Engaging young people in information and communications technology training in TAFE NSW

Bronwyn Campbell | Marvis Leung | TAFE NSW ITELG Industry Liaison Unit
About the research

Engaging young people in information and communications technology training in TAFE NSW.

Digital disruption is having a global impact on the future of how people live, consume and work. The Information and Communications Technology (ICT) industry is growing and evolving rapidly and demand for ICT workers in Australia is forecast to increase by approximately 70,000 workers by the year 2020. Conversely, participation in ICT programs in NSW high schools and in TAFE NSW indicates a declining trend. This research seeks to understand why young people are not engaging in greater numbers with ICT vocational education and training delivered by TAFE NSW, in light of the forecast growth in the ICT industry.

Literature identifies key influences on the study and career aspirations of young people and their engagement with post-school education and training. The research investigates what influences young people to consider a career in ICT, existing approaches to providing ICT career advice and information, what attracts young people into the ICT field, and why they might choose ICT training delivered by TAFE NSW.

The research highlights the need to raise awareness of digital disruption and the impact of emerging technologies on the future workforce across every industry. Raising the awareness of the impact of technology on all occupations needs to be included as part of all students career exploration. The renewed national focus on STEM education in schools and preparation for future STEM career is an encouraging current development. Young people need to be aware of the wealth of opportunities provided by a career in ICT, as well as the pervasiveness of technology across every industry. The research highlights significant gaps in career advice and guidance which adequately address the ICT field, emphasising the importance of strategies to improve the quality and provision of ICT career advice to all young people, to enable them to make fully informed vocational choices, which include considering a career in ICT.

Key messages

- ICT specific career advice needs to be developed, improved, and highlight the diverse occupations and opportunities provided by a career in ICT, including the pervasiveness of technology across every industry. This information needs to be provided to all young people at school, not just those undertaking ICT programs, and needs to be gender inclusive to engage girls and young women, as their participation across ICT training and employment is low and diminishing.

- Generation Zed, 15-24 year olds, traditionally TAFE NSW largest cohort engage with the world through technology, in a totally different way to any previous generation. Successful marketing and training strategies need to effectively target this generation.

- Parents and peers are significant aspirational influencers of young people, and are prominent in guiding their study and career decisions. Understanding important aspirational influencers need to inform the design of promotional strategies to successfully promote ICT careers and TAFE NSW study pathways, to young people including their parents.

- Partnerships between TAFE NSW and key stakeholders are critical to providing accurate, current, timely ICT career information which coincides with significant transition points in young peoples’ career development, to ensure that they are fully informed of all career options, including careers in ICT, when making future study and career decisions.

- Fostering the development of innovation and entrepreneurial skills is fundamental to supporting young people in their ICT studies and successful progression into the ICT field. Promoting and offering coding earlier at school, and highlighting STEM education and STEM careers appears the way forward. Cultivating entrepreneurial skills and innovation at TAFE NSW would increase students’ exposure to, and engagement with, opportunities in the ICT field.
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Persons, groups and locations have not been named to maintain the anonymity of participants. The research would not have been possible without the support of Director of Education, Information Technology and Creative Industries and OTEN, TAFE NSW – Western Sydney Institute.
## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive summary</td>
<td>1</td>
</tr>
<tr>
<td>Introduction</td>
<td>5</td>
</tr>
<tr>
<td>Research methodology</td>
<td>7</td>
</tr>
<tr>
<td>Literature review</td>
<td>9</td>
</tr>
<tr>
<td>Engaging young people in ICT in TAFE NSW</td>
<td></td>
</tr>
<tr>
<td>Framing the discussion</td>
<td>15</td>
</tr>
<tr>
<td>Target audience and influencers</td>
<td>22</td>
</tr>
<tr>
<td>Career advice – generalist and ICT</td>
<td>30</td>
</tr>
<tr>
<td>STEM, innovation and ICT at school</td>
<td>37</td>
</tr>
<tr>
<td>Promoting ICT</td>
<td>41</td>
</tr>
<tr>
<td>The importance of partnerships</td>
<td>45</td>
</tr>
<tr>
<td>Raising the profile of TAFE NSW</td>
<td>47</td>
</tr>
<tr>
<td>Systemic issues</td>
<td>52</td>
</tr>
<tr>
<td>Conclusion – the challenge for TAFE NSW</td>
<td>53</td>
</tr>
<tr>
<td>Making a difference – implementation</td>
<td>58</td>
</tr>
<tr>
<td>Resources</td>
<td>64</td>
</tr>
<tr>
<td>References</td>
<td>69</td>
</tr>
<tr>
<td>Appendices</td>
<td>72</td>
</tr>
</tbody>
</table>
### Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>NSW high school student HSC enrolments in ICT related subjects</td>
<td>17</td>
</tr>
<tr>
<td>Figure 2</td>
<td>TAFE NSW ICT student enrolments 2007-2015</td>
<td>18</td>
</tr>
<tr>
<td>Figure 3</td>
<td>NSW high school girl's participation in IDT – VETiS at school</td>
<td>19</td>
</tr>
<tr>
<td>Figure 4</td>
<td>NSW high school girl’s participation in IDT – TVET in TAFE NSW</td>
<td>20</td>
</tr>
<tr>
<td>Figure 5</td>
<td>TAFE NSW ICT women’s participation as a percentage of all ICT enrolments 2004-2014</td>
<td>21</td>
</tr>
<tr>
<td>Figure 6</td>
<td>TAFE NSW ICT student survey – influences to pursue a career in ICT</td>
<td>27</td>
</tr>
<tr>
<td>Figure 7</td>
<td>NSW high school student survey – ICT career information sources</td>
<td>28</td>
</tr>
<tr>
<td>Figure 8</td>
<td>NSW high school student survey – sources of general career information</td>
<td>32</td>
</tr>
<tr>
<td>Figure 9</td>
<td>NSW high school student survey – sources of ICT career information</td>
<td>33</td>
</tr>
<tr>
<td>Figure 10</td>
<td>TAFE NSW ICT student survey – ICT career information sources</td>
<td>34</td>
</tr>
<tr>
<td>Figure 11</td>
<td>NSW high school student survey – students offered coding at school</td>
<td>39</td>
</tr>
</tbody>
</table>
Executive summary

Understanding the key influences on young people’s career aspirations, including how they are provided with career development services and career advice, is critical to supporting young people to make fully informed study and career choices as they prepare to navigate the increasingly complex path from senior high school to study and work. Previous studies have identified key influences on the career aspirations of young people and their engagement with post-school education and training generally. This research investigates ways to attract and support young people explicitly into the Information and Communications Technology (ICT) field through TAFE NSW delivered ICT vocational education and training.

The TAFE NSW ITELG Industry Liaison Unit undertook this research to investigate why TAFE NSW ICT enrolments are not mirroring the predicted rapid growth in the ICT industry. Digital disruption is driving significant change in the ICT industry, and has major implications for the role of technology across all industries. However, the rapid forecast growth in the ICT industry in Australia is not reflected by student participation in ICT VET programs in NSW high schools, or ICT courses in TAFE NSW. The research seeks to determine whether young people are making fully informed choices in relation to ICT study and careers, and if not how to better advocate for this.

The research reviews existing contemporary literature on factors which impact on young people’s study and work aspirations and the importance of career development guidance, information and advice. TAFE NSW student enrolment data was examined, and participation by NSW high school student in Information and Digital Technology VET courses was reviewed, and the data indicates declining or stalled enrolments.

Qualitative information was gathered in a range of forums from various groups and individuals, including through TAFE NSW ICT student focus groups, structured, open-ended individual interviews with a number of TAFE ICT head teachers, staff and TVET coordinators, and structured, open-ended individual interviews with a small number of NSW high school staff. Additionally information was gathered via online surveys to TAFE NSW ICT students, and NSW high school students from the general school population; not specifically ICT school students. Relevant comments from focus group and interview participants, which had been prompted by the research questions, were illuminating and are provided throughout the report.

The research identifies student career aspirational influences, and young peoples’ understanding of ICT. It explores whether school students have adequate exposure to ICT at school, for example whether computer coding was offered at school, and whether students have an awareness of the breadth and magnitude of opportunities provided by a career in ICT. It queries how career guidance, both general and ICT specific, is provided to young people, the major sources of ICT career advice, and how well ICT careers, including relevant ICT training pathways in TAFE NSW, are being promoted. The research identified some common misconceptions about ICT, how better ICT information could be provided and highlighted current strategies which successfully promote ICT careers.

Young people, influences and understanding ICT

Generation Zed, the 15-24 year old student group, account for over 40 per cent of TAFE enrolments, comprising TAFE’s largest student cohort. Generation Zed is global, social, visual and technological and they engage with the world in a totally different way from previous generations. This impacts on where they source information and their learning engagement style.

The study reveals that young people’s understanding of ICT is quite general. The broad range of ICT roles and the opportunities offered by a career in ICT are not well understood, and nor is the pervasiveness of technology or the impact of digital disruption across all industries. It appears that young people are not generally aware that an interest in one industry, particularly if it is not explicitly ICT, does not preclude them from an ICT career within their preferred field, for example a website developer or network administrator could work in any industry.

Many factors influenced young people to study ICT at TAFE NSW. These include an innate interest in ICT, with parental, sibling and family as strong influences, and friends (peers) also influential. Many students interviewed were influenced by family or family friends working in the ICT field. Significantly, the TAFE NSW ICT students in the focus groups were not greatly influenced by factors from school. They reported significant gaps in the ICT career information, advice or guidance which they had received at school, prior to contacting TAFE.
Girls and young women

It became evident that girls and young women are under-represented in ICT studies at both NSW high schools and TAFE NSW. The number of girls enrolled in VETiS Information and Digital Technology (IDT) courses delivered at school, IDT TVET school courses delivered at TAFE and TAFE NSW ICT courses all revealed decreasing female engagement. Women’s participation in ICT training in TAFE NSW, which peaked at 34 per cent in 2008 had eased to 25 per cent by 2014. Women are under-represented in the ICT workforce, at 28 per cent, where women represent 44 per cent of the workforce across professional industries more broadly.

General career advice or ICT advice

The research highlights the crucial role that career development plays for a young person navigating the complex pathway from secondary education to post-compulsory study and employment. Current literature emphasises the speed at which the labour market and occupations are changing, which is particularly pertinent for the ICT industry, and underscores the need for high quality, relevant ICT career guidance.

The research identified that high school participants receive general career advice, but that the ICT career advice they receive, or source themselves, is often less than comprehensive. Some high school students only receive general career advice up until Year 10. It appeared that high school students are provided with specific ICT career information more commonly from their ICT school teachers, and are routinely expected to source career information from the web. However, this career advice is no substitute for first hand industry knowledge presented by ICT professionals or TAFE NSW ICT staff with current industry experience.

High school students, not studying ICT subjects at high school, may not be made aware of the impact of emerging technologies which are impacting across all industries, or the diverse range of opportunities offered by careers emerging in the ICT industry. TAFE NSW ICT student focus group participants, who had received career information about ICT at high school, commented that it did not include the broad range of ICT occupations, occupational features, or career opportunities provided by new or emerging technologies.

The research identified key transition points when NSW high school students make important decisions which impact on their study pathways, and significantly when they would value receiving career advice. These transition points include Years 7-8, choosing high school elective subjects, Years 9-10, selecting HSC subjects, Year 12 finalising career study decisions, and when receiving their Australian Tertiary Admission Rank (ATAR).

Promoting STEM and ICT

The Australia government’s recent focus which aims to encourage school students to study science, technology, engineering or mathematics (STEM) subjects, Restoring the focus on STEM in Schools, highlights the need to increase school students’ participation in STEM education, with pathways to STEM careers. This includes ICT and technology, and raising high school students’ awareness of emerging technologies and the increasing pervasiveness of technology across all industries.

A number of TAFE NSW ICT and NSW high school educational staff, interviewed recommend increasing children and young people’s exposure to ICT, including offering computer coding, technology challenges and ICT activities, and introducing ICT to school students much earlier than at high school. The research identified a number of significant transition points where young people in the TAFE NSW ICT student focus groups had indicated that they would have highly valued receiving ICT career advice, and potential ICT ‘Taster’ programs at high school.

The research highlights a number of current or suggested strategies to provide effective ICT career information to successfully attract young people into ICT careers through TAFE NSW delivered training. These included current strategies such as experiential ICT events, careers expos, ICT ‘Taster’ days at TAFE NSW, TAFE ICT staff, or TAFE ICT graduates career information talks at school, and technology Meetups. The report suggests developing comprehensive ICT career advice, in formats which appeal to Generation Zed, the target audience, and strategically coordinating the provision of this advice to NSW high school students including potentially via existing school career advisers’ networks.
Innovation and entrepreneurial thinking

A concept raised in interviews with TAFE NSW ICT staff was the need to foster innovation and cultivate entrepreneurial thinking, computational skills and problem solving for students to successfully transition to an ICT career. Ideas to foster innovation and entrepreneurial skills include suggestions such as incubation hubs, technology start-ups, developing apps, technology challenges, ICT boot camps, technology meetups and similar innovative activities. Coding challenges at school, and learning coding at high school, or at any stage has seen the development and support of innovation and entrepreneurial skills. Innovation, entrepreneurial thinking and being able to imagine the possibilities available through technology were viewed as critical attributes for success in the ICT field.

Improving the status of TAFE NSW

NSW high school staff interviewed identified that parents often hold university qualifications in high esteem and want their children, post-school, to attend university. University is often viewed as the pathway for academically inclined high school students. The TAFE NSW ICT focus group students acknowledged that the school community and young people frequently hold university qualifications in higher regard compared with TAFE NSW qualifications.

TAFE NSW ICT student focus group participants highlighted a number of benefits they perceived in studying at TAFE NSW rather than at university. They highlighted the hands-on experience offered by TAFE study, as opposed to a high level of theoretical learning at university, potentially at the expense of developing practical problem solving skills. Student collaboration at TAFE NSW which develops teamwork and project management skills was valued by TAFE NSW ICT students. They commented on the supportive learning environment provided at TAFE, emphasising the positive dual impact of TAFE’s lower student to teacher ratio, enabling easy access to teacher assistance, and the student collaboration which was nurtured within TAFE NSW ICT classes, where students were eager to assist one another to understand new concepts, handle difficulties or solve problems.

The expectation by many recruitment agencies and ICT employers that candidates would hold a degree level qualification was highlighted, creating a Catch 22 situation for many graduates, ‘to apply for a job, you need to have a few years of experience. But in order to gain experience, you need to get a job first.’ This stresses the value of work experience, and the need for TAFE NSW ICT graduates to have the opportunity to demonstrate their ICT skills and abilities. Work placement, industry experience or internship, whether paid or unpaid, was considered critical to underpin TAFE NSW graduates transition to employment in the ICT field. This concept was supported by literature and echoed by the TAFE NSW ICT focus group student participants.

Important partnerships

The study highlighted the importance of partnerships between TAFE NSW and a range of stakeholders, including local high schools, local employers and the ICT industry, to provide quality ICT career advice and ICT TAFE training outcomes to young people.

TAFE NSW partnerships with NSW high schools was identified as critical to attracting young people into ICT training at TAFE NSW. Across TAFE NSW connections with high schools varied and the depth of the connection between TAFE and local high schools was identified as pivotal to attracting young people from school into ICT training delivered by TAFE NSW.

TAFE NSW ICT staff interview participants highlighted the importance of TAFE NSW connections with the ICT industry, commenting that stronger partnerships, especially with large, high profile ICT companies would provide additional benefits, including raising the image of TAFE NSW and attracting young people into TAFE NSW ICT training.
Formulating strategies to attract young people into ICT

The research identifies issues and gaps in attracting young people into the ICT field. It identifies effective current strategies and proposed approaches to provide ICT career information to school students and prospective TAFE NSW students. Findings from the research provide direction to replicate current successful approaches and to formulate potential strategies to successfully attract and prepare young people for ICT careers through TAFE NSW ICT delivered training. The objective of the research is to inform improved learner engagement, increase participation in ICT training provided by TAFE NSW, and contribute to enhanced ICT employment and increased workforce productivity.
Introduction

Australia's economy is being enormously impacted by digital disruption, arguably one of the most significant mega-trends of the 21st Century. Digital technologies are radically changing the way we live, consume and work. A major implication of digital disruption is the forecast impact on the workforce. The Information and Communications Technology (ICT) industry is growing rapidly and demand for ICT workers in Australia is forecast to increase by approximately 70,000 workers by the year 2020.

Despite this forecast it appears that young people are not fully engaging in vocational training in the ICT field either in NSW high schools or in TAFE NSW. Student participation in vocational education and training ICT related programs at school, and enrolment in ICT qualifications delivered by TAFE NSW was examined, however anticipated increases in engagement in ICT, in response to the forecast growing demand for ICT workers, was not evident. Conversely enrolment numbers in vocational ICT training in NSW high schools and in vocational ICT qualifications delivered by TAFE NSW showed decline. This conundrum prompted the establishment and direction of the research about engaging young people in ICT training in TAFE NSW.

The research question

The TAFE NSW Industry Liaison Unit ITELG conducted this research to understand why TAFE NSW ICT enrolments were not mirroring the predictions of significant growth in the ICT industry. The research focuses particularly at student aspirations, young peoples’ understanding of information and communications technology, how career guidance is provided to young people, both generalist and ICT industry specific career advice. It explores whether ICT training and careers are promoted at school, and how TAFE NSW can better support this, to ensure that young people are fully informed of their career options including the opportunities provided by ICT. The research identifies current successful approaches, and outlines proposed future strategies to attract young people into ICT training delivered by TAFE NSW.

Charting the path through the research

A review of literature was conducted which included international perspectives. Studies on educational and occupational aspirations, aspirational influencers, the youth generation, career guidance, vocational education and training (VET) in schools, work placement, youth transitions, digital technology, Australian industry forecasts including the ICT workforce, and women in ICT were examined. TAFE NSW student ICT enrolment data was sourced and analysed, as was available NSW high school ICT data, including enrolments in Information and Digital Technology (IDT), the vocational stream of ICT delivered in high schools.

The research examines key influencers of young people’s vocational aspirations, particularly what or who inspires young people to consider training and careers in the ICT field. The study considers the importance of career advice, including how and where it is sourced. It seeks to identify how young people in NSW high schools are provided with career information and how they receive or source ICT industry specific career advice.

The research highlights significant transition points in a young person’s career decision journey and explores the aspects of timing, location, what or how young people might be provided with current comprehensive ICT career advice which supports informed career choices. Advice about educational pathways and training options, and the importance of providing this to both young people and their parents is considered. Elements were identified which contribute to the most valuable and effective ICT career advice, including awareness raising of science, technology, engineering or mathematics (STEM) education and careers, to engage young people and ensure that they include ICT when considering their future study and career options. The research seeks to identify major points of intervention in a young person’s career development and identify current effective strategies and potential approaches, to support young people to make fully informed vocational career decisions which include considering ICT study and a career in the ICT industry.

To undertake this research qualitative information was gathered in a range of forums from various groups and individuals, including TAFE NSW ICT student focus groups, individual structured interviews with a number of TAFE NSW ICT head teachers, staff and TAFE delivered VET school curriculum (TVET) coordinators, and interviews with a small number of NSW high school staff. Additional information was gathered via an online survey to TAFE NSW ICT students, and a separate online survey to NSW high school students from the general school population; not specifically ICT students. The focus groups and interview participants, as well as being asked structured
questions, had the opportunity to comment on further thoughts or reflections which the research questions had prompted. These were illuminating and remarks and observations prompted by the research are provided throughout the report.

Limitations of the research include student focus groups, and staff interviews where a representation from across TAFE NSW and NSW high schools, but are not the complete pool of either staff or students. Additionally the school student survey produced a low response as the researcher had limited and secondary access to NSW high schools. However, the responses collected provide valuable observations, reflections and insights.

