mccay/women-in-stem-its-time-to_b_5076711.html)

<sup>14</sup> DFEEST March 2013 *Female participation in STEM study and work in South Australia 2012* Quality, Tertiary Education, Science and Research Directorate Department of Further Education, Employment, Science and Technology Level 4, 11 Waymouth Street Adelaide South Australia 5000  
[www.dfeest.sa.gov.au](http://www.dfeest.sa.gov.au)

## Case Study 9: MAAP My Future – Women in Auto Trades

Issues: Industry partnerships, career exploration and girls in non-traditional trades

**Women in Auto Trades (WIAT)** is a component of MAAP My Future which is a careers' initiative of Auto Skills Australia funded by the Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education. This is a multi-agency partnership involving government, the automotive industry and groups and organisations that support women to take up and complete automotive trades' apprenticeships.

Women in Auto Trades attempts to address a chronic skills shortage in auto trades by seeking to empower women through employment in the industry. WIAT aims to encourage diversity in and enrichment of automotive workplace culture to the benefit of the industry as a whole.

### Context

Auto Skills Australia (ASA) is the body responsible for the development and maintenance of nationally-accredited automotive training qualifications in Australia. ASA is directly funded by the Department of Industry and has a key focus on developing skills capacity in the automotive industry. ASA works with industry bodies, unions and enterprises to ensure that workforce development plans equip automotive businesses with the skills needed today and for the future.

ASA has a role to play in advising government on emerging skills and labour supply issues facing the industry. The ASA:

- Actively supports the development and continuous improvement of high-quality training materials, including national qualifications, industry competency standards and training packages
- Engages in workforce development activities and services for industry
- Provides accurate industry intelligence to the vocational education and training sector on current and future skills needs and training requirements.<sup>15</sup>

The automotive industry employs motor mechanics, auto electricians, spray painters, vehicle builders and body repairers. However, it also needs a range of other occupations, including car and parts sales people, outdoor power equipment, marine, bicycles, production managers, business and office administrators, warehousing and logistics staff, human resource and training managers, designers and engineers.

The automotive industry offers employment in high-tech, innovative and rapidly changing environments. Education and training options to enter the auto industry include enrolment in a vocational preparation course (Certificate 1), an auto school-based apprenticeship or traineeship, an apprenticeship in the auto industry or a higher level (advanced skill) technical qualification<sup>16</sup>.

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<sup>15</sup> <http://www.autoskillsaustralia.com.au/about/>

<sup>16</sup> See <http://www.autoskillsaustralia.com.au/careers/#gear1>

## **ASA, MAAP My Future and women**

While Auto Skills Australia also provides web-based career profiling tools for people interested in working in the industry, its centre piece for career exploration, advice and support strategies is a user-friendly multi-level, information-rich website relevant to all states and territories, which can be accessed through its home page.<sup>17</sup> This home page provides the link to MAAP My Future<sup>18</sup>.

MAAP My Future provides mentoring support to apprentices in the early stages of their training and links to auto industry advisors and mentors that can be accessed either by telephone or the MAAP website - [www.maapmyfuture.com.au](http://www.maapmyfuture.com.au).

The program is an example of activity relevant to the agreement reached at the COAG Select Council on Women's Issues, May 2013:

- COAG ministers agreed to share good practice and explore further areas for national action to improve the economic security of women through increased participation in non-traditional occupations
- Ministers agreed to request that the COAG Standing Council on Tertiary Education, Skills and Employment (SCOTESE) include 'Increasing Women's Participation in the Trades' as a strategic discussion item on the next SCOTESE meeting agenda in order to link women in non-traditional trades' projects with existing employment and education initiatives<sup>19</sup>

Auto Skills Australia seeks to attract more women to the automotive industry. This objective is multi-focused, with an emphasis on communicating this objective, challenging stereotypes and attitudes about 'women's work' found not only in the industry but the wider community. MAAP My Future and Women in Auto Trades aim to engage girls and women, the industry and the wider community in this objective, while building understanding about potential pathways for women and partnerships to promote this agenda. ASA has designed female-centric web-based resources, with a 'push' incorporated into their career-profiling tool. Through this, gender sensitive data is collected and collated.

The national 'push' is intended to change the workplace environment and associated non-female-friendly cultures in workplaces and wider society, to encourage sustained change in the participation of women and to increase the critical mass of girls and women so as to normalise their participation in trades.

These efforts need support at all levels and benefit from the work of role models, ambassadors and networking women in trades, science and technology study and/or careers via social media such as Fanelle<sup>20</sup>, an NGO formally known as Female Apprentices and Tradeswomen Network. Fanelle's network is growing steadily, with encouraging uptake amongst young women.

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<sup>17</sup> <http://www.autoskillsaustralia.com.au>

<sup>18</sup> See: <http://www.autoskillsaustralia.com.au/maap-my-future/>

<sup>19</sup> COAG select Council on Women's Issues Communiqué– 3 May 2013 Canberra <http://www.dss.gov.au/our-responsibilities/women/publications-articles/government-international/coag-select-council-on-women-s-issues-communicu-s/coag-select-council-on-women-s-issues-communicu-3-May-2013>

<sup>20</sup> See: Attachment 1 & also see Fanelle on Facebook: <https://www.facebook.com/SupportFanelle?fref=ts>



The Women in Auto Trades website is supported by funding from the Office of Women NSW and includes links for girls and women to locate careers' advisers and mentors in their state, an apprentice adviser hotline and resources for school careers' counsellors, teachers and students.

## Resources

The following relevant links to female apprentices involved in the Women in Auto Trades project were provided by Auto Skills Australia:

- ASA Sarah Swarbrick & Louise Azzopardi (Heavy Vehicle Apprentice)  
<http://youtu.be/sFnZMq8bAWQ>
- ASA Erin Fairman (Motor Cycle Technician Apprentice)  
[http://youtu.be/N\\_ucTQgG1lo](http://youtu.be/N_ucTQgG1lo)
- ASA Elly Ravia (Light Vehicle Apprentice and Tyre Wheel Alignment Specialist)  
<http://youtu.be/yMgXMGvDx84>
- ASA Elizabeth Woods (Light Vehicle Apprentice Mechanic)  
<http://youtu.be/8aeif2I14Fk>
- ASA Carolina Diaz (Forklift Technician)  
<http://youtu.be/-cUOge4OG3g>
- ASA Renae Costello (Automotive Electrical Apprentice)  
<http://youtu.be/oEc7YI9w7rQ>

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<sup>21</sup> <http://maapmyfuture.com.au>

## Points to Note

- Special initiatives that encourage girls and young women to enter auto trades have been integrated into a co-ordinated national industry strategy that links careers, schools, students and their families with the wider community
- The collection of gender-disaggregated data is critical to the success of this project.
- Programs such as this require ongoing resourcing for sustainability. This can be achieved through partnerships between government/s and industry.
- Well-designed information-rich accessible web-based initiatives that link schools, workplaces and real people with the project have the potential to offer high-value career exploration.
- Girls benefit from ambassadors, role models and contact with women working in the industry.
- Critical mass remains a central requirement for cultural change in male-dominated workplaces. The opportunity to connect to other women through social media sites delivers support, encouragement and identification with a greater number of women in various workplaces at different stages of their careers.



## Case Study 10: Girls into trades seminar

Issue: Girls into non-traditional trades

**Girls into Trades Seminar** was a small pilot project involving high school teachers and female secondary students in Years 10, 11 and 12 from five schools in Brisbane.

The project was organised by the Association of Women Educators (AWE) and speakers were typically women who worked in or who owned businesses in non-traditional industries.

An evaluation of the project identified the need for more information and practical opportunities for girls and young women to engage with non-traditional career pathways.

### Background

Girls into Trades Seminar was a small pilot project involving high school teachers and female secondary students in years 10, 11 and 12 from five schools in the Brisbane metropolitan region.

The project centred on a seminar held in 2010 by the Association of Women Educators (AWE) and included presentations and discussion about non-traditional careers for women.

Queensland members of the National Association of Women in Construction Association (NAWIC) provided high-profile leadership for the seminar and the speakers were typically women who worked in or who owned businesses in non-traditional industries.

An evaluation of the students found:

- That the seminar gave students “a positive feeling about careers in the trades” and provided useful information that directly influenced decisions about career paths and subject choices.
- Almost half of the students commented that until this seminar they had had little or no idea about what they would do when they left school and in various ways described the seminar as having a positive impact on their thinking about future directions.
- The majority of participants were 12 students. They reflected that it would have been useful to attend such a seminar whilst in Year 9 or 10.
- They said they were motivated to seek further information about post-school training and access to apprenticeships. Finding such information was reported to be a challenge for many students and almost half stated that it would be useful to be provided with support for internet searches, perhaps through the provision of a website portal.
- More than half of the students expressed interest in eventually owning their own business with many reflecting on the positive examples provided by the seminar presenters. This response points to the importance of providing more information and examples of business owners in various trades, as well as relevant subjects and training options.