While not a central topic of the research the role of gender was considered and the representation of girls and young women in ICT was examined in both NSW high schools and in TAFE NSW. It became evident that girls and young women are significantly under-represented, and that their participation shows declining trends in ICT training in both NSW high schools and TAFE NSW. Additionally literature on the ICT industry’s concern about women’s low representation in the ICT field was reviewed.

The research report is structures around themes identified from the range of primary qualitative research data sourced from the student focus groups, educational staff interviews and student surveys, and includes quantitative data where relevant and available. Information is collated and synthesised into categories which emerged and these provide an organising framework for the body of the report. Relevant data has been presented in graphs, for ease of interpretation and greater detail about gathering the primary data is available in the research design. Supporting background information is provided in the literature review.

Value of the research

The research identifies a range of findings which inform improved approaches to design, develop, provide and promote specific ICT career information and advice to support young people to consider their career options more fully. It highlights a significant body of knowledge about the 15-24 year age group, and how to effectively engage this generation of young people. It emphasises the need to promote the expansion of ICT occupations within the ICT industry, which offer a broad range of opportunities in this field and significantly, the proliferation of ICT across all industry areas.

The research identifies successful strategies which are currently providing effective ICT career information to attract young people into ICT training and careers through TAFE NSW delivered training. However, these are being employed in an ad hoc way and could be customised and replicated consistently and more systematically across TAFE NSW. It outlines further suggested approaches for greater engagement of young people in ICT training delivered by TAFE NSW.

Increasing engagement with young people, TAFE NSW’ largest cohort of students, with high quality ICT vocational education and training, to prepare them for the ICT jobs of tomorrow, makes understanding and addressing the issues raised in this research critical. Findings from the research inform proposed implementation strategies to improved learner engagement in the ICT field, with the objective of increasing participation in ICT training provided by TAFE NSW, and contributing to enhanced ICT employment and productivity.
Research methodology

The aim of this qualitative research was to provide a way to explore and understand the importance of providing adequate information about the Information and Communications Technology (ICT) careers, occupations and the ICT field to support young people to make fully informed study and career choices.

The methodology draws on the work of Krueger and Casey (2015) and is designed to capture qualitative data particularly through the medium of focus group interviews. Focus groups have a distinctive cluster of characteristics, collecting qualitative data from homogeneous groups of people through focused discussion. Focus groups can be helpful to assess needs, develop plans, find out how consumers make decisions, improve existing programs or evaluate outcomes, and can help interpret or develop recommendations for later action or study. In this study focus groups were selected as they offered a unique vehicle to understand what students were actually thinking and their lived experiences. Student focus groups teased out the attitudes and experiences of young people prior to and after attending TAFE NSW, including their feelings and opinions on education, Information and Communications Technology (ICT), study at TAFE NSW and their aspirational goals. It filled in gaps explaining certain outlooks and expectations in a way that other methods of enquiry would not have been able to accomplish.

The methodology also drew on the work of Seidman (2006) who identifies interviewing as a fundamental mode of qualitative inquiry, where the researcher can investigate process and practice through the experience of others who make up an organisation. The individual experiences of teachers, educational managers and other staff associated with providing career information or ICT training to young people provided understandings and insights not accessible through other forms of investigation. Interviews, while time consuming, were viewed as a superior avenue of inquiry, providing a powerful way to gain insight into the educational issues being faced, and an understanding of the experiences of individual educators whose working lives reflect these issues.

A three pronged approach to gathering qualitative information included student focus group interviews, individual staff interviews and student online surveys. Participants included students and educational staff from TAFE NSW and NSW high schools. The research methodology sought to explore the viewpoints, expectations and experiences of a representation of young people and educational staff to provide a richer understanding and insight, from a range of perspectives, about the issues being encountered.

Phase one – Literature review and quantitative data

Phase one of the research included a review of both Australian and overseas literature on the influencers of young people’s education and career aspirations. General aspirational research was available; however, studies specifically in relation to young people’s aspirations to study or work in the Information and Communications Technology (ICT) industry were uncommon. General career guidance literature was viewed and evaluated, as nothing specific to ICT was found. Australian forecasting reports and media articles relating to anticipated growth of the ICT industry, and information on ICT training and education, particularly relating to science, technology, engineering or mathematics (STEM) were reviewed.

TAFE NSW enrolment data for young people aged 15-24 years was interrogated. Young peoples’ overall representation in TAFE NSW and their participation in ICT courses was examined and trends identified. Available school data of vocational Information and Digital Technology enrolments was sourced and analysed. Participation by girls and young women in ICT training in high school and in TAFE NSW was identified.

Phase two – student and staff interviews and surveys

Phase two involved a range of activities to gather qualitative primary information from selected participants from a number of different groups. These included TAFE NSW ICT students, NSW high school students, TAFE NSW ICT staff, head teachers, teachers, and TVET coordinators and NSW school staff.

TAFE NSW ICT student focus groups were undertaken with five (5) TAFE NSW student groups from various TAFE NSW locations. The student focus group varied in size from between five and fifteen students. The groups were located in the greater western suburbs of Sydney, one in the regional Hunter region and one in a small satellite community on the metropolitan fringe. Students were asked a series of open-ended discussion questions to explore their experiences and opinions. The questions focused on how and when they received career advice at school, whether the career advice was specific to ICT, what influenced them to study ICT, and why they chose to study at TAFE NSW (see Appendix A).
TAFE NSW student online survey targeting TAFE NSW ICT students aged 15-24 years was developed and conducted across TAFE NSW. The survey sought to identify the sources and quality of career information about ICT, received by young people prior to studying at TAFE NSW. The survey explored participants’ future study or work plans and their specific area of interest in the ICT field. Students were asked a series of multiple choice and short answer questions to collect their experiences, viewpoints and aspirations. Over one hundred TAFE ICT students responded to the survey, however forty one (41) respondents, were in the target age range of 15-24 years, and these responses were used in the research (see Appendix B).

High school student online survey was developed which targeted NSW high school student general population, not specifically ICT students. Randomly selected groups of NSW high school students in Years 9, 10 and 11 were invited to participate, from a cross-section of NSW public high schools. The survey sought to identify students’ exposure to ICT training and career advice, both generalist and ICT specific, while at school. It explored their attitude to TAFE NSW as a potential post-school study option. Students were asked a series of multiple choice and short answer questions to collect their experiences and viewpoints. A relatively small number responded, thirty five (35), as the researchers had limited, and indirect access to school students (see Appendix C).

TAFE NSW staff were interviewed via standardised open-ended individual interviews in person or by telephone. Thirteen (13) TAFE NSW staff including ICT head teachers, ICT teachers, and TVET coordinators across TAFE NSW were interviewed. The interview questions focused on TAFE NSW staff’s perceptions of:

- young people’s understanding of ICT
- identifying issues to promoting ICT, and how promotion could be improved
- identifying current successful or proposed strategies to inform improved provision of ICT career advice to prospective TAFE NSW students. (see Appendix D)

High school staff interviews telephone interviews were undertaken with five (5) NSW high school staff including personnel from Senior Pathways, NSW Department of Education, and high school-based staff. School staff semi-structured open-ended interview questions focused on:

- timing and type of career information provided to young people in high school
- identifying whether ICT is an integral part of career information
- exploring how well VET was valued and promoted at school
- identifying the level of school connection with the local TAFE colleges. (see Appendix E)

Phase three – Analysis and findings

The literature review, data and primary research information gathered from TAFE NSW student focus groups, TAFE NSW students online survey, high school students’ online survey, TAFE ICT staff interviews and school staff interviews were collated, documented and analysed. Emerging themes from the analysis guided the format of the body of the research.

Recurring themes emerged, and these guided the development of the framework for the research report. The information, analysis and findings was synthesised and documented in the body to the research report and research outcomes and findings are documented in the conclusion.

The research findings informed the development of proposed short, medium and long-term implementation strategies to provide more effective ICT career advice to young people.
A review of existing literature, data and forecasting reports was undertaken prior to conducting the research on engaging young people in information and communications technology (ICT) training at TAFE NSW. Topics reviewed include Australian workforce and ICT industry forecasting, girls and women’s engagement in ICT training and work. It includes young peoples’ aspirational influencers, career guidance, youth transitions and vocational education and training (VET) in schools. Literature reviews are provided in this chapter.

**Australia’s future workforce**

Deloitte Access Economics (2016)\(^1\) highlights the rapid growth currently being experienced by Australia’s digital economy. Demand for ICT workers is forecast to increase by approximately 70,000 workers to the year 2020. This reflects the integration of ICT workers across a broad range of industries as digital disruption changes the role of technology across the workforce into the future. Consequently demand for ICT skills and qualifications are also expected to increase. However, graduates with ICT qualifications have declined significantly since the early 2000s, causing Australian businesses to rely on importing overseas workers to fill the ICT skills gap.

They propose a multi-pronged approach including engagement from government, business, education institutions, and industry to address this issue. Improving Australian’s ICT capability needs to start at primary school, with curriculum which includes computing skills and technical ICT capabilities, with processes to teach students computational thinking and information systems to define, design and implement digital solutions. The inclusion of Technologies learning in the curriculum, is part of the broader challenge to develop Science, technology, Engineering and Mathematics (STEM) capabilities in Australia’s workforce. Not only do Australian students need to be digitally literate, users of technology, but they need to be builders of technology, to solve the problems of the future.

CEDA (2015)\(^2\) predicts that 40 per cent of all jobs will be computerised in 10-15 years. Most of these jobs involve manual and routine tasks. Jobs requiring perception, manipulation, creative thinking and social intelligence are likely to remain unaffected by computerisation for example system designing and algorithm solutions. Further predictions speculate that specialists in computing, systems and diagnostics will be highly regarded in the near future. Forecast automated system will require constant maintenance as well as development of future systems. Based on the trend of ICT from 1995 to 2014, professional occupations are currently taking 25 per cent of the total global market, up from 17 per cent. CEDA predicts that this trend is expected to grow.

CEDA concluded that for Australia to sustain the future automated economy, the next generation workforce must have a strong ICT literacy. ICT needs to be essential knowledge for Australians in general and needs to be taught as a core component of school curricula.

Angus (2015)\(^3\) reports five overarching technological developments identified by experts in the ICT field predicted to have a profound impact on the Australian workforce. These are Cloud services, the ‘Internet of Things’, ‘Big Data’, machine learning and robots and immersive communications.

Swan (2015)\(^4\) highlights the increasing demand for skilled ICT workers, revealing that a proportion of companies planned to increase and maintain current ICT staff levels. Swan cites a survey by Robert Half (2015)\(^5\) finding 48 per cent of Australian ICT executives will be creating extra technology positions for the next 6 months, while another 41 per cent will be refilling existing positions.

Contrary to the growing need for ICT workers, Knott (2015)\(^6\) revealed current student enrolment in ICT courses sizeably lower than in the early 2000s. Brown (2013)\(^7\) highlights the concerning number of students studying in areas that will be automated in the near future, stating that 60 per cent of Australian students are currently training for jobs that won’t exist in the future. Participation in ICT by school students is also declining.

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4. Swan, D. 2016, *IT job boom likely as leaders express confidence*, The Australian, Jan 19
Girls and women in ICT

The literature highlights the ICT industry’s concern about women’s low representation in the ICT field. The gender divide in ICT exists and is increasing, with the proportion of girls and young women studying ICT at school and at TAFE NSW low and diminishing.

Women’s low participation in ICT and women leaving the ICT industry is of concern to ICT employers, with women account for only 28 per cent of participants across all ICT occupations in Australia. Deloitte Access Economics (2016)\(^8\) revealed that female representation in the ICT profession is well below women’s representation in other professions, where they participate at 44 per cent across other professional industries. Women experience a greater wage gap in ICT, where women ICT workers average 20 per cent lower remuneration compared with men in the same roles. The average gender pay gap is less, at 9 per cent across all industry occupations.

The Australian Computer Society (2015)\(^9\) addresses common challenges faced by women in the ICT industry, and highlights the importance of improving the profile of ICT to women. It found that women familiar with ICT showed interest and considered the area to be quite promising as a career. They consider ICT to be fun, interesting, associating it with future opportunities and money. Women who were unfamiliar with ICT have a generally negative view of ICT, many considering it to be boring and difficult.

Macpherson (2013)\(^10\) mentions the lack of role models to support girls posing an issue, as role models exert a strong influence on girls’ decision-making. Girls’ decisions are also heavily influenced by their parents’ expectations, and Macpherson proposes that parents be encouraged to learn more about ICT and encourage students to take the rising opportunities in the field. Macpherson raises issues where women themselves viewed men as generally more suited to ICT. Women were seen to perceive ICT as hardware, algorithms and programming, unlike men who view ICT as an opportunity for social enjoyment. There were also women who found ICT interesting but would rather not pursue a career in ICT, holding the belief that pursuing a career in the ICT field would limit their aspirations of travelling, improving the world and meeting new customers.

Target audience

Social researcher McCrindle (2015)\(^11\) studied the generation born from approximately 1995 to 2009, coining the term Generation Zed to encapsulate this group. Generation Zed is global, visual and digital, they inhabit a world which is rapidly evolving and which has been transformed in their lifetime. They have grown up in fast moving, complex times, and they are a unique group who have seen more change in their short lifetime than any previous generation. They began life in the internet era, are being shaped by social media, and experience the transformative impact of mobile devices. They are logged-on and linked-up, influenced globally and live in a wireless world without perceived boundaries. Generation Zed has experienced massive demographic change, huge technological growth and significant social shifts. Generation Zed is visually engaged, with Google and YouTube their primary sources of information. They are the early adopters, the brand influencers, the social media drivers and the pop-culture leaders. Generation Zed’s are likely to be the most entrepreneurial generation, where Smart phones and portable technologies will allow these young digital natives to craft apps and other wealth generating ventures.

Flexibility is key to effectively engaging this generation in education, which must shift from teacher centred to learner adaptive, from content driven formal delivery to engagement focused and interactive. 21\(^{st}\) Century classrooms are being reconfigured and rewired to accommodate new students, new technologies and new learning styles. Education is being flipped; content can be accessed online, anytime, anywhere. It’s the discussion and application which is critical and requires an expert facilitator, the teacher. Essential engagement and practice will occur in classrooms. Today’s students’ have access to technology which means they can access any piece of information with the click of a button, so the role of the teacher has changed from the traditional teacher model to a facilitator of learning.

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\(^{8}\) Deloitte Access Economics Pty Ltd 2016, Australia’s Digital Pulse, Developing the digital workforce to drive growth in the future, Sydney.

\(^{9}\) Australian Computer Society (ACS) 2015, The promise of diversity – Gender equality in the ICT profession, ACS, Sydney.

\(^{10}\) Macpherson, K 2013, Digital technology and Australian teenagers: consumption, study and careers, University of Canberra, ACS

Aspirational influencers

The study by Nguyen & Bloom (2014) identified that multiple factors interact to drive young people’s educational aspirations. These include attitudes towards school, academic performance, parental expectations, peer plans and the student’s background demographic. Parental expectations and peer plans appear to be particularly influential in young people’s educational choices. The study concluded that a young person’s intention to participate in post-school study is formed and articulated relatively early in the secondary school years, and that intention is a strong predictor of subsequent participation in both university and vocational education and training. Importantly, it found that educational aspirations measured at age 15 years do not change markedly as students grow older, suggesting that these are formed early and that interventions later in the senior secondary school years may be too late to influence aspirations.

NCVER Insight (2014) Youth transitions in Australia cited that more young people are aspiring to complete Year 12, with university the most preferred post-school study destination. Various factors influence students’ aspirations, however parental expectations are recognised as a particularly significant driver.

The Australian university Group of Eight (2014) tracked student aspirations based on their parents’ occupational level of achievement. While the gap has narrowed between occupation groups the report highlighted that children of professionals are still twice as likely to attend university as labourers’ children, and significantly more likely than those whose parents are tradespeople or in clerical, sales or service work.

The study by Gemici, Bednarz, Karmel & Lim (2014) acknowledged the strong link between young people’s goals and their long term education and work outcomes. In the Australian context factors such as gender, indigenous status, home language and ethnic background, academic achievement at age 15 years, and parental and peer influences have been linked to aspirations. This research sought to identify the critically influential factors impacting on young peoples’ aspirations in order that policies and interventions might successfully leverage these dominant factors. A central insight of the study was the level of influence that external factors play in the formation of aspirations. Parental expectations of their children and the educational plans of their peers are key drivers of young peoples’ educational and occupational aspirations and reinforces the importance of parent-focused interventions. They propose expanding provision of programs which actively engage parents in the career decision-making process could be an effective avenue to raise the educational and occupational aspirations of Australian youth.

The study by Webb, Black, Morton & Plowright (2015) highlights the significance of aspirations as a key influence on young people’s engagement with post-school education and training. This research explores the impact of geography and neighbourhood on these young people’s values and aspirations for further education and post-school pathways. The research was conducted across four sites in Victoria and South Australia; all considered socio-economically disadvantaged and all located outside major population centres. The research confirmed that post-school participation by youth in areas of socio-economic disadvantage is lower than for socially advantaged groups.

The research describes aspirations as the ‘capacity to imagine futures’ and provides key messages. Young people were significant influenced by their educational and career ‘inheritance’, which moderated their further aspirations. Practical and financial constraints impact negatively on opportunities and aspirations. Exposure to new ideas or experiences can ‘disrupt’ strong links to the familiar, potentially challenging disadvantage. Vocational education and training (VET) provides an essential pathway to further education and work and school retention rates are improved by the presence of VET in schools programs. The perceived lower status of VET to university pathways perpetuates a powerfully entrenched view, relying on VET to support disadvantaged communities.

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15 Gemici, S, Bednarz, A, Karmel, T, & Lim, P 2014, The factors affecting the educational and occupational aspirations of young Australians, Longitudinal surveys of Australian Youth (LSAY), NCVER, Adelaide
STEM education

The Chief Scientist (2014)\(^{17}\) highlights the critical role of science, technology, engineering or mathematics (STEM) education in Australia’s economy and proposes a number of recommendations. Those relating specifically to education and training including student career advice which highlights the value of STEM and pathways to work, not only in STEM-related fields, increasing STEM qualified teachers, including STEM professional development and engaging approaches to teaching STEM, which include encouraging curiosity with ‘real world’ links. The recommendations also focus on fostering partnerships between schools, higher education, training providers and employers. It supported work-integrated learning models including work placement programs, and targeting increased STEM participation by women, disadvantaged and marginalised students and Indigenous students. The Chief Scientist’s recommendations include promoting parental engagement to nurture their children’s creativity, and fostering an interest and involvement in STEM activities and subjects. Recommendations for increased communication between STEM practitioners and the community included an online portal as an access point for information about STEM and along with other information should include career advice.

Prinsley & Baranyai (2015)\(^{18}\) highlight the critical need for science, technology, engineering or mathematics (STEM) education and the importance of industry experience to equip graduates with job-ready skills. This paper focuses on building connections between businesses and universities, but the concept applies with equal importance to vocational education and training graduates. The paper recommends a national approach to embed valuable industry placements and projects into Australian STEM education.

The Australian government (2015)\(^{19}\) commitment to restoring the focus on science, technology, engineering or mathematics (STEM) across the nation includes initiatives in four key areas of mathematics by inquiry, coding across the curriculum, pathways in technology early college high school (P-TECH) and summer schools for STEM students. The Warren Centre (2015)\(^{20}\) highlights the vision for a STEM nation and the crucial element of strong STEM education as the first stage in the innovation talent pipeline, stating that innovation capability begins in primary and secondary education, not at the tertiary level of education and this is also applicable to vocational education and training.

Career guidance

Rainey, Simons, Pudney & Hughes (2008)\(^{21}\) highlight the importance of the effective transition of young people from secondary education to working life for their social and economic wellbeing. Young people must navigate a pathway which has become increasingly complex, and career is now viewed as a continuous journey of adaptation in an ever changing environment. Career development services assist young people on their personal career development path. Additionally work placement, referral and how career development services are delivered play a part.

A study by Hooley & Dodd (2015)\(^{22}\) provides evidence of the economic benefits of career guidance. While they argue that career guidance is primarily concerned with realising the aspirations and potential of the individual, there is substantial evidence of important social and economic benefits which justify public investment. The paper highlights the support effective career guidance provides to the labour market, the education system and to social equity. Outcomes include increased labour market participation, decreased unemployment, enhanced skills and knowledge base and flexible and mobile labour market, improved capacity to ‘read’ or assess, and respond to changes in the labour market.

Hooley and Dodd (2015) refer to the acquisition of career management skills via career guidance as human capital, suggesting that career management skills are not simply the gaining education and skills, but internally motivated learning, job seeking skills and both attitudes and behaviours which contribute to working productively. The study postulates that career management skills represent a specialised form of human capital which enables individuals to navigate changing labour markets and identify the education and skills pathways which will best develop or advance their careers.

The Organisation for Economic Co-operation and Development (2004)\textsuperscript{23} \textit{Career guidance handbook defines career guidance as services and activities intended to assist individuals of any age and ... point throughout their lives, to make educational, training and occupational choices and to manage their careers ...}. It highlights some effective responses to providing career guidance in schools across OECD countries including career guidance-oriented schools to support students’ identity development in primary school and career planning guidance through secondary school, in collaboration between teachers, career guidance staff and partnerships with parents and the community. Portfolio system assists students to integrate knowledge, skills and attitudes concerning work. Bridges to the world of work initiatives aim to help students understand the world of work including their own occupational orientation. These include ‘work experience’, ‘work tasters’, ‘work shadowing’, and ‘work visits’. All staff responsibility emphasises the cross-curricular responsibility of all school staff members for providing career guidance. Specialist partnerships for career guidance personnel encourage partnerships with parents, alumni, representatives from business, trade unions and non-government organisations to support career guidance provision.

\textbf{VET in schools}

Clarke (2014)\textsuperscript{24} emphasises the current limitations of VET in schools as a vehicle to deliver post-school employment, suggesting that it is better viewed as a stepping stone on a vocational education pathway. Criticism of school delivered VET programs, identified that they focus on narrow occupations at the expense of access to foundational preparation.

Wheelahan, Moodie & Buchanan (2012)\textsuperscript{25} highlight a European Union project which investigated the ‘hybrid’ vocational qualifications, which both prepares graduates to enter work but also provide access to higher education. It aims to link vocational education and training more reliably to the labour market, and contribute to policy to open up transition and progression between general, vocational and higher education.

The project identified the conflict in the purpose of education and contradictory trends in educational and labour transitions. The atomisation of work roles see narrowing of vocational qualifications to prepare graduates for highly specific work roles and jobs, rather than for occupations or careers. The two fields of education and work, being merged into vocational education, with increasing emphasis on work competencies, work-based training and preparing the learners specifically for a particular workplace.

Employers are seen to criticise both VET in schools and higher education for not producing ‘work ready’ graduates. VET in school bears the dilemma of preparing a graduate for a highly specific job role, while developing knowledgeable and skilful workers, aware of career options and pathways. On one hand skills formation to prepare the students for work, provide knowledge and skills for a specific job. Conversely, individuals need to develop the capacity to exercise choice, judgment and creativity at work, and achieve a range of outcomes from training and education.

The research also highlighted that the Diploma has become a ‘cross over’ qualification between vocational and higher education. Drawing the question is this reflecting the increased complexity of the nature of work, requiring higher qualifications. Or is it credential creep, people seeking higher qualifications to advantage them in the increasingly competitive job market.

The Education Council (2014)\textsuperscript{26} provides an updated framework for vocational learning and vocational education and training (VET) delivered to secondary school students \textit{Preparing Secondary Students for Work}. The \textit{Framework} aims to ensure that VET delivered as part of senior schooling reflects changing technology, globalisation, and socio-economic demands.

\begin{itemize}
\item \textsuperscript{23} OECD 2004, \textit{Career Guidance; Handbook for policy makers}, OECD European Communities, Paris
\item \textsuperscript{24} Clarke, K 2014, \textit{Entry to vocations: building the foundations for successful transitions}, NCVER, Adelaide
\item \textsuperscript{25} Wheelahan, L Moodie, G Buchanan, J 2012, \textit{Revitalising the ‘vocational’ in flows of learning and labour}, NCVER, Adelaide
\item \textsuperscript{26} \textit{Preparing Secondary Students for Work: A framework for vocational learning and VET delivered to secondary students}, Education Council, 2014
\end{itemize}
Youth transition

A study by Karmel (2012)\(^{27}\) accepts that in the Australian context that better educational qualifications translate into higher labour force participation and lower unemployment rates, and this fundamentally underpins the increase of the school leaving age from 15 years to the completion of Year 12. It has driven policy targets to increase the proportion of age cohorts with a university degree. There has also been a shift in away from the singular focus on school completion to recognise the merit of vocational pathways.

Karmel highlights Australia’s relatively large number of pathways from full-time school based education into the labour market. The Australian education and training system and the labour market have two dominant features which appear to assist youth transitions. High full-time participation in school education is effective if the labour market demands educated labour. Multiple pathways including apprenticeships and traineeships, and VET in Schools all offer a variety of paths to a successful transition. Together with a high proportion of individuals progressing to tertiary education, spreads the risk and also staggers the entry of young people into the full-time labour market.

However, potential new entrants are challenged by employers’ increasingly high expectation of graduates, that they be ‘job-ready’ and already have experience. Anecdotally, it is becoming increasingly difficult for students both school and vocational, to secure work experience or work placements, which are viewed as important components in successful youth transition into the labour market. School and vocational education and training have traditionally provided positive opportunities for both students and employers to assess the workplace environment, type of work, and for employers a low risk way to evaluate whether a worker is competent and fits into the team. Work placement has provided a pathway for many students to secure their first full-time job. Greater employer engagement is a critical element in supporting youth transition.

This British study by Dolphin (2014)\(^{28}\) documents the high youth unemployment rate experienced in the United Kingdom (UK) and the negative impact of sustained unemployment on a young person’s future. Critical issues highlighted by Dolphin, relevant to the Australian context, include raising the status of the vocational education system, VET reforms which ensures the quality of VET and improves its reputation as a valid alternative to university education. European countries with lower youth unemployment have career education and guidance which perform a crucial function in ensuring smooth transition from education to work by embedding career advice in schools at key milestone points when young people are making critical decisions about their future.

Lessons from Europe include structural changes in the economy have reduced young people’s ability to compete in the labour market. Youth unemployment is lower in countries where the vocational route into employment through formal education and training is as clear as the academic route. The quality of VET is crucial to raise the status of the vocational pathway to both employers and young people. Youth transitions are improved by information about the employment outcomes of various options and courses, as part of careers education and guidance.

Many of the issues and findings of this report resonate within the Australian context, in particular the speed at which the labour market and occupations are changing, the need for high quality current career guidance, the need to raise the status of VET as a valid alternative pathway, to university to secure employment, and the need for increased employer/industry engagement.

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\(^{27}\) Karmel, T. 2012, *Youth transitions in Australia: lessons for other countries?* Conference Paper, NCVER Adelaide

\(^{28}\) Dolphin, T 2014, *Remember the Young Ones, Improving career opportunities for Britain’s young people*, Institute for Public Policy Research, London
The Information and Communications Technology (ICT) industry is growing rapidly and forecast demand for ICT workers in the Australian economy is expected to increase. Conversely, enrolments in ICT at TAFE NSW have been declining.

The TAFE NSW Industry Liaison Unit, Information Technology, Education, Library and Government (ITELG) conducted this research to understand the lack of growth in TAFE NSW ICT enrolments, given the prediction of significant growth in the ICT industry. The research examines student aspirations, and aspirational influencers, young peoples’ understanding of ICT, how career guidance is provided to them, both generalist career advice, and ICT industry career advice. Additionally the research explores the attributes of the current youth generation and how to more effectively target them in promoting ICT careers and the associated ICT training provided by TAFE NSW.

The following information is presented in a themed manner, collating primary research data which was gathered from a range of sources and in a variety of ways. This includes student focus groups, online student surveys and staff interviews. The research report covers the context in which the research is conducted, and following chapters discuss features of the youth target audience, major aspirational influencers on young people, generalist and ICT career advice, ICT delivered at school, promoting ICT, the importance of partnerships and raising the profile of TAFE NSW. Additional reflections and observations which emerged from the research have also been included.

In this chapter the forecast growth in the ICT industry is outlined, including the shortage of ICT professionals. Student participation in ICT programs at school and ICT qualifications at TAFE NSW is examined, including the participation by girls and young women. Women’s participation in the ICT industry is also reviewed.

**ICT industry forecast**

The literature points to rapid growth and digital disruption in ICT in the labour market. Deloitte Access Economics (2016)\(^1\) highlights the rapid growth currently being experienced by Australia’s digital economy. Demand for ICT workers is forecast to increase by approximately 70,000 workers to the year 2020. This reflects the integration of ICT workers across a broad range of industries as digital disruption continues to change the role of technology across the workforce into the future. Consequently demand for ICT skills and qualifications are also expected to increase. However, the report comments that graduates with ICT qualifications have declined significantly since the early 2000s.

CEDA, the Committee for Economic Development in Australia, (2015)\(^2\) predicts that 40 per cent of all jobs will be computerised in 10-15 years. Most of these jobs involve manual and routine tasks. Jobs needing perception, manipulation, creative thinking and social intelligence are likely to remain unaffected by computerisation for example system designing and algorithm solutions. In addition to this prediction:

- Specialists in computing, systems and diagnostics will be highly regarded in the near future. Most of work in the future may be done by automated system leading to constant maintenance as well as development of future systems.
- Based on the trend of ICT from 1995 to 2014, professional occupations are currently taking 25 per cent of the total global market, up from 17 per cent. CEDA predicts that this trend will grow.

Improving Australian’s ICT capability needs to start at primary school, with curriculum which includes computing skills and technical ICT capabilities, which includes processes to teach students computational thinking and about using information systems to define, design and implement digital solutions.

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2. CEDA, *Australia’s future workforce?*, CEDA, June 2015
Shortage of ICT professionals

Swan (2016) highlights the increasing demand for skilled ICT workers. Swan revealed that a proportion of companies planned to increase and maintain current ICT staff levels. He cites a survey report by Robert Half (2015) finding 48 per cent of Australian ICT executives will be creating extra technology positions for the next 6 months, while another 41 per cent will be filling existing positions which open up.

Contrary to the growing need for ICT workers, Knott (2015) comments that current student enrolment in ICT courses was considerably lower than in the early 2000s. Brown (2015) highlights the concerning number of students studying in areas that will be automated in the near future, especially by students studying at TAFE. Brown remarks that according to a report by the Foundation for Young Australians, 60 per cent of Australian students are currently training for jobs which will not exist in the future. In what Morton (2015) describes as a tectonic shift in the way jobs are automated, globalised and shared, he comments that jobs most affected by automation include low-skilled labouring, retail and administration jobs. Morton further comments that one of the Foundation for Young Australians recommendations is a greater level of incubator investment to help young entrepreneurs.

Women’s participation in ICT industry

Gender was not the principal focus of this research. However it became evident that girls and young women are significantly under-represented in ICT training at both school and TAFE NSW and women are not well represented in the ICT workforce. The literature highlights the ICT industry’s concern about women’s low representation in the ICT field. The gender divide in ICT exists and is increasing, with the proportion of girls and young women studying ICT at school and at TAFE NSW low and diminishing.

Women’s low participation in ICT and women leaving the ICT industry is of concern to ICT employers. Deloitte Access Economics (2015) revealed that women account for only 28 per cent of participants across all ICT occupations in Australia. Female representation in the ICT profession is well below women’s representation in other professions, where they participate at 44 per cent across other professional industries. Women experience a greater wage gap in ICT, where women ICT workers average 20 per cent lower remuneration compared with men in the same roles. The average gender pay gap is less, at 9 per cent across all industry occupations.

The Australian Computer Society (2015) addresses common challenges faced by women in the ICT industry, and highlights the importance of improving the profile of ICT to women. They found that women familiar with ICT showed interest and considered the area to be quite promising as a career. They consider ICT to be fun, interesting, associating it with future opportunities and money. Women who were unfamiliar with ICT have a generally negative view of ICT, many considering it to be boring and difficult.

Student engagement in ICT

The student engagement section considers the participation of students at school and TAFE NSW in ICT related vocational education and training and reviews student enrolment numbers and trends. This includes NSW high school student participation in a range of ICT programs at school, including Information and Digital Technology (IDT), the vocational ICT stream available to high school students. TAFE NSW student engagement in ICT qualifications delivered at TAFE NSW is appraised, including the participation by girls and young women in ICT vocational education and training.

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3 Swan, D. 2016, IT job boom likely as leaders express confidence, The Australian, viewed 19 January 2016
4 Robert Half 2015, 2015 Salary Guide, viewed December 2015,
7 Morton, R 2015, Two-thirds of students training for jobs that won’t exist, The Australian, viewed September 2015
NSW high school student participation in ICT

NSW high school student participation in ICT related subjects from 2007 to 2015 is reviewed. High school students in Year 11-12 (Stage 6) can enrol in the following Information and Communications Technology studies at school:

- Design and Technology (D&T)
- Information Processes and Technology (IPT)
- Software Design and Development (SDD)
- Information and Digital Technology (IDT) the vocational ICT stream.

Enrolment in technology based subjects reveal a trend of overall declining numbers.

![NSW high school - HSC student studying ICT](image)

**Figure 1: NSW high school student HSC enrolments in ICT related subjects**


Information and Digital Technology (IDT) is the vocational education and training (VET) ICT program offered by NSW high schools. Higher School Certificate (HSC) student participation in NSW high school delivered ICT programs is presented from 2007 to 2015. Figure 1 shows the declining participation by NSW high school students, not just in IDT vocational stream but across most areas of ICT study.

Knott (2015) speculates that a negative image attached to ICT could be one reason that young people are not engaging with ICT. He refers to the television program *The IT Crowd*, as an example, which portrays people interested in ICT as socially awkward computer technicians working in a basement. Misconceptions or stereotypes presented through the media may affect how young people view ICT.

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NSW Board of Studies, Teaching and Educational Standards, (BOSTES) annual statistics from 2007-2015 – sourced January 2015
Conversely CEDA (2015) determined that for Australia to sustain the impending automated economy, the future workforce must have strong literacy in Information and Communication Technology (ICT). Australian’s need to have ICT literacy generally and ICT needs to be taught as a core component of school curricula.

Schools are not the only educational institutions concerned with the development of the ICT workforce. The vocational education and training sector broadly and TAFE NSW in particular have a key role to play in growing the skill base for the ICT industry.

**TAFE NSW student participation in ICT**

TAFE NSW student participation in Information and Communications Technology (ICT) could arguably be expected to show an increase in line with ICT industry growth. However, ICT enrolments at TAFE NSW are not growing at the rate expected to match demand for ICT workers by the forecast growth of the ICT industry.

TAFE NSW total enrolments in ICT qualifications were 13,883 in 2007, 16,279 in 2011, rising to 17,626 in 2012 and easing to 15,621 in 2014 then decreased to 12,482 in 201512 (figure 2). The 2015 TAFE ICT student enrolments represents a 29 per cent fall from the 2012 peak of 17,626 ICT student enrolments, revealing diminished TAFE NSW ICT student enrolments, when growth could have plausibly been anticipated.

Participation by students in all government funded training in NSW in the Information and Communications Technology Training Package fell from 18,800 in 2010 to 15,700 by 201413. The Australian VET sector has experienced significant recent reform. It could be speculated that the deregulation of the VET sector, substantial changes to national funding arrangements for VET, and the expansion of private registered training organisations (RTO), may also be contributing factors impacting on reduced TAFE NSW ICT student enrolments. There is fierce competition in the VET sector between providers for student enrolments, and private RTOs may conceivably be

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12 TAFE NSW Historical Students Records (THSR), October 2014, TAFE NSW PRADA data, TAFE NSW Strategy, March 2016
Framing the discussion

encroaching on the market share of ICT students who traditionally would attend TAFE NSW. Data on private RTO enrolments in ICT was not available at the time of this study.

Girls and young women’s participation in ICT

This section considers girls and young women’s participation in ICT training and includes girls’ participation in Information and Digital Technology (IDT) the vocational ICT program delivered by NSW high schools, school girls participation in IDT delivered at TAFE NSW (TVET) and women’s participation in ICT qualifications at TAFE NSW.

Girls and young women are significantly under-represented in ICT training and education, and their participation shows declining trends, in ICT in both NSW high schools and at TAFE NSW. High school girls participation in Information and Digital Technology VET in schools (VETiS) courses, delivered at school, decreased from 28 per cent in 2010, to 16 per cent in 2014. In TAFE delivered Information and Digital Technology (TVET) high school girls’ participation had decreased markedly from 29 per cent in 2007, to just 9 per cent of all IDT TVET enrolments in 2014. Women’s participation in ICT at TAFE NSW peaked at 34 per cent in 2008 and then eased to 25 per cent by 2014.

Macpherson (2013)\textsuperscript{14} in Digital Technology and Australian Teenagers: Consumption, Study and Careers, mentions that lack of role models to support girls poses an issue as role models exerts strong influence on girls’ decision-making. Girls’ decisions are also heavily influenced by their parents’ expectations. Parents should be encouraged to learn more about ICT and encourage students to consider the rising opportunities in the field.

Figure 3: NSW high school girl’s participation in IDT – VETiS at school

Figure 3 illustrates the percentage of girls as a proportion of the total cohort of school delivered Information and Digital Technology. Their participation indicates that high school girls’ engagement with IDT at school increased steadily from 2006 to a peak of 28 per cent (439 girls of 1,150 total enrolments) in 2010 but subsequently declined to 16 per cent by 2014 (127 girls of 659 total enrolments).

\textsuperscript{14} Macpherson, K 2013, Digital technology and Australian teenagers: consumption, study and careers, University of Canberra, viewed Nov 2015.
TAFE NSW TVET gender participation

Participation by girls in TAFE NSW TVET programs has fallen from its peak of 29 per cent (233 girls of 809 total enrolments) in 2004, representing over one quarter of this cohort, to below 10 per cent (71 of 750 total enrolments) by 2014 when girls representing less than one in ten students. The diminishing proportion of high school girls choosing to study Information and Digital Technology raises the question about whether there is a broader issue in relation to attracting and retaining girls and women into ICT study and the industry generally.

![Graph showing participation of high school girls in IDT TVET at TAFE NSW](#)

Figure 4: NSW high school girl’s participation in IDT – TVET at TAFE NSW

The participation of high school girls in Information and Digital Technology (IDT) delivered off-site at TAFE NSW is illustrated in figure 4. While girls’ participation in IDT at school diminished, the decline experienced in the proportion of high school girls in TAFE NSW delivered IDT was extremely pronounced.
Women in ICT at TAFE NSW

Participation by women in Information and Communication Technology training in TAFE NSW has changed over time. In 2008 there were 5,232 women of a total of 15,438 ICT enrolments. This represented over one third (34 per cent) of ICT enrolments by women. However, by 2014 the proportion of women had decreased to one quarter of ICT enrolments (25 per cent). Only 3,959 women of a total of 15,621 total enrolled in ICT at TAFE NSW (figure 5).

![TAFE NSW ICT - Women's participation 2004-2014](image)

Figure 5: TAFE NSW ICT women’s participation as percentage of all ICT enrolments 2004-2014

The participation by girls and women in ICT training and women’s engagement in ICT employment provides a topic for further research and investigation and promotional and engagement activity.
Target audience and influencers

This chapter considers who comprises the youth and young adult target audience, dubbed Generation Zed, Net generation or the iGeneration. It identifies what characterises this generation, how they engage with the world in a unique way compared with previous generations, and how this impacts on designing, developing and delivering promotional and educational material to this distinctive group. The research considers young people’s understanding of Information and Communications Technology (ICT), whether there are significant gaps in their perceptions of ICT and the ICT industry and their awareness of the opportunities provide by jobs in the ICT field. It considers the influencers on young people and finally what ignites young peoples’ interest in ICT.