- Some of the possible deterrents and challenges for young women entering trades were identified as the need to study difficult mathematics courses, the potential for negative attitudes by male co-workers and employers and lack of physical strength. This feedback points to the need for continued reinforcement of female capabilities and the provision of positive examples.
- All of the participants reported that they were interested in trades because they perceived them to be “hands-on”, practical and creative. Most of the students attending the seminar praised the carpentry presentation as being the most engaging and informative. They expressed the desire for more of this kind of presentation, with concrete examples and demonstrations, opportunities for using tools, photographs, videos and real life stories.
- The students also appreciated that these women ran their own business and felt inspired to do likewise, perhaps even proactively employing other women.

Overall, the Girls into Trades Seminar was a useful experience for participants and prompted new thinking about future directions.

<http://www.security4women.org.au/wp-content/uploads/Girls-into-Trades-11-December1.pdf>

## Case Study 11: Doorways2Construction

Issues: Industry partnerships, careers programs and girls in non-traditional trades

**Doorways2Construction (D2C)** is South Australia's premier Vocational Education and Training in Schools (ViS) program for the building and construction industry. D2C participants get hands-on experience on construction sites via work experience and community projects.

D2C was developed in direct response to the increasing need to encourage young people to consider the building and construction as a career, improve entry level training opportunities and promote a positive image of the building and construction industry.

The program is designed to meet South Australian Standards, however schools in Queensland and NSW have purchased some of D2C curriculum units. WA is in the process of designing and implementing a high quality 4-year VET in Schools (ViS) program that will include a para-professional focus in construction that is likely to be attractive to young women.

### Young women and D2C

Girls are encouraged to get involved in the construction industry with annual try-a-trade programs held at various locations. The two-day 'taster' gives girls the opportunity to 'taste' a range of building trades.

Taster opportunities and feeder courses are important to build girls' confidence and courage. 'Champions' are also important, especially role models and guest speakers from the industry to encourage girls to 'think outside the box'.

### Context

The construction industry comprises three sectors, each with specialised building and construction requirements: housing, commercial and civil.

The industry offers a broad range of career paths, including architectural draftsman, brick layer, building estimator, building site manager, building surveyor, carpenter, ceiling fixer, concreter, construction project manager, construction worker, dogger, floor finisher, gyprocker, joiner, landscape architect, painter and decorator, plant operator, plasterer, fibrous plasterer, solid plumber, rigger, roof plumber, roof tiler, scaffolder, steel fixer, stonemason, wall and floor tiler.

In South Australia, the Construction Industry Training Board (CITB) collaborates with schools, RTOs, teachers and trainers, SACE Boards and officials from the three school systems<sup>22</sup> and their VET and/or Senior School Coordinators to offer training pathways for students in Years 10–12 interested in entering the construction industry through the D2C program.

D2C provides students with potential access to post-school training positions such as apprenticeships, traineeships or Skills for All<sup>23</sup> training places. Industry members collaborate via a range of activities, including school visits to industry, speaking and engagement in school-based career-related activities, and offers of work placements (including participation in community projects). This partnership model helps sustain quality outcomes for all involved.

<sup>22</sup> South Australian Department of Education & Child Development (DECD), Catholic Education in South Australia (CESA), South Australian Independent Schools (non Government/private)

<sup>23</sup> See: <http://www.skills.sa.gov.au>

## Description

Doorways2Construction (D2C) is South Australia's premier Vocational Education and Training in Schools (ViS) program for the building and construction industry. It was initiated in direct response to the increasing need to encourage young people to consider building and construction as a career, improve entry level training opportunities and promote career pathways and positive images of the building and construction industry.

Differing requirements in each state and territory make national adoption of programs for secondary school students problematic. Even though D2C is designed to meet South Australian standards, schools in Queensland and NSW have purchased some of the D2C curriculum units. WA is in the process of designing and implementing a high quality 4-year ViS program that will include a para-professional focus on construction that is likely to be attractive to young women, providing pathways to careers such as project manager, estimator and surveyor.

## Aims

- Create more awareness of building and construction among young people
- Provide students with accurate information about career opportunities and the tools necessary to successfully seek work in the industry
- Develop basic skills that students can take into the industry.

## Components

- Training: Cert I - Construction in Year 11 and 240 hours Certificate III in Year 12
- Experience: 4 weeks minimum (20 days) work placement
- Career advice, site visits, career talks
- White card - general Occupational, Health, Safety and Welfare requirements in the building and construction industry.



*D2C Curriculum Pathway*

## Young women and D2C

D2C participants get hands-on experience in construction sites through work experience and community projects. Girls are encouraged to get involved in the construction industry with annual try-a-trade programs held at various locations. The two-day 'taster' program gives girls the opportunity to try a range of building trades and get an industry perspective with on-site tours.

### 2012 Girls in Construction Try-a-Trade day



*CITB has an equity focus and is proactive about attracting more girls and young women to D2C, particularly via a Facebook page called CITB Girls in Construction.*

D2C recognises that while young men will 'have a go', young women need to feel that they can succeed before they enter a course of study and/or career path that challenges gender stereotypes. Taster opportunities and feeder courses are important for young women to build confidence and courage.

'Champions' are important, particularly female role models and guest speakers from the industry to encourage girls to 'think outside the box' and careers' advisers who encourage and support young women to make non-traditional study and career choices.

Despite improvement, the number of girls enrolled in D2C remain comparatively low.

Year	Cert 1	Plus
2010	3.2per cent	0per cent
2011	2.7per cent	7.3per cent
2012	2.1per cent	0per cent
2013	2per cent	2.5per cent
2014	4.2per cent	1.2per cent

*Percentages of females enrolled in Cert 1 and Plus programs for 5 year period (CITB)*

It is up to specific schools to decide whether they run separate or integrated programs for girls. It is important to note that to promote the construction industry to young women change is required at school level, through special initiatives. Some innovative programs are in place in South Australia. Valley View High operates a Tradie Lady Shed for Year 9 and 10 girls that includes an integrated program of 'tasters' in electrical, electronics, plumbing and carpentry. Students can then transition to D2C from Year 10.

Salisbury High School is collaborating in a D2C program with Kurna Plains School<sup>24</sup>, where eight of the twelve participating indigenous students are young women. The group also has a female mentor working with them as they renovate and refurbish a Housing Trust home. One student travels from rural South Australia to Salisbury for one day each week for this program. While partnerships and work placements are not easy to find, they provide real world experience and a sense of pride in the work achieved. It is anticipated that a leading SA construction company will partner with the program in the restoration of an old church that is now a community facility at the Point Pearce Mission<sup>25</sup> on Yorke Peninsula.

<sup>24</sup> See: <http://www.kaurnaas.sa.edu.au>

<sup>25</sup> See: <http://www.samemory.sa.gov.au/site/page.cfm?u=1237>; &/or <http://guides.slsa.sa.gov.au/content.php?pid=342949&sid=2808354>

## Points to note

- While CITB's key focus is to ensure that present and future workers in the industry are competent and capable of getting the job done, there is interest and investment in attracting more women to the industry
- A partnership model (in this case between the Industry Training Board and the Department of Education & Child Development (DECD) is a prime way for delivering a trade-oriented program - sharing expertise and resources whilst also monitoring the program to ensure its quality and sustainability
- Clustering of schools on a regional basis with collaborative curriculum timetabling offers access to courses such as D2C to a wider range of students, regardless of which education sector they are enrolled in
- Girls and young women whose study and career choices challenge gender stereotypes require information and support, including role models and mentors. Taster courses are important
- While one size does not fit all, champions are highly significant for girls entering male-dominated trade areas
- Change is required at school level to increase the numbers of girls who choose study pathways that transition to apprenticeships and traineeships in non-traditional areas<sup>26</sup>.

## CITB doorways2construction students 2014<sup>27</sup>



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<sup>26</sup> The number of female apprentices who came through the SA doorways2construction program will be available shortly.

<sup>27</sup> Permission for photos to be used received from CITB 16<sup>th</sup> April 2014

## Case Study 12: Graduate Qualities Strategy

Issue: Career exploration

**The Graduate Qualities Strategy (GQS)** is part of the Careers Strategy Implementation Project run by the SA Department of Education and Child Development (DECD).

GQS links with DECD's VET in Schools (ViS) program. ViS includes schools offering Industry Pathway programs and schools working with employers, industry and training providers. It aims to provide 'a more systematic approach' to career management, ensuring school leavers' transition from secondary education with 'graduate qualities'.

GQS was developed in consultation with principals and leaders of Eastern Adelaide schools to complement their plans for a career strategy across Years 8-12.

### Context

The DECD Careers Strategy Implementation Project, of which the Graduate Qualities Strategy is a component, links with DECD's VET in Schools (ViS) program. This program includes schools offering Industry Pathway programs, whereby each school delivers a Vocational Pathway Plan. As well, schools work in clusters and partnerships with employers, industry and training providers to deliver careers' pathways for students. The strategy aims to provide 'a more systematic approach' to developing career management skills, thus ensuring that students leave secondary education with 'graduate qualities'. The original concept was informed by good practice examples and evaluation of related programs<sup>28</sup>. The strategy is collaborative and incorporates 'a suite of learning tasks within the Australian Curriculum which have been developed using the Australian Capabilities, the SACE Capabilities and the Employability Skills Framework'.<sup>29</sup>

### The Eastern Adelaide Region approach

DECD information states: "In contemporary society young people face diversity of choice when making decisions about life, learning and work. As educators we have a role to co create a learning environment, with young people, where they can flourish as individuals and develop capabilities including those relevant to the world of work, further study and career.