Generation Zed – iGeneration

Over 40 per cent of the traditional TAFE NSW enrolment falls within the 15-24 year age group collectively. This combined age group is largely made up of a generational group known as Generation Zed, a term coined by social commentator McCrindle (2015). This 15-24 year age group is also the largest cohort of TAFE NSW students and effectively engaging them is critical to TAFE NSW. This is the target generation for TAFE NSW biggest cohort, and the group that TAFE NSW needs to address most to attract these potential students into TAFE courses.

Generation Zed is global, visual and digital, they inhabit a world which is rapidly evolving and which has been transformed in their lifetime. They have grown up in fast moving, complex times, and they are a unique group who have seen more change in their short lifetime than any previous generation. They began life in the internet era, are being shaped by social media, and experience the transformative impact of mobile devices. They are logged-on and linked-up, influenced globally and live in a wireless world, without boundaries. Generation Zed has experienced massive demographic change, huge technological growth and significant social shifts. This youth generation is visually engaged, with Google and YouTube their primary sources of information. They have always had a device connected to the internet. They live in an era of information overload, and many would prefer to watch a video summarising an issue rather than read an article discussing it. Messages are increasingly image-based, and signs, logos and brands communicate across language barriers with colour and pictures rather than words and phrases. They are the early adopters, the brand influencers, the social media drivers and the pop-culture leaders. Generation Zed is likely to be the most entrepreneurial generation, where Smart phones and portable technologies will allow these young digital natives to craft apps and undertake other wealth generating ventures.

Rosen (2010) describes the iGeneration as a group who are growing up with technology and with technologies such as iPhone, iPod, Wii, iTunes, which are individualised in the way that they are used. This group are being defined by their use of media and technology, their attachment to electronic communication and their ability to multitask. To them a phone is a portable computer. They are the most technologically immersed generation, and their multiple engagements might include games, texts, Skype, Facebook, YouTube and juggling multiple websites. This all impacts on how they engage with learning.

Learning environment – implications for TAFE NSW

In an era of information overload, images, signs, colour and picture replace messages using words and language. In his analysis of learning styles McCrindle (2015) highlights the dominance in the visual and hands on learning styles as opposed to the traditional classroom. Effective engagement in learning environments have moved from verbal to visual, from sit and listen to try and see, from curriculum centred to learner centric. Today’s students have access to technology which means they can locate information with the click of a button, so the role of the teacher has changed from the traditional teacher model to a facilitator of learning.

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15 TAFE NSW Historical Students Records (THSR), October 2014
TAFE NSW’ role in engaging youth generation

TAFE NSW will need to ensure that they consider the engagement style of Generation Zed to successfully attract their biggest target age group, 15-24 year old prospective students to vocational education and training. TAFE ICT staff interviewees were asked about the current generation being highly engaged and extremely familiar with technology, and whether they considered there was a need to adjust how TAFE NSW provides or promotes ICT career and course information to better engage these young people. TAFE staff interviewees generally agreed on the importance of contemporary career information to target the generation known as Generation Zed or the iGeneration.

TAFE NSW ICT staff commented that ICT needs to be better understood by Generation Zed. It needs to be highlighted that young people who are users or consumers of ICT, may not be interested in becoming creators or developers of technology. Clarifying this understanding about the difference between using and developing ICT was viewed as important. Young people need to be aware that basic ICT skills are required in almost all jobs, and TAFE ICT staff interviewees speculated that Generation Zed often think that if they are competent users of ICT applications, that they understand ICT, highlighting the disconnection between being a consumer as opposed to a creator of ICT.

When asked how ICT career promotion could better engage the youth generation, TAFE NSW staff interviewees made a number of suggestions. These included promoting ICT training and careers via social media to engage young prospective students, such as advertising on the same online platforms with which young people are familiar, for example Google, YouTube or Facebook. One TAFE ICT staff member commented ‘Don’t expect that they (young prospective students) will search for information in spaces they don’t normally inhabit.’ Some TAFE ICT staff complained that Generation Zed students, aged 15-24 years are the most challenging to engage, commenting that in their view they did not appear to want to participate. One staff member commented ‘All they (Generation Zed) do is play with their phones ...’

One TAFE ICT staff member interviewed suggested developing a mobile App for TAFE NSW, to promote careers in ICT, advertise TAFE study pathways, and display course information. Another TAFE ICT staff member suggested increased advertising including individual advertisements that highlight ICT qualifications which prepare students for specific job roles. Google targeted advertising was proposed, where Google profiles users via their online search results and distributes advertisements to their browser based on their interests. TAFE ICT staff suggested showcasing TAFE students work to raise interest among younger people and the community, with a promotional tag line such as ‘This is what you can do at TAFE’.

The TAFE NSW ICT staff interviewees commented that young TAFE ICT students need to be taught using a more visual approach. Incorporating more group work was viewed as useful, as students tend to be more fully engaged through working in teams. Some TAFE ICT staff suggested having less focus on ICT online courses, speculating that they tend to have lower completion rate and in their view, it is challenging to provide the same quality of education online as is achieved by face-to-face training.

School students target group

In relation to engaging school students in ICT training TAFE NSW ICT staff interviewees suggested that specific ICT streams units such as networking, could be introduced and made available in schools rather than default ICT programs currently being taught. They speculated that some school students may prefer certain areas of ICT more than another for example programming rather than networking or vice versa.

TAFE ICT staff interviewees suggested providing better information about ICT courses to appeal to school students, including how students can engage with ICT training at TAFE NSW. They commented on the need for greater interaction between TAFE NSW and NSW high schools to facilitate providing accurate and up-to-date ICT career information, including TAFE pathways, to ICT school teachers and school career advisers. Efforts to increase VET in schools both at school and delivered by TAFE (TVET), and to improve VET training for ICT school teachers was proposed. Improving the relationship between TAFE and school career advisers including school ICT teachers was viewed as important, emphasising the importance of partnerships between TAFE NSW and NSW high schools.

A number of TAFE NSW staff interviewees highlighted the concern that school students may overlook the pathway to university which is available at TAFE. They suggested promoting TAFE pathways to prospective students to commence their training with TAFE and ensure that students are aware of the option to progress to university.
TAFE staff interviewed speculated that many parents pressure their children to achieve a higher education degree, so promoting university pathway via TAFE NSW to parents, as well as to the high school students, was seen as important.

**Young people’s understanding of ICT**

This section considers young people’s understanding of ICT, the ICT industry, and whether they are aware that ICT permeates every industry and field of endeavour. It seeks to establish how well young people comprehend the breadth and scope of opportunities offered in the ICT field. School students and TAFE NSW ICT students were asked about their understanding of ICT, and TAFE NSW ICT staff were also asked about their perceptions and opinions of young people’s understanding of ICT.

**School students understanding of ICT**

School students from a cross-section of NSW high schools were asked, via an online survey, about their exposure to ICT training at school and what career advice, both generalist and ICT specific, they had received. The survey went to the general student population in years 9, 10 or 11, and did not explicitly target ICT students. The survey took place in late 2015, and 35 students responded. Approximately two thirds of the respondents were studying some form of ICT program at school.

High school students surveyed were asked how well they understood ICT. One quarter of the school students surveyed directly answered that they do not understand ICT and half of respondents had a limited concept of ICT, answering that ICT has something to do with computers. Almost one third of school ICT students surveyed simply answered that ICT is related to computers, hardware and software.

Only one quarter of the school student survey respondents, who were not undertaking any ICT subjects at school, could provide an answer which demonstrated a reasonable or commonly accepted understanding of ICT. Answers indicating a satisfactory understanding of ICT by non-ICT students are presented below:

- **ICT is to do with computers and how they work. How they telecommunicate and transmit information as well as receiving it**
  - A non-ICT school student respondent

- **Information technology in my opinion is all about understanding the programming behind the technology, designing websites, and lots of different types of activities such as using different software such as Prezi**
  - A non-ICT school student respondent

**TAFE NSW students’ understanding of ICT**

TAFE NSW ICT students surveyed were asked whether their understanding of ICT as a career had changed since undertaking their ICT studies at TAFE NSW. One fifth of TAFE student survey respondents reported that prior to studying at TAFE their understanding of ICT careers was poor or lacking. Seventy per cent indicated that their understanding about ICT careers had changed somewhat, and that there were some aspects about an ICT career which they had not previously known.

TAFE NSW ICT staff were asked about their perceptions and opinions of young people’s understanding of ICT. Ten TAFE NSW ICT staff, in separate interviews, were asked for their perspective on whether young people, who are prospective TAFE students appear to be given adequate career information, advice or guidance about ICT before enrolling in a TAFE course. That is, when the students enrolled in an ICT qualification at TAFE did the head teacher or the class teacher encounter issues with the young students’ understanding of ICT? There was general consensus by the TAFE ICT staff interviewed that prospective TAFE students had not received adequate career information, advice and guidance, prior to contacting TAFE to enrol in an ICT course. This applied unless students had received detailed advice at an information session provided at TAFE which was specific to their ICT course.

There was some concern by the TAFE ICT staff interviewed that in their opinion school careers advisers often appeared not to fully understand the scope of potential ICT careers and the plethora of ICT job roles available. Some TAFE ICT staff interviewees were concerned that careers in ICT were not actively promoted to school students and that career information specifically about ICT was not provided to most school students.
General misconceptions about ICT

TAFE NSW ICT staff were interviewed about common misconceptions which they had observed in relation to young peoples’ understanding of ICT. They cited a range of issues, particularly when young people initially attended TAFE NSW. ICT staff highlighted apparent false impressions and misconceptions which young people appeared to have about ICT, including:

- lack of awareness that ICT is ubiquitous and permeates every industry, or that a student’s interest in a field other than overtly ICT would not preclude them from an ICT career within that industry. For example, a website developer, network administrator, software and applications programmer could work in any industry.
- lack of awareness of the broad range of roles and occupations, and the career potential offered by a career in ICT.
- lack of clarity about the distinction between being a consumer or user of ICT and being a creator or developer of technology.
- misunderstanding about the culture of ICT and who is suited to an ICT career. The ICT industry is sometimes viewed as nerdy, boring or only for extremely intelligent students who are highly accomplished at programming or science, technology, engineering or mathematics (STEM) subjects.
- misunderstanding where some students considered that ICT was not suitable for girls, and some girls appeared to lack confidence in relation to being able to handle the hardware aspect of ICT.
- assumption that skills playing computer games equals an aptitude for ICT. Often students think that playing computer games means they are good at ICT. ‘Parents see their son engrossed at the computer and assume that they will be good at ICT’ one staff member commented. Often these students find that computer games have not prepared them for the rigour of ICT study.

In relation to misconceptions about ICT study, TAFE NSW ICT staff interviewees remarked that ICT students do not always understand that ICT studies will involve significant theory as well as practical components. Some students have less interest in, or aptitude for, the theoretical aspect of their ICT study program. Additionally, TAFE staff commented that students often do not fully grasp the course content prior to enrolling, however once immersed in training generally they appeared to enjoy the ICT studies. TAFE ICT staff commented that some school students have a negative view of ICT, speculating that potentially this may be because of the way ICT had been presented to them at school. TAFE ICT staff interviewees speculated that some prospective ICT students may have been steered away from ICT training at TAFE because of negative exposure to ICT at school.

Aspirational influences on young people

This section considers what influences young people’s study and career aspirations and who or what significantly influence the direction of their post-compulsory study and career directions, particularly in ICT. Existing literature on the aspirational influences of young people is reviewed. The views of young people at high school and those studying ICT at TAFE NSW were sought via online surveys to NSW high school students and TAFE NSW ICT students. TAFE ICT student focus groups were conducted and NSW high school education staff were also interviewed.

Significant influences

The literature points to a number of factors which influence young people’s aspirations, and a number of studies identified similar findings in relation to significant aspirational influences. Studies highlight the level in which external factors, including parental expectations and peer plans particularly, appear to play an influential role in young people’s educational choices.

Nguyen & Bloomberg (2014)18 found that a young person’s intention to participate in post-school study is formed and articulated relatively early in the secondary school years, and that intention is a strong predictor of subsequent participation in both university and vocational education and training. Importantly, it found that educational aspirations measured at age 15 years do not change markedly as students grow older, speculating

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that these are formed early and that interventions later in the senior secondary school years may be too late to influence aspirations.

The study by Gemici, Bednarz, Karmel & Lim, (2014)\(^\text{19}\) acknowledges the strong link between young people’s goals and their long term education and work outcomes. A central insight of this study was the level of influence that external factors play in the formation of aspirations. Parental expectations and the educational plans of their peers are key drivers of young peoples’ educational and occupational aspirations. The study reinforces the importance of parent-focused interventions, such as expanding provision of programs which actively engage parents in the career decision-making process, as potentially one avenue to raise the educational and occupational aspirations of Australian youth.

A study by Webb, Black, Morton, Plowright & Roy (2015)\(^\text{20}\) highlights the significance of aspirations as a key influence on young people’s engagement with post-school study. This study explores the impact of geography and neighbourhood on young people’s values and educational and career aspirations. It confirmed that post-school participation by youth in areas of socio-economic disadvantage is lower than for socially advantaged groups. The study highlighted some constraining factors which included:

- young people often lack requisite science, technology and maths (STEM) subjects, because of narrow choices at school, which limit their subsequent possible pathways into professions
- travelling to work or study hamper young people’s participation. Significant constraints include inadequate public transport, reliance on access to a car and the distance to education
- occupational aspirations where much more traditional, and more gender stereotyped
- parental involvement still strongly influenced young people’s aspirations about further training and career directions.

**TAFE NSW ICT student influencers**

In an effort to identify major aspirational influences on TAFE students an online survey was conducted which targeted young student currently undertaking ICT training at TAFE NSW. One of the survey questions asked students to identify who had influenced them in their decision to pursue a career in ICT.

**TAFE NSW ICT student survey**

There were a relatively small number of respondents to the TAFE NSW ICT student online survey, and so the results cannot be considered representative of all young TAFE ICT students. However, the student survey results supported the findings of the current literature which highlights the influence of parents and peers (friends) on young people’s study and career aspirations. The survey additionally revealed that many of the survey respondents had an innate interest in ICT.

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Target audience and influencers

Figure 6 – TAFE NSW ICT student survey – influence on them to pursue a career in ICT

Based on the TAFE NSW ICT student survey data, two thirds of respondents first considered ICT as their future career between the age of 15 and 19 years. There were a number of influencers in the surveyed students’ decision to pursue studies and a career in ICT (figure 3). The most influential factor in a student’s decision to pursue studies and a career in ICT appeared to be an innate interest in ICT (64 per cent). This was followed by the influence of family (17 per cent), which includes parents (12 per cent) and siblings (5 per cent), and friends (17 per cent). School career advisers appear to have played a lesser role in influencing the TAFE ICT student’s decision to pursue an ICT career (12 per cent) (figure 6).

TAFE NSW ICT student focus groups

Focus groups were conducted with young TAFE NSW ICT students. Many factors influenced the TAFE ICT focus group students’ decisions to study and pursue a career in ICT. The major influence across all focus groups was family, especially those with family working in the ICT industry. Many of the focus group participants reported being influenced by the work and stories of family members working in ICT, or those of family colleagues or friends, and had chosen to follow in their footsteps. There were some TAFE ICT students who were coerced by their parents to study ICT, but later found that as they progressed through their course, they discovered a great interest in the area.

A number of TAFE ICT focus group participants mentioned accessing online websites such as the TAFE NSW website and career hubs and websites, some of which showed information about the current job market and roles in demand, and also cited other information sources which had influenced their decision making. The influence of friends and an innate personal interest in ICT were also among the more common influences for TAFE focus group participants to study and consider a career in ICT. Less common factors included work experience from an ICT-related role, and hardware usage from an early age.

TAFE NSW ICT student focus group responses appear to indicate that school had not had a significant influence on these students’ decision to study and work in ICT. A small number of students who did study ICT at school reported that they felt deterred by the content of their school ICT curriculum. TAFE focus group participants mentioned that they had found the ICT studies at school boring as it was targeted to a very basic level, and they felt that school had oversimplified the ICT workplace and the ICT industry.
Influences on school students

NSW high school students were surveyed in relation to career aspirational influences. They were asked how they received general career information and also how they received ICT industry career advice. High school students were asked to identify whether they were currently studying any ICT units at school. As there was a relatively small number of respondents to the high school student survey, the results, while informative are not representative of the NSW high school population.

The NSW high school student survey respondents identified their sources of ICT career advice and these are illustrated in descending order in the graph below (Figure 7). School teachers, online websites and family ranked the highest in relation to providing ICT career advice to the high school student respondents. Most of the non-ICT student received no ICT career advice from either school career advisers or from family members, while family members were a very common source of ICT career information among ICT students.

![NSW high school - ICT career information sources](image)

Parental expectations were explored in interviews with high school staff. NSW high school staff interviewees commented that parents have a huge influence on their children, and they speculated that sometimes parents have excessively high expectations that their child would undertake a university pathway, however some students may lack the ability to meet their parent’s expectations. High school staff mentioned the importance of finding the most appropriate pathway for students with different skillsets, highlighting the significance of matching the pathways to the students’ interests and aptitudes.

The NSW high school student survey respondents showed strong plans to go to university after completing their high school studies (81 per cent). Conversely, only 11 per cent of respondents have plans to study at TAFE and 6 per cent has not yet decided their post-study options. None of the school survey respondents planned to proceed directly to employment or to study at a private college.

Young peoples’ interest in ICT

NSW high school students were surveyed in relation to their general interest in ICT. Based on the results from the survey, school students in the study reported that they began to show interest in ICT between 10 to 15 years of age. High school student’s interest in studying ICT, scored an average of 6.5 out of 10, where a score of 10 shows great interest. 42 per cent of school ICT students showed great interest in studying ICT, 29 per cent showed moderate interest and 29 per cent showed little to no interest in studying ICT. The majority of respondents not currently undertaking ICT at high school showed no interest in pursuing ICT study. Girls at high school generally
revealed less interest in ICT compared with boys at school. When female high school students were asked to rate their interest from a scale of 1 to 10, girls averaged a score of 5 where male school students averaged an interest score of 7.

The high school students surveyed identified that they received career information from multiple sources. About one third of the high school students surveyed were not studying ICT. Almost three quarters of the school students surveyed, who were not studying ICT, had received no career information relating to ICT. They had received general career advice from school teachers, school careers advisers and family. The surveyed school students, not studying ICT, had not received any ICT career information from family or school careers advisers.

**TAFE NSW student interest in ICT**

TAFE NSW ICT student focus group participants were asked at what age they became interested in ICT. The ages at which students in this sample first began to take a general interest in ICT ranged from as young as 4 years up to 23 years old, and the average age was at 13.5 years. Based on comments from the student focus group participants it appears that exposure to hardware and software uses, especially those made for entertainment, encourage student to take a general interest in ICT, although more as a consumer of ICT rather than as a developer or creator of ICT.

When the TAFE ICT student focus group participants were asked at what specific age they started to take interest, and focus on studies and a career in ICT, the student focus group participants responded with ages ranging from 4 to 19 years of age, with an average age of 16. This average age is the age at which most high school students are making decisions relating to selecting their Higher School Certificate (HSC) subjects, coinciding with Year 10 studies at high school.

**Introducing students to ICT**

TAFE NSW ICT and TVET staff were interviewed and twelve responded about the age at which they speculated that school students should first be introduced to Information and Communications Technology (ICT) there was a broad range of responses. Two TAFE ICT staff suggested as early as Kindergarten, while over half (58 per cent) advocated presenting ICT in primary school, certainly by Year 6, prior to the end of primary school education. One TAFE ICT staff member suggested teaching Microsoft Office skills to primary school students, so that the students become competent users of ICT. One quarter of TAFE ICT staff interviewed suggested providing ICT ‘Taster’ programs to high school students at around Years 8 or 9, prior to the students choosing their electives in Year 9. One TAFE staff member mentioned that school students were often asked to bring their own devices (BYOD) to school. Another TAFE staff member mentioned that some ICT skills are being developed coincidentally by students through the use of everyday technology such as writing a report for school in Word document format, or using web applications, such as Google, to search for information. Ten of the twelve TAFE NSW staff interviewed (83 per cent) recommended introducing ICT earlier than Years 10 to 12.