During a student's school life there should be a dynamic approach so that young people transition from school with 'graduate' qualities that enable them to participate as active and valued citizens. This approach supports each young person's transition through school and beyond using pedagogy that provides challenge and opportunity and authenticity for students to explore, innovate, experiment and practice.<sup>30</sup>

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<sup>28</sup> Trade School for the Future, Industry Skills Program

<sup>29</sup> *Teaching And Learning Services – Vocational Pathways Portfolio Careers Strategy Implementation Project School Funding 2013 – Information Teaching & Learning Services DECD Government of South Australia*

<sup>30</sup> *Graduate Qualities – As An 8-8 12 Career Strategy Implementation Project Eastern Adelaide Region 2013 – Information DECD SA*



The Graduate Qualities Strategy Project for Eastern Adelaide Region is a complex embedded pedagogical career exploration project between schools, industry and community. It is a partnership model that includes secondary schools (teachers and students), a senior college, community-based centres that cater for disadvantaged youth from diverse backgrounds, community members and parents, academics and experts, families, industry and employer mentoring strategies. The approach connects existing DECD strategies and activities with new approaches, activities and pedagogies to enhance career exploration and student capacities.

GQS was developed in consultation with principals and leaders of Eastern Adelaide schools to complement their plans for a career strategy across Years 8-12 that fits within the Australia Curriculum Capabilities framework. This approach is innovative - dynamic, holistic, learner-centred and future focused, while meeting Service Agreement requirements. It builds on existing good practice to strengthen the delivery of the Australian Curriculum and the SACE, so that all learning is responsive to the graduate qualities required from learners facing uncertain futures in the 21<sup>st</sup> Century. It seeks to support young people from diverse backgrounds to:

- provide students with opportunities to build their career management capabilities so they can confidently craft their careers over time, being flexible, resilient and responsive to change and unpredictable events<sup>31</sup>.

GQS provides opportunities for young people to develop graduate qualities that connect the plethora of career material, mainstream curriculum and their lives beyond school.

<sup>31</sup> Op cit

**Points to note**

- GQS is a model of collaborative partnership that provides an outstanding example of a flexible future-oriented and embedded approach for career exploration in schools.
- GQS caters well for activities and experiences that highlight STEM and vocational/trade learning pathways.
- This approach does not appear to have been implemented with any distinct focus on girls, nor evaluated from a gender perspective. This could be a focal point for future research and assessment.

## Case Study 13: The Advanced Technology Project

Issues: Career exploration pathways; STEM

**The Advanced Technology Project** aims to increase the numbers of students in STEM (science, technology, engineering and maths), with a view to careers in defence and allied industries in South Australia.

The project, which is funded by the Defence Materiel Organisation and the SA Department of Education and Child Development, also provides professional development programs for teachers.

### Context

The Advanced Technology Project is a National Partnerships Agreement initiative, funded for four years by the federal Defence Materiel Organisation (DMO) and managed by the SA Department for Education and Child Development (DECD SA).

### Description

The Advanced Technology Project combines high-level maths and science studies in secondary school with cutting-edge technical Vocational Education and Training (VET). This combination provides an opportunity for simultaneously achieving a nationally-recognised vocational accreditation and the South Australian Certificate of Education (SACE).

The Advanced Technology Project aims to:

- Increase the number of young people who undertake career pathways in engineering, electro technology, technical design and manufacturing via apprenticeships and Vocational Education and Training (VET) and University studies
- Increase the number of students studying science, technology, engineering and mathematics (STEM)
- Prepare students for careers in South Australia's diverse and growing defence and allied industries.

By raising the number of students studying STEM, the ATP seeks to increase the pool of young people ready to move from school into higher or further education, apprenticeships, scholarships and Industry. SA's defence-related industry is a significant (but not sole) focus for this program.

The project provides significant professional development programs in STEM for teachers, including tours of IT-related industries that identify potential industry placements for students. Industry professionals visit schools to talk with students and teachers and programs such as 'Engineers in the classroom' increase awareness about the range of careers available. As well, apprenticeship brokers and industry skills managers work with clusters of schools.