TAFE ICT staff speculated that by Years 10 to 12 many students had already developed quite established ideas about their career aspirations. They proposed that it would be wasted effort to introduce ICT career opportunities to attempt to influence school student’s career aspirations, if they had not already considered a career in ICT. While the study by Nguyen & Bloomberg (2014) also suggest this, feedback from the TAFE NSW ICT student focus groups did not altogether support this supposition. Over one-third of the TAFE NSW student focus group participants challenged this, expressly identifying these high school years, particularly Year 10, and Year 12, as times that they would have highly valued receiving additional career information guidance.
This chapter considers the importance of career guidance to young people. It explores how general career advice and industry specific Information and Communications Technology (ICT) career advice is provided to young people at school. It emphasises critical aspects in providing career advice to high school students such as timing, whether school students receive career information about the ICT industry and whether they are made aware of the significant career opportunities offered by the ICT industry. The research highlights progressive approaches to providing career information and also identifies gaps in provision.

Importance of career guidance

The literature emphasises the importance of career guidance to support young peoples’ career development. What choice? An evaluation of career development services for young people highlights the effective transition of young people from secondary education to working life as important for their social and economic wellbeing. In this study Rainey, Simons, Pudney & Hughes (2008) stress the challenges faced by young people who must navigate a pathway which has become increasingly complex, accentuating that career is now viewed as a continuous journey of adaptation in an ever changing environment.

A study by Hooley & Dodd (2015) provides evidence of the economic benefits of career guidance, arguing that while it is primarily concerned with realising the aspirations and potential of the individual, there is substantial evidence of important social and economic benefits which justify public investment. The paper highlights the support effective career guidance provides to the labour market, the education system and to social equity. This overseas study highlights a range of benefits including individual outcomes of career guidance include increased human capital, social capital and supported transitions to further learning and work. Primary outcomes include increased labour market participation, decreased unemployment, enhanced skills and knowledge base and flexible and mobile labour market, including an improved capacity to ‘read’ or assess and respond to changes in the labour market.

Career Guidance; Handbook for policy makers, Organisation for Economic Co-operation and Development OECD (2004) presents the concept of career self-management skills, which include the combination of attributes and skills such as decision making, self-awareness and self-confidence, proposing that this foundation is laid down at an early age. Hooley & Dodd (2015) also refer to the acquisition of career management skills, commenting that these skills represent a specialised form of human capital which enables individuals to navigate changing labour markets and identify the education and skills pathways which will best develop or advance their careers.

General career advice at school

NSW high school staff interviewees were asked at what junctures throughout the high school stages was career advice initially, and subsequently provided to students. They were also asked what type of career advice was provided, whether it was generalist and did information include specific ICT career advice.

High school staff in the majority advised that high school students are provided with a general introduction to careers in Years 7-8 (high school Stage 4). This career information is not specific to ICT; the initial career information if provided to simply allow students to develop their social skills. School staff interviewees advised that Year 9 high school students are encouraged to begin thinking about choosing their pathways for the future. In Year 10 school students are usually given general careers information. Most students are given general career information, but are not provided with information or advice which is specific to ICT careers or industry.

Two senior NSW high school staff interviewees mentioned that school students should know how to look for career information on their own. However, it should be noted that while young people are knowledgeable and confident using technology such as Facebook, YouTube and searching the web, not everything about a career in ICT is discoverable online.

Sources of generalist career advice

When NSW high school staff interviewees were asked where school careers advisers and school teachers of ICT source their ICT career advice, school staff advised that the Job Guide is provided to all career advisers. University and TAFE NSW course information pamphlets are provided to careers advisers, and they also source information at career expos and online from the web. General information about a range of careers is provided periodically throughout the year to school career advisers by various universities. This information is distributed to NSW high schools through the internal regional career advisers’ networks, which generally meet quarterly.

Several NSW high school staff interviewees commented that high schools that have close relationships with their local TAFE college ICT sections have seen better promotion in ICT by career advisers. They commented on their observation that ICT career information appeared hard to find or access, and that school career advisers, with their highly demanding workload, did have limited knowledge about ICT.

ICT industry specific career advice

The provision of career advice, specifically on ICT, highlighted a number of aspects about most effectively providing career guidance. These aspects were explored and are organised by the following themes:

- when ICT career advice was provided
- what types of ICT career advice
- where or how the advice was sourced
- to whom the ICT career advice was provided.

Additionally, the research identifies gaps in the provision of ICT career advice and finally some progressive or successful approaches to providing ICT career advice to school students or prospective TAFE students.

Effectively timing ICT career advice

When TAFE NSW ICT student focus group participants were asked when they would have liked to receive more ICT career information while still at school, many of them stated that it would have been helpful to have ICT ‘Taster’ programs provided to them in Year 9 when they had to decide on their HSC subject and Year 10 (Stage 5) when they had to choose a career path. TAFE focus group participants commented that Year 10 (Stage 5) could be considered career year, as this was when they were making significant decisions about what future career they might pursue and the direction of study needed to achieve this career.

The TAFE ICT student focus group participants also identified Year 12 (Stage 6) at high school as a significant decision making point when students would have valued receiving more ICT career information. The most common reason stated was that students needed to plan their future study and career. The data suggests that many students value a just in time approach to when they would like to receive career information, at the time when they have to choose a field of study or select a career.

Type of ICT career advice

The NSW high school staff interviewees were asked what types of career information or advice about ICT was provided at school. School staff commented that high schools have access to national career websites such as myFuture, and Job Jump. School staff interviewed advised that they provide a range of types of career information and advice including school talks (one school made it compulsory for parents of interested students to attend, if the student was to participate), career expos, industry speakers and TAFE NSW speakers.

Universities host Career Days which high school students attend on excursion. One high school careers adviser commented that TAFE NSW needs to host and promote more open days for high school students, commenting that in their region the local TAFE college did not initiate contact to promote ICT careers to their high school. Therefore careers promotion of TAFE courses at this high school was totally reliant on the school career adviser’s initiative.

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Two NSW high school staff interviewed mentioned ICT careers webinars, one notably done in collaboration between Digital Careers and Macquarie University. These webinars were rolled out to school career advisers and school teachers and were posted at the NSW DEC Senior Pathways website. Students are sometimes able to attend these seminars.

**Sources of ICT career advice**

NSW high school staff interviewees were asked if they felt that there was adequate support to gain up-to-date and relevant ICT career advice and information, to provide to school students, and if not what additional support they would like. One school staff member commented that school staff new to teaching or new career advisers would have limited access to networks for career information and would therefore find it challenging to obtain up-to-date ICT career advice. They added that these new school staff would need to gather information about ICT careers prior to, or while they work, and develop strong information sources and networks. NSW school staff advised that the external Career Adviser Association of NSW and ACT sends regular eNews to career advisers, approximately once each month.

**School students source of ICT career advice**

The NSW high school student survey respondents revealed disparities in the sources of career information, especially when comparing general career advice and ICT specific career advice. Ensuring that career advisers have adequate information about the range and breadth of ICT career and industry opportunities is critical to ensuring that students at school are fully informed of all career choices, including ICT options, so that they include ICT in the range of career possibilities they consider when choosing study pathways and careers.

High school student survey respondents reported receiving career advice from a range of sources. Their career information sources depended on whether they were studying ICT at school, and whether the career advice was general or ICT specific. However, the largest proportion of school students in the survey reported that they sourced career advice from school teachers. High school students sourcing general information received it from school teachers, then family, school careers advisers and then friends in descending order (figure 8, page 18). This graph illustrates that almost two thirds (64 per cent) of high school students look predominantly to school teachers for general career information. This is followed by family members (57 per cent) and school career advisers (54 per cent).
NSW high school students survey results indicated that high school teachers are the main source of ICT career information to high school students, representing the predominant career information source for over half (56 per cent) of the survey respondents. Online websites (41 per cent) and family members (38 per cent) are also major sources of ICT career information. Career advisers were a less common source of ICT career information (21 per cent), contrary to being a significant source of general career information for students (Figure 9). While over half of students obtained general career advice from school careers advisers, only one fifth of students received ICT career information from school careers advisers, illustrating a potential gap in the information about ICT careers held by schools career advisers.

ICT career information – TAFE NSW student focus groups

TAFE NSW ICT student focus group participants advised that prior to studying at TAFE they obtained career information from a variety of sources. Career websites emerged as the most common initial source of ICT career information among this group, especially career websites which reveal current job market trends, roles in demand and pay rate for different ICT roles. TAFE ICT student focus group participants indicated that this information was highly sought after by them when making career decisions.

TAFE NSW ICT student focus group participants advised that they had received ICT career information from family members, and sometimes from their family’s colleagues, who work in the ICT industry. Friends were also a popular source of ICT career information. Word of mouth and receiving personal career advice appeared to be powerful influencers for the TAFE ICT student focus group participants. One TAFE ICT student commented that having work experience in an ICT-related role had provided them with a great opportunity to meet people and learn more about the ICT industry. TAFE ICT student focus group participants mentioned other sources of ICT career information including school career advisers and school career events. However, schools did not appear to have played a significant role in influencing these TAFE ICT student focus group participants’ decisions to study and consider a career in ICT.
ICT career advice sources – TAFE NSW student survey

An online survey to TAFE NSW ICT students queried their sources of ICT career information. Many TAFE student survey respondents identified that they had always been interested in ICT, and had arguably developed an innate interest in pursuing ICT, although they had also sourced additional ICT career information from a range of sources. However, there were still a significant proportion of TAFE ICT student survey participants who sought and located ICT career information which had encouraged their interest in pursuing ICT. TAFE websites (32 per cent), career events, including combined school talks and career expos (27 per cent), the media (22 per cent) and people working in ICT industry (17 per cent) provided ICT career information which encouraged interest and inspired the survey respondents to study ICT (figure 10).

Figure 10: TAFE NSW student survey - ICT career information sources

ICT career advice provided to whom?

NSW high school staff interviewees were asked whether career advice about ICT was provided to all students, or only to interested students or those currently undertaking ICT study as school. They were also asked about how well ICT careers were promoted at school, whether well promoted, marginally promoted or not promoted.

NSW high school staff advised that generally only ICT school students participated in ICT career events such as the University of Technology Sydney, UTS’s Big Day in ICT. This was often due to the limited capacity within schools. Some high schools only allow students with good performance to join career excursions. School staff advised that career events are often not compulsory, and high school students only choose to attend an event if they consider them interesting. High school students were encouraged to find career information on their own as high schools have limited capacity to cover all possible career options in every industry.

Gaps in provision of ICT career advice

The research identified a number of apparent gaps in the provision of ICT career information to high school students, including promoting ICT careers, accessing comprehensive information about ICT careers, to whom ICT career information is provided and how the information is provided.
Lack of career promotion in ICT

The research examined the promotion of careers in ICT through the high school student survey, and found that it appears that ICT careers are not always highly promoted in schools. The school students’ survey results revealed that only one quarter (26 per cent) of school survey respondents agree that a career in ICT is being well promoted in their schools, compared with 39 per cent said a career in ICT is slightly promoted by their school. The remaining one third (35 per cent) said that they were not aware of the promotion of ICT careers at their school.

NSW high school student survey results indicate gaps in the ICT career information provided by high school career advisers, and provide some insight into the potential need for greater promotion of ICT careers by schools (figure 9, page 18). There may be a possibility that ICT career information is routinely being distributed only to ICT students by schools. High school student survey respondents indicated that a significant proportion of students not undertaking ICT, were not receiving any ICT career information. High school students not currently studying ICT are possibly not being exposed to ICT, or made aware of the enormous occupational possibilities presented by the current ICT industry, nor of emerging technologies and potential future opportunities. This could represent a missed opportunity to promote ICT training and careers to high school students.

Issues with ICT career advice

One NSW high school staff member commented that ICT career information is hard to find or access, and that school career advisers, with their highly demanding workload, may have limited knowledge about ICT. TAFE NSW ICT student survey respondents identified issues in the career information provided to them prior to undertaking their TAFE NSW studies. TAFE ICT student survey respondents identified inadequate ICT career advice as follows:

- poor classification of ICT roles, only mainstream roles were discussed (46 per cent)
- breadth and scope of ICT roles and occupations was not adequately covered. Some areas of ICT were not promoted (42 per cent)
- students’ lack of confidence in career advice (25 per cent)
- information was not up-to-date, as newer and more immersive technology had emerged of which they were not aware (17 per cent)
- prevalence of gender-role stereotypes (8 per cent)
- simply did not receive any career information about ICT. One ICT TAFE student just went along with their father, who asked what their friends were doing and enrolled them in the same course because they had no plans after Year 12.

Gaps receiving ICT specific career advice

TAFE NSW ICT staff interviewees identified specific issues in relation to providing appropriate ICT career advice to high school students and raised the following issues:

- when undertaking ICT class exercises, high school teachers need to explain the purpose and real life application of the activity. Contextualising the ICT task and describing specific applications would ensure that the student learning is more relevant and meaningful. This would support students to better assess their interested in pursuing further studies and potentially a career in ICT
- timing in relation to providing career advice is critical. The need to schedule career information sessions at times when students are not distracted by significant academic events, for example scheduling career information sessions for Year 12 students away from second semester, when their exclusive focus is on completing their Higher School Certificate (HSC) exams. Students indicated that they would value some ‘just in time’ career guidance, and so some ICT promotion could target HSC students just after the completion of the HSC, although as they would no longer be attending school, this would need to be via broadcast or print media
- TAFE NSW staff speculated that some school career advisers may only be part-time, and that some may not have a comprehensive knowledge of the latest ICT career and industry trends.
Progressive approaches to ICT career exploration

NSW high school staff interviewees were asked if there were any other thoughts that the interview had prompted in relation to providing more effective or all-encompassing career advice, in particular ICT career information to high school students. One high school staff member proposed a progressive approach to helping young people identify career direction generally, and this would be relevant to apply to ICT as well. They suggested that rather than asking young students ‘What do you want to do when you grow up?’ ask them ‘What problem do you want to solve?’

When TAFE NSW ICT staff were interviewed in relation to providing better ICT advice and exploration they suggested forums in which ICT career advice could be presented, or better provided to students while still at school including:

- career open days held either at school or on TAFE NSW campuses, including talking to high school students, high school teachers, high school career advisers and parents
- short ICT TAFE ‘Taster’ programs and/or ICT competitions targeting Years 9-10 (Stage 5) high school students
- career evenings or weekend career information events, scheduled to enable parents to attend
- career expos promoting what TAFE NSW has to offer potential students
- promoting ICT careers and training to all school students, not just to students already interested in, or currently studying ICT careers. This represents a significant missed opportunity to promote ICT careers.

TAFE NSW ICT staff interviewed identified strategic groups or people who would add value when providing ICT career advice and promoting TAFE ICT training to prospective students, and these include:

- inviting ICT industry representatives to speak to students about ICT career opportunities, training and the skills which industry really values
- involving parents more, as they are major influencers of their children’s career choice
- involving high school career advisers more, and support the TAFE NSW/school connection.

TAFE NSW ICT staff interviewed suggested particular approaches to provide ICT career advice so that the information would be most successfully received including:

- promoting ICT job roles and specific occupations which are in demand, but which may have been overlooked by career advisers, to raise school students awareness of these ICT occupations
- providing more detailed descriptions of specific ICT roles, including remuneration and the qualifications and training pathways which prepare graduates for these roles
- developing ICT career information through fliers and social media which include specific ICT roles, details about pay scales, and highlighting those which are in high demand
- focusing on ICT as part of science, technology, engineering and mathematics (STEM), and highlight the opportunities provided by ICT, to parents as well as to students, giveb the significant role parents play in their child’s decision making about study and career aspirations
- targeting Generation Zed, currently young people 25 years and under, to provide ICT career information in visual formats, including videos and web links, which are engaging for young people. This generation generally find paper-based format with lengthy text lacklustre and uninspiring.
This chapter considers how Information and Communications Technology (ICT) programs, including the vocational school program Information and Digital Technology (IDT), are offered to students in NSW high schools. The research explores whether ICT has a strong focus at school, whether coding is offered to young people at school, as part of the focus on STEM education and the importance of fostering and developing innovation and entrepreneurial thinking. The significance of introducing ICT earlier at school to raise awareness of technology and exposure to the opportunities ICT provides, and ways to spark school students’ initial interest and understanding of ICT earlier at school are considered.

Cultivating entrepreneurial skills and innovation

The expanding ICT industry and the youth generation arguably thrive on innovation and entrepreneurship, and school provides the major preparatory ground and important foundations to begin preparing the next generation of young people to successfully navigate the transition to post-compulsory training and into the future labour market.

TAFE NSW ICT staff who were interviewed, highlighted the critical importance of cultivating entrepreneurial skills in TAFE students, to enable them to successfully navigate a career in the Information and Communications Technology field. They emphasised the need to foster innovation in TAFE ICT students to ensure success in their studies, a strong transition to employment in the ICT industry and success in the ICT field. One TAFE ICT staff member commented that ‘a critical aspect for students to be successful in ICT is passion, entrepreneurial skills and understanding the potential of technology.’

Some TAFE ICT staff commented on the Australian government’s focus for the first time in recent years in actively promoting technology and innovation, with policy focusing specifically on increasing training in science, technology, engineering or mathematics (STEM) was very encouraging.

TAFE ICT staff interviewed highlighted a range of activities and events which would foster innovation and an entrepreneurial mind-set in TAFE ICT students and these could include Tech meetups; special interest group informal events which focus on specific interests, in this case technology. Meetups are informal get-togethers to learn, do or share something. Attendance at Tech Meetups by parents and school career advisers could provide better insight into the ICT industry, participants’ motivation, and provide an environment which cultivates entrepreneurial thinking in students. Often Meetups are held in environments where alcohol is served, such as hotels, so Tech meetups would need to be held in a youth friendly environment or locations, to enable school students under 18 years old to attend. Entrepreneurial skills could also be fostered through ICT start up groups.

Some TAFE NSW ICT staff interviewees commented on the importance of promoting external TAFE projects to the general public, particularly projects which contribute to the community. Local councils hosting Incubation programs were seen as useful to support innovation and develop ICT students’ entrepreneurial skills. One TAFE ICT teaching section had partnered with local city council to support incubation programs, where the TAFE ICT course involves students in developing an ICT start up.

Coding and computational thinking

Coding is viewed as a way to foster creative thinking and problem solving, all of which are beneficial in cultivating innovation. One of the benefits promoted about learning coding is that it builds computational thinking, creativity and develops entrepreneurial thinking.

Computational thinking is the thought process which involves framing a problem and expressing its solution in a way that a computer can effectively carry out the solution. Computational thinking is mainly practiced in post-compulsory education however its grounding can be gained at school through STEM education. Problem-based learning which is elemental to STEM education, allows students to practice problem solving in a trial and error environment. Computational thinking reformulates a problem by disentangling the segments into manageable units. This enables complex problems to be broken down and addressed using multi-step procedures to find a solution. Computational thinking is in essence a problem solving process, which can be applied to problems of scale to achieve significant improvements in efficiency.
Introducing programming to young learners is seen to help improve mathematics, logical, creative and critical thinking. Brown (2015)\textsuperscript{25} cites learning computer languages as similar to learning foreign language or a musical instrument. Previous research established that the more languages children learn while young, the more they use these languages in the future. Brown mentions that a student aged twelve went as far as thinking of pursuing programming in the future and developing something new that could change the world. Learning about ICT earlier at school could potentially increase opportunities to support the budding ICT professionals of the future.

\textbf{ICT and VET in schools (VETiS)}

A range of Information and Communications Technology (ICT) programs are delivered by NSW high schools. These ICT programs include:

- \textit{Technology} (Mandatory) Year 7-8 (Stage 4) comprising a range of technology streams
- \textit{Information and Software Technology} (IST) Year 9-10 (Stage 5)
- \textit{Information and Digital Technology} (IDT VET) Year 11-12 (Stage 6) offers three IDT streams:
  - Digital Animation
  - Networking and hardware
  - Web and Software applications
- \textit{Information Process and Technology} (IPT) Year 11-12 (Stage 6)
- \textit{Software Design and Development} (SDD) Year 11-12 (Stage 6).

\textit{Information and Digital Technology} (IDT) is the vocational ICT program offered at school, and is delivered through the vocational Industry Curriculum Frameworks (ICF), accredited by the Board of Studies Teaching and Educational Standards NSW (BOSTES). This vocational \textit{Information and Digital Technology} program can be delivered at school, as VET in Schools (VETiS), alternatively IDT can be delivered to high school students on TAFE NSW premises and this is known as TAFE delivered VET (TVET).

\textbf{Offered coding at school}

NSW high school students were surveyed about career advice generally, ICT career advice specifically, and were asked if they had been offered coding at school. Among the high school student survey respondents, two thirds (66 per cent) were studying some form of Information and Communications Technology (ICT) at school. However, under half of the respondents studying ICT have been offered the opportunity to study computer coding or programming at school (\textit{figure 11}). One high school ICT student survey respondent mentioned that coding is not offered in the Information Software and Technology (IST) subject they were undertaking, commenting ‘Coding is not available – the Information Software Technology class is just learning basics of trouble shooting, hardware, software, etc’ – an ICT school student respondent.

Approximately two thirds (68 per cent) of high school student survey respondents were aware that the vocational Information Digital and Technology (IDT) was offered by their schools. The remaining students were uncertain about whether IDT courses were offered at their school. Participation in IDT was relatively low in this sample, where the largest group of students studying ICT (46 per cent) were undertaking Information Processes and Technology (IPT). Students undertaking ICT were all studying school-based ICT studies, and none of the students in this survey sample had undertaken their ICT studies through a TVET program at TAFE NSW.

Influence of ICT school studies

TAFE ICT student focus group participants were asked about the influence of ICT school studies which they had previously undertaken. Participants had mixed views about their experience of Information and Digital Technology vocational program at high school. Some of the participants from two focus groups had previously undertaken Information and Digital Technology VET in School (VETiS), and commented that their IDT VETiS program had motivated them to pursue ICT and to study at TAFE NSW. The easy transition from their school VET program to the TAFE Certificate IV in ICT and then the pathways to ICT Diploma level qualifications had encouraged some students to study at TAFE NSW.

Conversely, participants from two other focus groups felt strongly opposed to the value of the IDT VETiS program provided at their schools. Four participants in one focus group who took the IDT VETiS programs commented that they had found the content boring and claimed that this had not encouraged them to study ICT. In the fifth TAFE ICT student focus group only one participant had studied the IDT VETiS program. This participant also stated that they had felt discouraged from studying ICT because of their poor school experience. This highlights the disparate experiences of high school students in relation to ICT delivered at school.

High school staff interviewees were asked whether Information and Digital Technology (IDT) was delivered as TVET, that is IDT VET course delivered at TAFE NSW, or whether IDT VET courses were delivered on school premises (VETiS) by VET trained school teachers. High school staff advised that schools preferred to deliver IDT VET courses at school, if they had VET trained school teachers available to deliver the program, rather than have school students trained off-site at TAFE NSW. High school staff speculated that the decision to deliver VET training on-site at school might be linked to the funding model where schools potentially lose funding if the high school students’ vocational training is delivered off-site.
VET in schools: engaging schools and students

TAFE NSW ICT staff interviewees were asked about their perception or awareness of high schools engagement with Information and Digital Technology (IDT) vocational courses, and how TAFE could better promote ICT to high school students, to encourage them to consider ICT VET course at school and potentially ICT courses at TAFE NSW.

A number of TAFE NSW ICT staff commented on the financial implications for high schools in relation to TVET, where schools lose funding when school students go off-site to TAFE to undertake vocational programs. TAFE staff also speculated that there may be occasions when school students were not actively encouraged to undertake TAFE NSW delivered VET (TVET) courses. Some TAFE ICT staff interviewees expressed the perception that high school students are not always informed, or encouraged by the school to consider TVET course offered by their local TAFE college. They surmised that this may be because of the cost to the school, potential timetabling clashes for school students between school and TAFE classes, or issues with students travelling off-site. One TAFE NSW TVET staff member commented on their knowledge of a school student who left school to undertake a TAFE NSW course, and had been unaware that TAFE was offering the same course, via TVET, to current high school students at their school.

TAFE NSW ICT staff highlighted the importance of developing a strong relationship with local high schools, commenting that TAFE NSW could also improve their partnerships with private and Catholic schools. Engaging with high schools and promoting TVET courses, including the high level of hands-on experience provided by TVET was seen as important. There was also value in promoting the easy transition pathways from ICT at Certificate III level undertaken at high school to ICT Certificate IV and Diploma in ICT, which students could complete in one year at TAFE NSW after graduating from high school.

Over one quarter of the TAFE ICT staff interviewed emphasised the importance of promoting TVET to parents, speculating that it seemed to them that parents were not well informed about TVET courses, which are delivered at TAFE. TAFE staff also suggested approaching school career advisers and coordinators to promote TVET, commenting that ICT VET courses appeared not to be comprehensively promoted in high schools. Encouraging high school students to study ICT TVET, delivered at TAFE, would allow school students to experience TAFE NSW campus life. Encouraging school students to enrol in TAFE NSW part-time or in short courses, as a ‘Taster’ while they are still at school would also achieve this. Current TAFE NSW students sharing their TAFE ICT educational experience with school students was also viewed as an effective way to influence school students to consider studying ICT at TAFE NSW.

TAFE NSW ICT staff interviewees proposed a variety of strategies aimed at engaging school students in ICT including ‘Try-a-skill’ days to increase young people exposure to ICT, and to raise school students’ awareness of the diversity which exists within the ICT industry. One TAFE ICT staff member mentioned that students appeared to be more interested in web technology, and that web design captivated more students than networking, therefore it was considered important to carefully choose ICT career information topics which school students would find interesting to successfully engage them.

TAFE ICT staff proposed other creative approaches to engaging high school students included offering TVET as an online course, offer ICT gaming as a school TVET course, and offering preparation for Higher School Certificate (HSC) classes in school holidays, in a similar format to a ‘summer school’, for ICT units with the aim to support students to succeed in their HSC exams.
Promoting ICT

This chapter considers the promotion of Information and Communications Technology (ICT) careers and the relevant TAFE NSW study pathways to young people. It seeks to identify whether ICT is being well promoted at school and whether there are more effective ways to promote ICT to the youth and young adult target audience dubbed Generation Zed, or the iGeneration. The research considers current strategies and also proposed approaches to improve promoting ICT qualifications delivered by TAFE NSW.

ICT and TAFE NSW promoted at school

The research investigated whether NSW high school staff considered that a career in ICT was considered of equal importance to other careers, and whether staff believed that ICT careers where as strongly promoted as other careers to high school students. The majority of high school staff interviewed said that ICT was considered of equal importance compared to other careers, with one school staff member speculating that ICT was not given the same priority. High school staff interviewees acknowledged that ICT is now pervasive in every industry, with one school staff member proposing that ICT should be introduced as part of the school curriculum as early as possible and recommending that this be Years 7 and 8 (Stage 4) at high school.

ICT TVET promoted at school

NSW high school staff interviewees were asked about their perception of the promotion of the Information and Digital Technology (IDT) the vocational program at school, whether delivered at school (VETiS) or by TAFE (TVET). They were asked to comment on whether IDT VET courses were well promoted, marginally, or not promoted at all. All school staff interviewees agreed that IDT VET programs were well promoted in NSW public high schools.

NSW high school staff interviewees were asked how well TAFE NSW is promoted, compared with university, as a favourable post-school study option to ICT students, and how TAFE NSW could be more effectively promoted. The majority of high school staff interviewed commented that school careers advisers are encouraged to promote all post-school study options, not just university pathways. However, fewer school staff members commented on whether TAFE NSW and university pathways are promoted equally, noting that they had observed that the vast majority of school students aspire to attend university. One high school staff member commented that they were aware that private schools were inclined to lean towards direct university pathways, speculating that VET programs may be less actively promoted by the private school sector. One high school staff interviewee mentioned the importance of finding the most appropriate pathway for students with different skillsets, highlighting the significance of matching the pathways, whether TAFE NSW or university, to the students’ interests and aptitudes. The school staff member commented anecdotally that parents have a huge influence on their children, however sometimes the expectation that their child would undertake a university pathway is excessively high, and some high school graduates may not have the aptitude or capacity to meet these parental expectations.

One high school staff interviewee revealed that some school students not planning to attend university were considering private education providers which provided more interesting courses. However, they speculated that some of the courses offered by private institutions did not always have ideal outcomes as some of them may be in some industries which did not have strong forecast growth in Australia.

NSW high school staff interviewees suggested that actively promoting ICT studies available at TAFE NSW was an obvious strategy, as was increasing school students’ participation in TAFE NSW delivered IDT VET (TVET) study, and these approaches could potentially lead to increased post-school participation in TAFE ICT programs. High school staff interviewees remarked that TAFE NSW needs stronger communication with local high schools and access to younger students in Years 9 and 10 (Stage 5) at high school. They speculated that it may be more difficult to change older students’ career aspirations. Conversely, other high school staff suggested promoting TAFE NSW studies to high school students before the end of Year 12, assuming that students who suddenly decide that they want to study at TAFE NSW may have difficulty enrolling in their preferred ICT course.

Both NSW high school and TAFE NSW ICT staff interviewees suggested that TAFE publish more good news stories highlighting TAFE ICT students’ and graduates’ success stories. These could be published on the web, TAFE websites, YouTube as well as in mainstream print media, such as local newspapers, to promote training and career opportunities in ICT study at TAFE and raise TAFE NSW’ profile to high school students.
Promoting ICT at TAFE NSW to young people

Many TAFE NSW ICT student focus group participants commented that schools provide a less than comprehensive description of ICT and what the industry encompasses, commenting that in their experience the school curriculum over-simplifies the ICT industry. They commented that only the more common ICT roles are discussed at school, and they had been unaware of the vast occupational roles and opportunities available in ICT. Some focus group participants added that they had received no ICT career information at all prior their TAFE NSW studies. This highlights the need for more detailed information about the scope and diversity of jobs in the ICT industry, to be developed, provided and promoted to young people at high school to raise awareness of ICT and to better engage high school students to consider a career in ICT.

A number of TAFE NSW ICT student focus group participants who had initially enrolled at university, but had subsequently discontinued their university studies prior to enrolling at TAFE NSW, commented that TAFE’s study load suited them better than the rigours of university’s academic approach. These TAFE students suggested that ICT ‘Taster’ programs should be delivered frequently over the course of the year to raise awareness and to improve high school students’ view of ICT training delivered by TAFE NSW. The ICT student focus group participants commented that demonstrating actual ICT skills to school students would give them a better understanding of what it means to work in the ICT field.

TAFE NSW ICT student focus group participants when asked how to more effectively promote ICT to young people most frequently suggested providing ICT ‘Taster’ programs to Years 9-10 high school students. They also proposed increasing the promotion of Information and Digital Technology (IDT) vocational school courses delivered on-site at TAFE.

Some TAFE NSW ICT student focus group participants suggested that TAFE ICT staff visit schools and provide ICT career advice to support school career advisers and to supplement the information schools provide. When TAFE NSW provides introductory information days at school or TAFE campuses, they need to use more visually engaging information which provides concise, relevant information. The focus group participants suggested that useful information would include:

- what students will be studying in ICT training at TAFE NSW
- what ICT infrastructure the students would access at TAFE NSW
- the variety of different ICT roles, including fact and figures such as pay rates
- the benefits of TAFE NSW delivered courses.

Some TAFE NSW ICT student focus group participants recommended taking a more contemporary ‘Generation-Zed’ approach, and developing an app for TAFE NSW ICT information to target prospective students. They suggested that the app be gaming themed with tasks encouraging the use of ICT. The app could also be an information hub which contains details about ICT careers, ICT roles and other relevant material. Other suggestions by TAFE ICT student focus group participants included placing course advertisements in places people frequent, or commonly view, for example advertising in shopping centres or on Coca Cola cans.

Parental influence over young people’s career aspirations is strong according to the observations of some TAFE NSW ICT staff interviewees. A significant strategy highlighted by six of the thirteen, almost half the TAFE ICT staff interviewed in relation to publicising ICT to young people was the importance of promoting to parents, as well as to young people. ‘Sell ICT to the parents,’ advised one TAFE NSW ICT head teacher.

TAFE NSW ICT staff interviewed suggested providing ICT information sessions with high school career advisers to get schools more involved in promoting ICT careers. There was a perception by almost half of the TAFE NSW staff interviewed that school career advisers, and possibly ICT school teachers, lack current comprehensive information about careers in ICT. TAFE ICT staff suggested that one way to address this could be to develop ICT information pamphlets and distribute these to TAFE TVET Institute Consultants (TICs), high schools and potentially to high school career advisers across NSW. ICT career information pamphlets could include:

- detailed information about specific ICT occupations
- ICT occupations forecast to grow over the next few years (2, 5, 10 years)
- relevant ICT qualifications, streams and TAFE NSW study pathways.
TAFE NSW ICT staff interviewees highlighted that the strategic timing of state-wide TAFE NSW advertising campaigns during school students’ subject selection periods was considered of critically importance to encourage school students to consider ICT study delivered by TAFE NSW. Posting TAFE NSW offers live on TAFE websites earlier, timed when Year 12 high school students are not engrossed in completing their HSC exams, or have already decided on their future study pathway. Identifying appropriate timing applies for all ICT promotional events.

**Marketing ICT career information**

Marketing TAFE NSW ICT courses generally was viewed as important by all TAFE ICT staff, with critical aspects including:

- promoting TAFE NSW ICT training online and through websites. Most young people and prospective students looked online for information
- locating TAFE NSW course advertisements on websites which have built-in advertisement spaces, especially sites popular with young people
- holding ICT information sessions with TVET teachers and high school students
- involving local youth centres to promote ICT careers to their clients, speculating that they would potentially have a captive audience who were looking for career direction and advice.

Several TAFE NSW ICT staff felt that TAFE could improve their overall marketing, commenting that TAFE NSW ICT success and achievements were not adequately reported in the media. Additionally TAFE ICT staff commented that TAFE websites and TAFE courses online required search engine optimisation to improved search-ability and ensure that TAFE NSW ICT programs could be readily found in a simple search. TAFE ICT student focus group participants confirmed this, with those who had searched TAFE websites for career information complaining of limited information and having experienced significant difficulties navigating the TAFE NSW website.

**Improving TAFE NSW and ICT promotion**

The research explored ideas and strategies on improving the promotion of ICT to young people at school. Both NSW high school staff and TAFE NSW ICT staff interviewees were asked how ICT career advice could be improved and provided to young people at school, including to their parents. Educational staff interviewees identified a raft of current successful strategies, or proposed approaches, to attract young people into an ICT career through training delivered by TAFE NSW. These promotional activities suggested are collated here and they include:

- incorporating ICT in early stage curriculum such as Years 7 and 8 (Stage 4) at high school
- providing ICT career seminars and information sessions to which parents are invited, preferably scheduled in the evening to facilitate parents’ attendance
- participating in career expos and supporting high school students to attend expos
- promoting ICT in entertaining and engaging ways such as excursions, big days out, big days in, fun activities and competition events, using engaging approaches such as gaming to attract school students attention at events, and encourage their interest in ICT
- encouraging young people’s participation in WordPress camps, ICT Boot camp with challenges related to web development with themes which can be changed to suit course topic. Encourage both school students, and potentially their parents, to raise awareness of the opportunities provided by a career in ICT
- participating in Hour of Code and other coding challenges, where students use coding to solve problems
- hosting ‘Try a skill’ TAFE ICT events, ICT school days and ICT ‘Taster’ programs at TAFE campuses to stimulate high school students interest in ICT. TAFE NSW ICT staff suggested that it would be best to hold ‘Taster’ events twice a year. In semester one targeting Year 12 high school students, and in second semester to target younger high school students
- facilitating ICT career sessions which include personal meetings with members of ICT industry bodies or guest speakers from highly regarded ICT companies for example Cisco or Google
• visiting schools to promote TAFE NSW courses to high school teachers and students, and high schools inviting TAFE NSW ICT staff or TAFE student graduates working in the ICT industry, as guest speakers, to promote ICT training delivered at TAFE NSW to current school students
• developing and distributing brochures and newsletter which highlight ICT career opportunities to school students, including to their parents
• providing new short courses which appeal to current ICT trends such as apps development or hack-a-thons
• offering short holiday courses, such as ICT Summer Schools to high school students to inspire their curiosity in ICT, or to university graduates having difficulty find a job, to top-up their current skill set
• advertising TAFE ICT courses in Careers with Code an ICT promotional publication which promotes ICT careers to young people, linking ICT careers to relevant university degree pathways. TAFE NSW could advertise TAFE pathways to ICT occupations however, this would require funding
• publishing good news stories on TAFE NSW ICT programs or TAFE ICT students in local and community newspapers
• paid advertising of TAFE NSW ICT courses in magazines such as Parents and Citizen magazine
• identifying and promoting opportunities for ICT scholarships or internships to encourage students to undertake ICT study.

Issues promoting TAFE NSW
NSW high school staff interviewees were prompted for further thoughts about providing more effective, all-encompassing ICT career advice to school students. High school staff interviewees made the overall comment that universities seemed to be better at promoting ICT career and course information and that TAFE NSW needed to improve their promotion of ICT to schools. In their view this represented a significant unexploited opportunity for TAFE NSW.
The importance of partnerships

The research explores the importance of partnerships between TAFE NSW and key stakeholders. It examines how these partnerships can be better developed or more strongly engaged to effectively promote TAFE NSW delivered Information and Communications Technology (ICT) programs, particularly to engage young people in ICT training and the ICT industry. This chapter considers the importance of the TAFE NSW and NSW high school connection and the value of other partnerships in promoting ICT delivered by TAFE NSW.

TAFE NSW and school connection

NSW high school staff interviewees were asked whether their high school has an active, positive relationship or partnership with the TAFE NSW campus in their area, and if so, who was the relationship predominantly between. High school staff interviewed generally felt that there was a constructive relationship between their high school and the local TAFE campus. However, one school staff member disagreed, citing the relationship weakening due to policy changes such as the implementation of the NSW Smart and Skilled funding policy for vocational education and training and the recent departmental separation between TAFE NSW and NSW Department of Education and Communities.

One high school staff member interviewed commented that their regional high school had a very strong relationship with the local TAFE, mentioning that high school students’ parents were impressed with the TAFE college and had remarked on the great information which TAFE provided. Conversely, one school careers adviser cited a poor relationship with an inner metropolitan TAFE NSW college, who in their view, seemed to lack initiative in promoting TAFE courses to the local high school.

TAFE NSW ICT staff interviewees commented that high school career advisers should promote ICT but that it was important to ensure that they have a thorough understanding of the industry. TAFE ICT staff interviewees mentioned the need to promote the ICT industry to the general community to raise awareness and understanding that technology now influences every industry and in many cases is revolutionising industries and occupations.

NSW high school staff when interviewed highlighted an innovative partnership at one regional high school, providing students with the option to participate in a university degree collaboration. This is promoted to students who are at risk of dropping out of school, youth at risk, who are interested in ICT but are finding study challenging. This provided a pathway to a higher education degree delivered in collaboration between the local TAFE college and the local university. An advantage for the students is that entry to the degree program is not dependant on their Australian Tertiary Admission Rank (ATAR) marks.