There are nineteen schools involved in the ATP program, which is based in the northern, southern and western metropolitan regions of Adelaide and includes schools from the Independent, Catholic and public sectors. Collaborating industries include Australian Submarine Corporation (ASC).

Activities in 2013 included the 2013 Science Expo, where ATP students from the Southern Advanced Technology Schools hosted the event for 200 primary school students. The secondary school students were given a brief to 'design, manufacture or experiment with a variety of devices to show the science behind a range of practical (interactive and educational) topics' that included activities such as bridge building, wind turbines and robotics.

### **Points to note**

- The Advanced Technology Project is an excellent example of collaboration between industry, schools and other educational agencies to enhance understanding and improve uptake of STEM subjects in schools
- The role of the Industry Pathways Broker is central to the success of this project (as it is to others). In this case, the broker not only promotes the program through schools, teachers, STEM-affiliated organisations and specialists and industry, she also educates and, importantly, links schools and their students and teachers to the world of work
- This is especially significant when considering the inclusion of increasing numbers of girls in such projects. In this case, the broker is educating and encouraging industries (mostly male-dominated with low/minimal uptake of female technical/professional staff) and schools to focus on girls through various initiatives, including girls' only classes in technology subjects at some high schools
- Without special funding and resources the ongoing sustainability of such important projects is questionable
- STEM programs such as this require specific activities and resources to encourage enhanced female participation, and so redress significant gender imbalance.

## Case Study 14: STEM Scale Up Program

Issues: STEM and career exploration

**STEM Scale Up Program** is an Iowa USA project that aims to 'turbo-boost' numbers of students studying STEM in Iowa.

Scale Up Program sources the best STEM-related educational programs available around the US and makes the best of them available locally. The programs have an annual opportunity to tender for inclusion in the Iowa pool of available resources - schools then apply for funding to implement the program of their choice.

Scale Up Program is a useful case study for sustainable partnership models for careers' development in STEM-related fields.

### Context

STEM Scale Up Program is an Iowa USA-based state-wide program now in its third year. It was implemented to 'turbo boost' the number of students enrolled in STEM subjects by sourcing the best STEM education programs available locally and nationally and making them available to Iowa schools. The program is supported by extensive ongoing funding<sup>32</sup> and utilises a high-level partnership model established by the Governor of Iowa.

This initiative presents a case study for ongoing, generously-funded collaborative partnership models that focus on enhancing the quality and uptake of STEM education in Iowa.

### Description

The Governor's STEM Advisory Council identifies target areas that support the goals listed in the Governor's Executive Order 74. These priorities address the most pressing challenges facing STEM education in Iowa, and include (in order): student interest and achievement, technology enhanced instruction for global learning, STEM teacher recruitment and preparation, STEM learner readiness for post-secondary education and career, STEM education policy, public awareness of the importance of STEM education for the economy and society, public/private partnerships, mapping STEM education to economic development and, STEM for all – students with high potential who are under-represented and from non traditional demographics<sup>33</sup>.

Each year the Governor's STEM Council calls for proposals that are reviewed by an expert panel of independent reviewers. Successful programs are listed on the website. Groups and schools then select and apply for funding to implement the program of their choice<sup>34</sup>.

Governor's STEM Council executive director Jeff Weld says: "So far indicators are very strong that this investment inspires more interest among the youth of Iowa in STEM fields."<sup>35</sup>

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<sup>32</sup> \$3 million in 2014/15

<sup>33</sup> For detail of priority areas, see: [http://www.iowastem.gov/targeted\\_priorities](http://www.iowastem.gov/targeted_priorities)

<sup>34</sup> 2014/15 Programs can be viewed at: <http://www.iowastem.gov/2014-2015-stem-scale-programs>

<sup>35</sup> 'STEM Scale-Up programs now available for this year' Interview: Jeff Weld, Executive Director, Governor's STEM Council Radio Iowa <http://www.radioiowa.com/?s=STEM+Scale+up>

A regional STEM Network is organised around hubs located at various education sites throughout the state. The Scale Up website acts as a communication and linking tool for career exploration for students, parents, communities, educators and corporate partners, with links to

websites related to careers, STEM jobs, recommended colleges and universities for further study and further STEM-related information. This in turn is supported by 'active learning community partners' – industry and work places, public facilities, museums and NGOs. The project involves major corporate sponsors who work in partnership with the Governor's STEM Advisory Council.<sup>36</sup>

## Girls and STEM

While there is a focus on girls and STEM as part of the STEM Scale Up Program,<sup>37</sup> issues similar to those faced in Australia are evident.