Industry partnerships to promote ICT and TAFE NSW

TAFE NSW ICT staff interviewees were asked to consider external bodies who are, or could potentially, partner with TAFE NSW to promote ICT vocational training in TAFE NSW to young people. TAFE NSW ICT staff agreed that TAFE partnering with major ICT companies was seen as a valuable way to raise TAFE’s profile and the image of training delivered by TAFE NSW. They also remarked that companies willing to provide work experience, or host student excursions to familiarise students to ICT workplaces would also be highly beneficial. TAFE staff interviewees suggested a range of external bodies that might assist in promoting TAFE NSW ICT courses to young people as follows:

- Australian Computer Society (ACS) although TAFE NSW staff interviewees commented that they seem to focus on promoting their own products. ACS could focus more on appealing to young students to take up ICT training and work
- Cisco certification has credit towards TAFE NSW qualifications, and Cisco actively promotes TAFE
- collaboration with Microsoft
- Digital Careers initiatives which aim to engage Australia’s youth in the field of ICT, through innovative programs and challenges targeting primary and secondary school students
• Data61 – National ICT Australia (NICTA) and Commonwealth Scientific and Industrial Research Organisation (CSIRO) Digital Productivity merged in late 2015 to become Data61. Data61 has recently developed a job matching platform called Ribit which links STEM higher education students seeking work with small business and innovative employers. To date Data61 have focused on university students, but are now exploring including TAFE NSW ICT students in the Ribit initiative.

• Local councils hosting ICT incubation programs

• Local small business employers seeking to recruit TAFE NSW ICT graduates.

Several TAFE NSW ICT staff reported that small business employers in their area, in suburban metropolitan locations in some cases appeared to prefer TAFE NSW graduates over university graduates, as they considered TAFE graduates had more practical experience and problem solving skills. TAFE ICT staff interviewees encouraged promoting the job-readiness of TAFE ICT graduates, which make graduates attractive candidates to some ICT employers. TAFE NSW ICT graduates have hands-on skills, problem solving abilities and have often worked in project teams as part of their TAFE studies. One TAFE ICT staff member remarked that ‘Once on the job they (TAFE ICT graduates) hit the ground running’.

TAFE NSW ICT staff interviewees commented on the potential for TAFE NSW to work with businesses and companies to provide the type of ICT training needed by staff in their company. TAFE NSW could also assist companies by identifying ICT student graduates, to fill vacant ICT positions in businesses and companies. Some TAFE NSW ICT staff considered that traineeships appear to be under-utilised, TAFE ICT trainees could be a cost effective way to recruit workers, while providing the employer with traineeship incentives.
This chapter explores raising the profile of TAFE NSW as a provider of excellence in vocational education and training in Information and Communications Technology (ICT). It considers a range of topics including outcomes for ICT graduates, and their transition to employment in the ICT industry. The research considers young people’s understanding of various pathways to employment and TAFE NSW ICT students’ perception on the potential benefits and possible disadvantages of studying ICT at TAFE NSW when compared with ICT study at university.

Raising TAFE NSW’ profile

The report by Beddie (2015) recognizes the intractable nature of the lack of parity of esteem between post-compulsory education and higher education, commenting on the perennial aspect of this issue. TAFE ICT staff were questioned about raising TAFE NSW’ profile to prospective students and to employers, in particular these groups’ perception of the value of TAFE training. TAFE NSW staff interviewees considered raising the profile of TAFE as important and suggested a number of approaches to influence the positive esteem in which TAFE NSW is held, including:

- developing employer partnerships, and promoting activities such as ‘Try-a-skill’ days between TAFE ICT students and local employers. This would provide a win-win situation where TAFE ICT students could gain insight and experience while ICT employers would have the advantage of a risk free opportunity to link with excellent potential ICT employees
- workplace visits by TAFE ICT students to ICT businesses and industries which promote students skills and highlight what TAFE NSW ICT graduates can offer employers
- marketing TAFE NSW ICT graduate good news stories in the media.

Several ICT staff mentioned that small business employers already seek TAFE NSW students because employers value TAFE graduates practical skills, problem solving and team work, and some employers prefer new recruits so that they can shape their work practices to suit the company.

TAFE NSW outcomes

Perceived relevance of TAFE NSW ICT study to industry

When TAFE NSW ICT student focus group participants were asked about the appropriateness of their TAFE NSW ICT studies most students felt that the practical skills they learned at TAFE were relevant and could be applied to an ICT job. One student in particular mentioned that their TAFE NSW qualification is all they needs from their goal job. However, TAFE students felt that skills provided would vary between different qualification levels. They commented that the higher the ICT qualification, the more likely the skills learned could be applied to a job in the ICT industry. TAFE NSW ICT focus group participants commented on their perception of the value and application of ICT qualifications in relation to the job market as follows:

- Diploma level skills can certainly be applied to real work scenarios
- Certificate IV level had some practical skills that could be applied to work
- Certificate III level skills were considered not relevant to the workplace. Students commented that skills taught at this level were rudimentary and would be considered basic foundations to ICT.

A number of TAFE NSW ICT student focus group participants did not consider that all units of competency taught in their course were relevant to ICT. Some units which students considered as irrelevant included:

- Workplace health and safety
- Business management
- Ethics and sustainability.

TAFE NSW ICT student focus group participants mentioned that they would prefer the ability to choose which units of competency they study in their ICT course. However, many students seemed unaware that companies require these supplementary skills. There appeared to be a need for TAFE NSW ICT staff to clarify to students the relevance of the knowledge provided by these particular units and to highlight their value in the workplace, particularly to employers, to better engage ICT students in these areas of learning.

**Transition to ICT work**

**Career guidance and the labour market**

A study by Dolphin (2014) on improving career opportunities and youth transitions in Britain and Europe, emphasises the connection between labour market transition and career guidance. The report highlighted the speed at which the labour market and occupations are changing, and the need for high quality current career guidance to support young peoples’ transition from school education to training and employment. It focused on the need to raise the status of VET as a valid alternative pathway, alongside university, to secure employment and also the need for increased industry and employer engagement.

TAFE NSW ICT staff mentioned current job recruitment advertisements, in which employers often request previous employment experience and higher education qualifications, which young TAFE ICT graduates do not routinely hold. This highlights the need to encourage employers to consider providing some work experience to students; otherwise it creates the dilemma of a ‘Catch 22’ situation; ‘To apply for a job, you need to have a few years’ experience. But in order to gain experience, you need to first get a job.’ Networking and developing industry and employer connections for TAFE ICT students was seen as critical to addressing the issue around transition to employment.

TAFE NSW ICT staff interviewees suggested that TAFE ICT graduates apply directly to companies for ICT positions as a potential approach to addressing the challenge for ICT graduates transition to employment. This was an alternative to applying for ICT positions via a recruitment agency who may cull the TAFE NSW graduates, although they have the required skills, in favour of university graduates. TAFE ICT staff interviewees also suggested that TAFE students be encouraged to keep work logged in a portfolio during their ICT studies to demonstrate their experience, even though it may not be direct employment experience, this would demonstrate their ICT knowledge and capabilities.

**Credential creep**

TAFE NSW ICT staff interviewees commented on the requirement by recruiters and employers for higher ICT level qualifications, which may be contributing to credential creep in the ICT industry. Credential creep encapsulates the process of increasing minimum job requirements. This may happen when a professional organisation increases the entry requirements to a profession, or it may be the result of ‘one-upmanship’ among candidates for a job, creating a kind of artificial increase in required credentials for a position. TAFE NSW ICT staff speculated that credential creep may be increasing pressure on young people to achieve higher ICT qualifications before applying for jobs in the ICT field.

**TAFE NSW students seek work experience**

In the study on youth transitions Dolphin (2014) emphasises the importance of work experience and highlights the critical importance of work placement to provide a pathway for many students to secure their first full-time job. Dolphin asserts that some kind of work experience or work placement is viewed as an important component in successful youth transition into the labour market.

TAFE NSW ICT student focus group participants also raised the issue of work experience. Many students value work experience and acknowledge its importance, and felt that the employment experience required for what they considered entry level positions was unreasonable and difficult to achieve. Many students consider that internships and apprenticeships would be valuable and wanted TAFE NSW to provide or facilitate more work-placement opportunities, whether paid or unpaid. Many TAFE NSW ICT students commented that they have the necessary ICT skills but lack the work experience to make them attractive candidates to ICT employers.

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TAFE NSW ICT staff interviewees speculated on a range of issues which might confront TAFE ICT graduates, including TAFE ICT students assuming that they would achieve a highly paid job immediately on graduation from TAFE. TAFE NSW ICT staff commented that to achieve high salaries in the ICT field generally takes time and some experience working in the industry.

Jobs for TAFE NSW graduates

TAFE NSW ICT student focus group participants commented that despite acknowledging that skills learned from their courses can be applied to actual work, a large proportion of respondents felt that it would be difficult to find a job in the ICT field when they graduate, even if they hold a Diploma level qualification. Conversely, some students considered that their qualifications were ideal for the ICT roles to which they aspire. Common concerns expressed by many of the TAFE ICT student focus group participants included:

- uncertainty about how to identify an ICT career entry point, or ICT entry level positions
- seemingly unreasonable work experience requirement for entry level positions, especially jobs advertised online by recruitment companies such as SEEK
- requirement by the majority of employers for candidates to hold a ICT university degree
- student’s speculated that an ICT graduate holding qualifications at Certificate III level or below would be unlikely to gain ICT employment in the current job market.

There may be implications for the way TAFE NSW ICT students are currently searching for entry level ICT positions. Some students may be searching for junior-level positions, which normally require at least 1-3 years employment experience, rather than entry-level positions aimed at new entrant ICT graduates.

What about university?

This section comments on the lack of parity of esteem experienced between post-compulsory education including vocational education and training delivered by TAFE NSW when compared to higher education. It identifies the significantly high level of high school students who aspire to attend university, and TAFE NSW staff and students’ experiences and perspectives on ICT study at TAFE NSW and university.

University and qualification creep

TAFE NSW ICT staff interviewees were asked for their perspective on parity of esteem of VET. Half of the TAFE staff interviewees commented that they were aware of a perception of university education often being held in higher regard compared with TAFE NSW qualifications. Over half of the high school staff interviewees commented that parents hold university education in high regard and want their children to attain a university qualification. High school staff commented that high achieving ICT school students aim to go to university rather than to TAFE, with one school staff member observing that academically inclined higher school certificate (HSC) level students would usually elect university pathways over TAFE NSW as a post-school study option. However, high school staff speculated that not all HSC graduates were able to make a successful direct transition from school to university.

NSW high school student survey respondents overwhelmingly (80 per cent) planned to attend university after completing their HSC studies. One TAFE ICT staff interviewee mentioned their experience of having an almost empty room during one of their TAFE NSW ICT career information presentations at a local high school. They commented that at high school careers events, university careers staff appeared to be given priority over TAFE NSW staff.

However, TAFE NSW ICT staff interviewees observed that presenting ICT career information talks at schools has, in their view, broadened school students and school teachers’ awareness of the alternative of TAFE NSW studies as further options.
TAFE NSW versus university – students’ perspective

When TAFE NSW ICT student focus group participants were asked why they chose to study ICT at TAFE rather than at university, many TAFE students commented that they sought the opportunity to use TAFE as a pathway to a university degree. Responses were gathered comparing TAFE NSW students’ perception of the benefits and the disadvantages of studying at TAFE NSW rather than at university. The following responses highlighted TAFE ICT student focus group participants’ suppositions on the positives and negatives of studying at TAFE NSW.

Perceived benefits of studying at TAFE NSW

TAFE NSW ICT student focus group participants provided the following perspective on the benefits of studying ICT at TAFE NSW rather than at university:

- TAFE NSW offers more hands-on and practical experience compared with university study where the content is mostly theoretical
- TAFE NSW has a lower student to teacher ratio; therefore students requiring individual attention are able to gain this from their TAFE teachers. Students who had previously attended university, and subsequently studied at TAFE, identified that gaining adequate individual assistance had been an issue for them at university
- fewer students in TAFE NSW classes meant that the TAFE students have greater access to ICT course infrastructure
- more student collaborative work in TAFE compared with university, meant that managing project work and teamwork were being learned while studying at TAFE
- a few students who went to university prior to TAFE commented negatively about their university experience, attributing this to what they found to be an overwhelming workload and high level of theoretical learning
- TAFE NSW students who perform well are eager to assist those students who are struggling in their studies, this collaborative environment raised the overall class performance
- many students found the TAFE learning environment ‘friendlier’, and an easier fit with their peers
- some TAFE ICT staff speculated that local small business employers felt TAFE graduates were more knowledgeable in the application of ICT when compared with university graduates.

Perceived disadvantage of studying at TAFE NSW compared with university

TAFE NSW ICT student focus group participants provided their perspective on the disadvantages of studying ICT at TAFE rather than at university as follows:

- young people and the school community hold university education in much higher regard compared with TAFE training and education, highlighting the lack of parity of esteem for TAFE NSW
- TAFE NSW fees have increased markedly from 2015 and in some cases TAFE qualifications costs were equivalent to, or in some cases exceeded, the cost of some university degrees
- some TAFE NSW ICT students commented on the limited ranges of ICT courses available at some smaller regional or rural TAFE campuses. Metropolitan TAFE campuses may offer a greater range of ICT courses, and students who wish to study a specific ICT course not available in regional areas, may be obliged to commute to a city campus
- some TAFE NSW participants reported that TAFE ICT infrastructure was not as up-to-date as they would have preferred, for example one college was still using Windows Server 2003
- lack of collaborative student project or work experience in certain campuses, possibly due to small classes
- current job market requirements for several years of employment experience and higher education qualifications from graduate recruits, which TAFE NSW students felt they would have difficulty achieving.

TAFE NSW ICT student survey sample were asked about their plans on graduating from TAFE NSW. One third of TAFE student survey respondents plan to further their ICT education at university and another third of TAFE respondents plan to find a job in the ICT industry. One quarter of TAFE NSW student survey respondents are unsure of their future plans after their complete their TAFE studies.
Pathways to university

When TAFE NSW ICT staff were asked whether they thought that TAFE NSW provided a pathway to university two thirds of the TAFE staff interviewees agreed. One TAFE staff member speculated that it may be the main reason for some student’s enrolment, suggesting that a pathway to university was the focus of many TAFE students. They commented that TAFE can provide underlying skills, and an easier transition compared with direct entry from high school to university. Another TAFE staff member interviewed commented that in their view a pathway to a university qualification was not necessarily the emphasis of all TAFE NSW ICT students.

TAFE NSW ICT staff highlighted that many universities now offer their own pathways into their undergraduate degrees, which may impact on the university pathway benefit offered to potential students by TAFE NSW. TAFE ICT staff speculated that recent changes to the VET funding model, and the increased cost of TAFE NSW qualifications, which may be viewed as expensive, and in some cases TAFE fees being more costly than university fees, could potentially impact on the financial appeal of TAFE NSW as a training option.
Systemic issues

The research highlighted a number of national or systems wide issues which may have an impact on the engagement of young people with Information and Communications Technology (ICT) training delivered by TAFE NSW. These systemic issues are detailed here.

VET reform – national funding model

TAFE NSW staff interviewees commented that TAFE NSW fees has escalated dramatically speculating that some ICT qualifications are now as expensive as, or exceed the cost of, a university degree. One TAFE staff member observed that the ICT Advanced Diploma is now so costly that students generally overlook it in favour of university, unless they specifically did not wish to attend university. TAFE staff also remarked that policies surrounding VET FEE HELP funding induce students to skip Certificate IV in ICT in favour of commencing ICT training at Diploma level. TAFE NSW staff speculated that this presents a risk for some Diploma students who may struggle with the higher level qualification, without the underpinning knowledge and skills provided by the Certificate IV pathway.

National vocational ICT curriculum

One TAFE NSW ICT staff member interviewed criticised the Information and Communications Technology (ICT) training package as outdated, and commented that there were gaps in training for some emerging technologies. They claimed that the ICT training package is too rigid, where many aspects taught are fixed, and that this had the unintended impact of discouraging innovation. Conversely, there is a greater need and expectation for ICT, even more so than in many other industries, that the ICT curriculum be current and up-to-date. TAFE ICT staff interviewees also highlighted the need for ICT graduates to demonstrate innovative abilities and entrepreneurial skills to be successful in the ICT industry.

TAFE NSW systems

TAFE NSW ICT staff interviewees highlighted the enrolment system which had been recently implemented by TAFE, and which had created significant complexity for enrolling students. TAFE staff commented that this system requires streamlining, speculating that young people might be induced to enrol with alternate vocational education and training providers if they were unable to have their enrolment managed quickly and efficiently by TAFE NSW.

TAFE NSW staff interviewees commented that TAFE NSW courses are no longer as flexible or friendly as they had been in the past, and that TAFE ICT students are not always offered the full selection of elective units. Some TAFE NSW ICT focus group student participants also criticised the promotion of the flexibility of TAFE NSW courses. Some TAFE students claimed that despite advertising flexibility for their courses, in reality they had little or no choice of the days or times of their classes, with some students commenting that they were required to attend study five days per week. TAFE ICT student focus group participants commented that class schedules seemed to be quite rigidly fixed, and that while they had been offered course flexibility, this was not always their experience.
This research investigated ways in which young people access and receive information and career advice about Information and Communications Technology (ICT). It has considered contextual information about the rapid growth of the ICT sector and digital disruption which is significantly changing how we engage, consume and work. It considers the major influencers on young people’s study and career aspirations, the types of career advice young people are receiving at school or prior to undertaking post-school study and why more young people are not choosing to study ICT at school or at TAFE NSW. The type of career advice has been considered, whether general or ICT specific, and particular transition points at high school at which relevant ICT career advice is, or could be more effectively delivered. The report identifies current and potential ways to deliver ICT career information, the importance of cultivating innovation and entrepreneurial thinking for success in the ICT field, and highlights effective ICT focused activities and initiatives which promote ICT.

The report discusses a range of findings elicited from various groups, including TAFE NSW and NSW high school students and educational staff. The report highlights successful ICT promotional strategies, currently being used in an ad hoc way, and recommends a more consistent approach to developing ICT career advice including the timing of delivering that advice at significant transition points to young people. This aims to support young people to make informed career choices, which include considering ICT options and careers available in the ICT field, prior to deciding on post-school training and study pathways. The following information and findings which emerged from the research have been collated and synthesised by major themes.

**ICT and the labour market**

Australia’s economy is being enormously impacted by digital disruption, arguably one of the most significant mega-trends of the 21st Century. Digital technologies are radically changing industries and employment. A major implication of digital disruption is the forecast impact on the workforce.

Current workforce forecasting reports highlight the rapid growth currently being experienced by Australia’s digital economy. Demand for ICT workers is forecast to increase by approximately 70,000 workers to the year 2020. This reflects the integration of ICT workers across a broad range of industries as digital disruption continues to change the role of technology across the workforce into the future. Consequently demand for ICT skills and qualifications are also expected to increase, however, graduates with ICT qualifications have declined significantly since the early 2000s.

Improving Australian’s ICT capability needs to start at primary school, with curriculum which includes computing skills and technical ICT capabilities, with processes to teach students computational thinking and understanding of information systems to enable them to define, design and implement digital solutions.

**ICT career advice**

The report highlights the crucial role of career development for a young person navigating an increasingly complex pathway from secondary education to working life. Current literature underscores the speed at which the labour market and occupations are changing, the need for high quality current career guidance, especially pertinent for ICT career advice where the industry is changing so rapidly.

The research identifies that many school students up until Year 10 at high school are only receiving general career information. High school students who are not undertaking ICT subjects at school will likely receive no ICT career information at all, and these students may be unaware of the magnitude of the digital revolution, or the many ICT opportunities available across all industries. Therefore they will not be equipped to make fully informed training and careers choices, which include considering ICT.