Academic Development Expertise in Student Support Services education director, Dr Kimberly Lees, says:

*"Bridging the gap for girls through curriculum and instruction is currently being offered in Iowa through the STEM Scale-Up Programs (via) enriched ... learning and community engagement so girls have the opportunity to apply their knowledge in the real world to see if there's a "fit". Also, teachers need to be taught early to recognize that social norms no longer exist for girls and boys when teaching subjects, that girls must be called upon as much as boys, and that students, especially girls, that excel in these fields should be mentored and groomed for further STEM growth and development.*

*Today, research continues to show a paucity of women in the STEM career field, followed by a lack of women role models for those who may want to aspire towards that end. In fact, women hold only 7.5 per cent of all patents in the United States. There is much to be done in closing the gender gap for women in fostering STEM women graduates.*  
*(<http://www.nerdwallet.com/blog/nerdscholar/2013/women-in-stem/>)*

*I have recently done various research projects on the new STEM initiatives due to just having moved to Iowa whereby the state and local governments, universities, colleges, school districts and private industries are pursuing this important universal preparation for future scholars in order to shorten the gap that exists for women in the field.*

*However, this federal, state, and local initiative will require a major mind shift, a restructuring in how we think about the role gender plays in dominating the STEM fields and the role models that mirror those careers. We need to gracefully offer a change in the culture and climate of these organizations so that young women can visualize themselves in these professions and feel comfortable and confident in pursuing these careers afforded them. Moreover, in academia, the concept of changing of the guard is a challenging one, since men have ruled over the STEM fields for centuries and male faculty are slow to surrender their historical rights of honour.*

*I have delineated below a list of web addresses for your perusal regarding STEM initiatives. I have also offered my former dissertation article URL address regarding the importance of mentoring for women, and how gender has a greater impact than race or ethnicity for career potential.... especially in leadership positions... We are slowly recognizing this gap and moving towards that end, but at a snail's pace unfortunately. Yet, we must celebrate women's major accomplishments and continue to make strides for other women to follow."*

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<sup>36</sup> See: <http://www.iowastem.gov/corporate-partners>

<sup>37</sup> See: <http://www.iowastem.gov/search/node/girls%20in%20STEM>

1. **USDA: United States Dept. of Agriculture Agricultural Research Service (ARS) - Outreach Activities –**  
<http://www.ars.usda.gov/services/docs.htm?docid=1275>
  
2. **USDA United States Dept. of Agriculture -**  
[http://www.usda.gov/wps/portal/usda/usdahome?navtype=SU&navid=EDUCATION\\_OUTREACH](http://www.usda.gov/wps/portal/usda/usdahome?navtype=SU&navid=EDUCATION_OUTREACH)
  
3. **Obama launches new STEM Initiatives – November 24, 2013**  
<http://www.eschoolnews.com/2009/11/24/obama-launches-new-stem-initiatives/>
  
4. **Iowa State University to Serve as Hub for Statewide STEM Efforts – 5/20/2012**  
<http://www.extension.iastate.edu/article/iowa-state-university-serve-hub-statewide-stem-efforts>
  
5. **Mentoring Women and Minorities into Positions of Educational Leadership [microform]: Gender Differences and Implications for Mentoring / Ann M. Schneider (1991)**  
<http://catalogue.nla.gov.au/Record/5543475>

#### **Points to note**

- This large-scale initiative offers a valuable illustration of the global desire to improve the uptake and quality of STEM, in education and career choices. Scale Up addresses industry and innovation in one location
- The state-wide, funded and ongoing nature of this partnership model adds value to career exploration information and innovative STEM activities. However, it is not possible to assess how (or if) it impacts on embedding STEM and career exploration activities into the curriculum from this brief description
- Despite mainstreaming STEM, this case study and comment highlight the challenges for addressing the impact of negative gender stereotyping on the participation of girls and women in STEM and non-traditional occupations and careers.

## **Other programs and strategies of interest**

### **1. Go Girl, Go for IT**

#### **Context**

The need to increase the numbers of girls taking up IT at university.

#### **Aims**

Go Girl aims to debunk the myth that a career in IT is boring and is only chosen by nerds with no personality, and to address the declining number of females studying IT at a tertiary level.

#### **Background**

The Go Girl Network provides personal and professional networking, knowledge and skills development, career and business development, access to and connections with other women in ICT, education forums and events, mentoring and scholarship programs and regular member communication.

#### **Programs**

Go Girl is a free career showcase run by the Victorian ICT for Women network for secondary school girls in Years 8-11 to experience the incredible range of vocational avenues that are available in IT. It is being held at Deakin University and will give girls the opportunity to talk to talented, young and well-established role models with ICT careers.

### **2. Princess Machine**

[www.goldieblox.com](http://www.goldieblox.com)

#### **Aim:**

To encourage girls in STEM with Rube Goldberg Contraption Music Video

#### **Background**

Start-up toy company GoldieBlox “believes there are a million girls out there who are engineers. They just might not know it yet.”

#### **Program**

GoldieBlox makes engineering construction kits for girls 4-9. They include books that put the engineering projects in the context of a story – the girls are building gizmos to help characters they care about.

## Appendix 4 – The Survey Instrument

### WOMEN AND GIRLS INTO NON-TRADITIONAL OCCUPATIONS AND

Women in Adult and Vocational Education Inc (WAVE) has been contracted by economicSecurity4 Women (eS4W) to undertake research into career exploration in schools, to investigate school-based 'career exploration' initiatives that encourage young women into non-traditional occupations, and that engage them in science, technology, engineering and mathematics (STEM) subjects. The outcomes of this research will inform a report to the Federal Government through eS4W, one of the six federally funded National Women's Alliances.

The research seeks to review and outline contemporary initiatives in approaches to career exploration for young women at school, and to recommend models that enhance effective outcomes.

The need for this research is driven by government concerns that labour force participation rates can be assisted by expanding the range of employment opportunities for women, and in this case, especially young women. To do this, we need to know more about current approaches to career exploration, especially those that aim to overcome gendered stereotypes in occupations and industry, and to identify best practice models in whole or part.

We welcome your participation in this important research through the survey, and ask that you pass it on to others who may be interested.

If you wish to provide further information on effective models and approaches to career exploration, please contact one of WAVE researchers, Linda Simon on [lindasimon2@bigpond.com](mailto:lindasimon2@bigpond.com).

# WOMEN AND GIRLS INTO NON-TRADITIONAL OCCUPATIONS AND

## Background Information

### 1. Name (Optional):

If you are happy to participate in a follow-up interview, please provide your name and a preferred contact email.

### 2. Organisation/Employer (Optional):

### 3. Email address (Optional):

### 4. Organisation Type

- Non-profit organisation
- Peak Industry Body
- School
- Government Department or Authority
- TAFE or Private RTO

Other (please specify)

### \*5. State/Territory:

- Australian Capital Territory
- New South Wales
- Northern Territory
- Queensland
- South Australia
- Tasmania
- Victoria
- Western Australia

### 6. What is your role/interest in relation to career exploration activities in schools?

# WOMEN AND GIRLS INTO NON-TRADITIONAL OCCUPATIONS AND

## Career Exploration

Career exploration for young people in Australian schools is provided in diverse ways. The following questions seek to deepen our understanding of what is working and what needs improvement.

**7. What, in your opinion, are the key strengths of current approaches to career exploration in schools that you are aware of?**

**8. What, in your opinion, is needed to strengthen current approaches to careers exploration in schools generally?**

## WOMEN AND GIRLS INTO NON-TRADITIONAL OCCUPATIONS AND

### Young Women and Science, Technology, Engineering and Maths (STEM)

This study focuses on the role of career exploration for young women, with a particular interest in young women and their participation in Science, Technology, Engineering and Maths (STEM) and non-traditional pathways. The following questions seek to broaden our understanding of current barriers to young women in STEM and non-traditional pathways and to identify approaches/programs/models that are effectively supporting young women in STEM and non-traditional pathways.

**9. What are the particular weaknesses in career exploration in relation to young women, including those that may result in gendered outcomes?**

**10. What are the particular weaknesses in relation to young womens' exposure to Science, Technology, Engineering and Maths (STEM) pathways, including those leading to jobs in non-traditional occupations and industries?**

**11. What are the enablers of successful/effective models of career exploration for young women?**

# WOMEN AND GIRLS INTO NON-TRADITIONAL OCCUPATIONS AND

## The Role of Stakeholders

It is clear that no single stakeholder alone can effectively address the challenges of providing meaningful career exploration for young people in schools. The following questions seek information about the role of different stakeholders and how to strengthen their role.

**12. What needs to happen at a policy level (e.g. systemic) to further strengthen school based models of career exploration for young women?**

**13. Partnership between schools and industry/employers are often seen as a useful way of promoting exploration of and exposure to industry areas. What are the enablers of effective partnership between schools and industry?**

**14. Partnership/collaboration between schools and RTOs (both public and private) are also seen as important. In what ways might a role for RTOs in school-based career exploration be strengthened?**

**15. In what ways are/can community and non-profit organisations play a role in career exploration programs and services for young women in schools?**

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