The research identified gaps in students awareness about ICT and the ICT field, particularly that technology is ubiquitous and permeates every industry, and that a student’s interest in a field which is not overtly ICT, would not preclude them from an ICT career within that industry eg a website developer, network administrator, or software and applications programmer could work in any industry. The research findings emphasise the need to develop current in-depth ICT career advice which includes detailed information about specific ICT roles, the present ICT job market, ICT skills in demand, the broad range of occupations and the career potential offered by ICT. The image of ICT as a career needs to be improved and promoted and information about ICT occupations and related training pathways needs to be readily available.
The provision of ICT career advice to young people highlights the importance of local TAFE / School connections and networks in engaging young people in ICT VET, both at school and TAFE. The study identifies career networks, such as NSW & ACT Careers Advisors Association (CAA) and NSW school careers advisers’ networks which currently operate. These networks provide opportunities for TAFE NSW to engage with existing communication channels to deliver TAFE developed ICT career advice to high school students more broadly and with greater coordination.

**Importance of partnerships**

The study highlighted the critical importance of partnerships between TAFE NSW and a range of stakeholders, in providing quality ICT career advice and ICT training outcomes to young people. These include relationships with local high schools, local employers and the ICT industry.

TAFE NSW partnership with NSW high schools was identified as a critical relationship to attracting young people into ICT training at TAFE NSW. This included developing relationships or improving existing partnerships between TAFE NSW colleges and NSW high schools, especially local relationships to improve the promotion of ICT training opportunities offered at local TAFE colleges. In some cases TAFE was praised for the level of engagement with local schools. In other cases school career advisers commented that universities were better than TAFE at providing information about their university programs and pathways. This highlights the opportunity to increase the consistency of TAFE NSW’ connection with local high schools to facilitate the coordinated provision of information, events and activities which focus on TAFE ICT programs and training.

Providing innovative ICT outcomes for school students in partnership with local TAFE and university is demonstrated by the following partnership. A resourceful partnership between a regional high school and the local TAFE college, provides students with the option to participate in a degree collaboration. This opportunity is promoted to students who are at risk of dropping out of school or those finding study challenging but who are interested in ICT. This initiative provides a pathway to a higher education degree delivered in collaboration between the local TAFE college and local university. An advantage to the students is entry to the degree program not being dependent on their Australian Tertiary Admission Rank (ATAR).

ICT industry partnerships were identified as valuable. Developing these could include engaging members of the ICT industry when providing career advice, hosting ICT information sessions or ICT promotional ‘Taster’ programs to school students. Industry representatives include members of industry peak bodies, representatives from high profile ICT companies and TAFE NSW ICT graduates now working in the ICT field. They could provide advice on the current ICT industry trends, highlight the benefits and opportunities available when working in ICT, highlight career paths and emphasise the advantages of TAFE NSW ICT qualifications and pathways.

**Career exploration – key transition points**

Young people are navigating a pathway from secondary education to working life which has become increasingly complex and which emphasises the crucial role played by career development. This highlights the need to begin providing career advice and career preparation programs earlier in schools, well before Years 9-10, with a key principle to expand exposure of young people to unfamiliar careers and sectors of employment, particularly to science, technology, engineering or mathematics (STEM) areas including ICT.

Progressive career exploration approaches which assist young people to identify career direction generally, and which provide exposure to ICT, needs to be an integral part of career development. Part of the career discovery style proposed involves problem solving approaches. Asking young students ‘What problem do you want to solve?’ rather than asking ‘What do you want to be (or do) when you grow up?’ was viewed as a positive exploratory alternative to start identifying potential career aspirations. This is an approach already used in introductory coding programs, and which fosters problem solving and entrepreneurial thinking. It could also be used when school students are undertaking TAFE ICT ‘Taster’ or other ICT programs aimed to engage them in the ICT field.

The research identified key transition points where high school students are making important decisions, which impact on their study trajectory, and where they would value receiving career advice. These transition points include Years 7-8, when choosing high school elective subjects, Years 9-10, when selecting subjects for the Higher School Certificate (HSC) study, Year 12 when finalising career study decisions, and post-HSC when year 12 graduates receive their Australian Tertiary Admission Rank (ATAR). Identified key transitions provide ideal
points of intervention to promote TAFE NSW ICT offerings, emphasise the advantages of studying at TAFE NSW, the practical ‘hands-on’ learning, low student to teacher ratio, easy access to teacher’s assistance, team and project work and positive outcomes from training provided by TAFE NSW. Promotion could highlight TAFE NSW ICT pathways, including as a transitioned or ‘soft’ entry to university, which may better suit some candidates, compared with direct entry from high school to university, and also TAFE NSW’ direct pathways to employment.

Future Directions

Raise the status of TAFE NSW and vocational education and training

Research highlighted the need to raise the profile of TAFE NSW as a valuable post-compulsory training option and increase the focus on TAFE pathways to both higher education and careers in ICT. Information on TAFE NSW and VET options available to young people at school could be improved and need to be designed and presented to be inclusive of all students, not stereotyped to a narrow cohort. Effort is needed to raise the status of TAFE NSW as a valid pathway, alongside university, to achieve ICT qualifications and to gain employment in the ICT field.

One way to raise the profile of TAFE NSW could be by identifying and promoting an ICT brand ambassador. Other suggestions include identifying and promoting ‘good news’ stories profiling innovative ICT programs delivered by TAFE NSW and highlighting ICT student and graduate success stories and achievements, particularly ICT employment outcomes. These could be in collaboration with mainstream and local media, with ‘good news’ stories published on the web, TAFE websites, YouTube and developed into fliers for career events. Improving TAFE NSW’ profile needs to be addressed more consistently across the state and monitored to assess whether media drives create successful outcomes, such as increased course enquiries.

Providing innovative TAFE NSW ICT ‘Taster’ programs targeting high school students, tailored appropriately for specific age groups, and which facilitate their experience of the TAFE environment was identified as a successful strategy. These need to be interesting, innovative, and engage young people in solving real world problems. These experiential events highlight the ‘hands-on’ practical component, and team work integral in TAFE NSW ICT training, which is valued by both TAFE ICT students and employers. TAFE ICT vocational training which provides positive outcomes, ensuring that students have ‘hands-on’ skills, and are ‘job ready’, should be promoted to young people, their parents, and to the general public.

Many TAFE ICT students expressed concern about ‘qualification creep’, and the perceived demand by employers for higher level qualifications, particularly university degrees. However, TAFE graduates often demonstrate greater practical experience compared with their university counterparts, and TAFE NSW teachers interviewed identified that local employers had expressed merit in TAFE graduates practical experience. Employers and employment agencies would do well to take a broader approach which acknowledges the importance of demonstrated ICT skills rather than concentrating narrowly on the acquisition of higher education ICT qualifications, to the exclusion of ICT competencies.

STEM education, cultivating innovation and entrepreneurial skills

Restoring the focus on STEM in schools initiative aims to encourage school students to study STEM subjects and raise their awareness of the abundant proliferation of careers built on science, engineering, maths and technology (STEM). The initiative includes key elements, one of which is supporting the introduction of computer coding across different year levels in Australian schools leading to greater exposure to computational thinking, and, ultimately, expanding the pool of ICT-skilled workers.

The research found that currently computer coding does not appear to be offered to all students at school. Even some students studying ICT at school indicated that coding was not included in their ICT study program. The Hour of Code targets young people and teaches students to use coding to solve problems. The importance of coding programs whether at school, in school holidays, or provided to existing workers have been seen to develop computational thinking, problem solving and entrepreneurial skills.

Cultivating entrepreneurial skills in TAFE ICT students was identified as important to enable them to successfully navigate from education to a career in the ICT field. A range of activities, such as incubation programs were seen as useful to develop ICT students’ entrepreneurial skills. TAFE ICT staff emphasised the need to foster innovation
in TAFE ICT students to ensure their success at their studies and to achieve a positive transition to employment in the ICT industry and achieve success in the ICT field. One TAFE ICT staff member commented that ‘A critical aspect for students to be successful in ICT is passion, entrepreneurial skills and understanding the potential of technology.’

Marshalling ICT promotion to the target audience

TAFE NSW largest cohort is the 15-24 year age group, encompassing the generation born between the early 1990’s and 2009, dubbed Generation Zed, or the iGeneration. This generation engages with the world in an entirely different way to previous generations. They respond to visual and eye catching promotion, such as contemporary-style street advertisements or short video clips and these need to be on platforms with which they are already familiar; their ‘go to’ sources of information including Google, YouTube and social media such as Facebook. TAFE NSW needs to ensure that they consider the engagement style of Generation Zed, in both promotion and delivering, to successfully attract their biggest target group, aged 15-24 years to ICT vocational education and training.

The study confirms that parental expectations and peer plans are particularly influential in young people’s aspirational choices. Therefore targeting and engaging not just Generation Zed but also their parents would potentially increase the effectiveness of ICT promotional activities. Of note in this research was the number of TAFE ICT students who identified that they were innately interested in ICT, or always interested in ICT, some from early primary school age. However, effectively promoting ICT programs available at TAFE NSW was still useful to this group.

Experiential ICT events, such as careers expos, ICT ‘Taster’ days at TAFE, technology Meetups and Big Day In ICT university promotions, appeared to be effective avenues to promote ICT study and careers. Engaging or partnering with existing experiential events or activities, and replicating successful approaches were considered positive ways to improve TAFE NSW ICT promotions.

Promote TAFE NSW ICT pathways to high school students undertaking Certificate III, Information and Digital Technology through TVET or a VET in Schools programs, which provides advanced standing toward Certificate IV then Diploma ICT qualifications. These qualifications can be achieved in one year post-school study at TAFE NSW, and this pathway could be better promoted to school students and VETiS staff.

Challenges and gaps

The research highlighted some challenges, issues and gaps in the provision of ICT career guidance and advice to young people, including the lack of provision of ICT specific career information, the need for consistent provision of current, relevant, ICT career information in a format which is engaging to young people, their peers and their parents. The lack of strategically coordinated timing of the provision of ICT career advice and events which align with significant transition points in a young person’s career development journey, and providing ICT specific career information in a systematic, coordinated way was considered an issue in the provision of ICT career information to young people.

When the provision of general career advice was compared to the provision of ICT specific career information, it appeared that many school students even up to Year 10 at high school are only receiving general career advice. It appears that high school students who are not undertaking ICT subjects at school are commonly not receiving any awareness raising information about opportunities in ICT.

ICT career information is often provided by an ICT school teacher rather than from a school career adviser. This indicates that the ICT career advice school students receive appears to be dependent on the local ICT school teacher’s knowledge of the ICT industry, ICT occupations and skills requirements, and ICT career opportunities. School students also appear to be routinely directed to search for ICT career information online. While this is not a problem of itself, online searches on the web should not replace other career development strategies and information about ICT provided at school. The image of ICT as a career needs to be improved and promoted, information needs to be more engaging and it needs to be more easily located via a web search.
Youth Transitions highlighted the importance of work placement to provide a pathway for many students to secure their first full-time job. Some kind of work experience or work placement is viewed as critical in successful youth transition into the labour market. Many TAFE NSW students reiterated the value they placed on work experience, whether paid or unpaid, to support their transition into the labour market.

Girls and young women are significantly under-represented in ICT VET training in both NSW high schools and TAFE NSW, and women are under-represented in the ICT workforce. This highlights the need to ensure that ICT promotion and events are inclusive of, and attractive to, girls and young women. The gender gap evident in ICT training and the workforce, and the low participation by girls and women in ICT training and women’s engagement in ICT employment provides a topic for further research and investigation.
Making a difference – implementation

The findings and conclusions from the research about attracting young people into Information and Communications Technology (ICT) training and work, has informed the development of the following suggested strategies for implementation. These ideas for implementation are not intended to be either an exhaustive or prescriptive list. A number of strategies may already be in use, in an ad hoc way, by various TAFE institutes. This implementation plan recommends taking a more coordinated, consistent TAFE NSW state wide approach to implementing these and other strategies.

Short term implementation

Develop ICT career information

Develop ICT career information – TAFE Information and Communications Technology (ICT) sections could develop or collate ICT career information including the broad range of ICT opportunities, current ICT job market trends, ICT roles in high demand, specific job roles and potential range of remuneration. Ensure that ICT roles are well classified, that new or emerging occupations are included, and avoid gender stereotypes. This information could be provided to support high school careers advisers and ICT school staff, to inform school students about ICT careers, including TAFE ICT pathways. ICT career information could be developed as pamphlets, fliers and for social media.

Support school teachers to promote ICT to school students – School teachers appear to be a significant source of ICT career information for young people. There is a visible need to promote the importance of STEM related careers and the future job market trend in ICT, to school students via school teachers or school careers advisers. Career information about the ICT industry, which TAFE has developed, or collated, could be provided to ICT school teachers and school career advisers, for them to provide to school students.

ICT information provided at school transition points – Support high school careers advisers by providing them with ICT career information, linked to relevant TAFE courses. School career advisers could make this information available to school students in various Years, at specific transition points or decision making junctures when students are choosing subjects eg Year 9 and Year 10 high school students choosing HSC subjects, and Year 12 students selecting post-school study pathways.

Promote ICT and TAFE NSW

Media campaign – to highlight the success of past TAFE ICT students, who have graduated and are now working in the ICT industry. Media coverage of TAFE graduate ‘Good news’ stories. Potentially collaborate with mainstream and local media to provide coverages of TAFE NSW student achievements eg student who have won major awards, such as state or national awards. These could be published in a range of formats, such as web, TAFE websites, YouTube and print.

Student profiles – Western Sydney University’s Unlimited campaign video featuring Deng Thiak Adut, a child soldier from Sudan, now a Sydney lawyer, provides an example of a very successful web advertising campaign, which went viral and attracted millions of viewers. This is an excellent example of the type of good news story which TAFE could identify and promote about ICT graduates.

Advertise courses on platforms young people use – To target young people, Generation Zed audience, consider using visual advertisements involving less text such as short 2 minute YouTube videos and google targeted advertisement. Web advertisements could be distributed on education relevant websites or social media. Young people respond to visual and eye catching contemporary style street advertising or short video clip on YouTube, Google or Social Media. Video advertisement duration and the amount of information relayed could vary depending on the video platform and preferably be short, showing quick, attention-grabbing content.

STEM or ICT training initiatives – Identify and promote initiatives which support students to undertake ICT TAFE training, such as Jobs of Tomorrow Scholarship. This initiative encourages prospective students to undertake training in qualifications relating to Science, Technology, Engineering or Mathematics (STEM), by providing financial support. From the ICT training package there are 16 eligible ICT qualifications ranging from Certificate IV to Advanced Diploma on the list.
Promote ICT at TAFE to parents – Awareness raising of ICT TAFE training and employment opportunities to parents, so that they are informed on how to best support their children in considering studying ICT at TAFE as a valuable career pathway option, which can include a TAFE degree pathway.

Partnerships – improve TAFE NSW connections

Improve TAFE’s relationship with NSW high schools – Explore developing relationships or improving existing partnerships between TAFE NSW colleges and NSW high schools, especially local relationships to improve the promotion of ICT training opportunities offered by TAFE. In some cases school careers advisers report that universities are better than TAFE at providing information about their programs and pathways. This could be an opportunity to improve TAFE ICT course information to schools and make sure that TAFE also includes its own Degree options.

High school career advisers’ networks – Engage with high school career advisers’ networks to influence the views of career advisers about ICT and TAFE as a post-school option. Promote ICT careers, the growth of ICT as an industry, and the growth of ICT into all other industries.

Engage with school career advisers – Develop or foster the TAFE / school connection for stronger engagement with local school career advisers to promote ICT training at TAFE to school students. Provide ICT information sessions to school career advisers to get schools more involved. It appears that career advisers often lack current comprehensive information about ICT careers.

Promote TVET – TAFE staff approach school career advisers and coordinators to promote TVET, as it appears that some high schools may not be strongly promoting VET courses. Encourage high school students to take TVET, as training delivered at TAFE allows school students to experience TAFE campus life.

ICT guest speakers at events – Identify opportunities to include guest speakers from highly regarded ICT companies (eg Cisco, Google) to promote ICT training and careers, to school students at career events. Industry speakers could present opportunities provided by an ICT career and ICT training and skills which industry seeks and values. TAFE ICT graduates working in the ICT field would also be very influential.

ICT events and ‘Tasters’

ICT Taster classes or TAFE open days – Provided ICT ‘Taster’ class, ‘Taster’ experience or TAFE open days. Given the demand for higher qualifications, students may have the idea that university is the only pathway to quality ICT education and that university qualifications are expected by employers. To improve the image of ICT training provided by TAFE, school students could be given the opportunity to experience the TAFE learning environment and the practical aspect of TAFE, which is highly valued by many current ICT TAFE students.

ICT careers events for Stage 4 high school students – Target years 7 to 8 (Stage 4) high school students to promote ICT training and careers when they are considering future elective subject choices. Provide taster programs and host talks with Industry bodies, industry representatives or TAFE graduates working in the ICT industry. Highlight the benefits of working in the ICT industry such as continuous growth in work opportunities, and emphasise the benefits of TAFE ICT qualifications and pathways.

ICT careers events for Stage 5 high school students – Hold short ICT ‘Taster’ programs or ICT competitions to target years 9 to 10 (Stage 5) high school students. This is when they will be considering subject choices for their Higher School Certificate (HSC) studies.

‘ICT Taster’ HSC summer school – TAFE host summer school ICT ‘Taster’ programs offering preparation for Higher School Certificate (HSC) classes in school holidays, to support school students to do well in their HSC, while allowing them to experience the TAFE campus environment.

‘ICT Taster’ summer school – TAFE host summer school ICT ‘Taster’ programs for prospective students who may not be sure whether they want to commit to a full-time ICT course. This would give them the opportunity to try ICT. Host various ICT ‘Taster’ courses, or have a variety of streams of ICT within the one program. Deliver the summer school as a short course, or if possible a free course.
TAFE ICT event at schools including parents – Host and promote more ICT open days and career days to raise the presence of TAFE NSW to schools. Target event advertisements to schools students and parents rather than the general public, and provide ICT ‘Taster’ programs for high school students. Allow parents as well as students to see the opportunities offered by ICT and to experience the TAFE NSW environment.

Career Expo evenings or weekends – Participate in career expo evenings or weekend career information events, aimed at young people and scheduled to enable parents to attend. Parents are highly influential of their children’s career aspirations and study choices. Offer engaging activities which will interest school students attending the expo.

Medium term implementation

Better career information and communication

ICT industry intelligence – TAFE NSW to develop or enhance strategic partnerships with the ICT industry, including large, medium and small enterprises, to gather advice on current ICT industry trends and occupations to integrate into ICT career and course information which targets prospective ICT students.

Awareness raising about ICT industry and occupations – formulate approaches to raise awareness about breadth and diversity of ICT career roles and opportunities across a broad range of industries.

ICT career information could include:

- current ICT market trends and jobs
- ICT forecast, roles in demand
- current roles and new or emerging occupations
- pay ranges for different ICT roles.

This ICT career information could be promoted to:

- high school student
- high school careers advisers
- high school ICT teachers, VETiS teachers and TVET teachers.

Improve navigation for TAFE NSW website – Improve the current TAFE NSW website to be friendlier and easier to navigate. The complexity of the TAFE NSW and Institute websites can make student information and enrolment unnecessarily challenging. Information provided on websites should be straightforward and relevant to the field of study, and ICT information recommended includes:

- Course unit guidelines showing unit descriptions and its relevance to the industry
- Post-TAFE study pathways or work options for graduates
- Industry roles with information such as ICT role descriptions and pay ranges.

Develop TAFE NSW ICT mobile app – develop a mobile app which briefly describes the ICT industry in the form of dynamic, fun facts and snapshots, and provides course information on ICT programs available at TAFE. Include promoting ICT training and careers via social media to engage young prospective students, such as advertising on the same online platforms with which young people are familiar, for example Google, YouTube or Facebook.

Promote ICT and TAFE NSW

Promote open doors for ICT TAFE courses when HSC students receive ATAR – Market TAFE NSW ICT courses to HSC graduates as they receive their Australian Tertiary Admission Rank (ATAR) scores. Target HSC graduates and promote TAFE offerings, highlighting university pathways and employment outcomes, through ICT training at TAFE. University of Technology Sydney (UTS) ‘Don’t let your ATAR define you’ radio campaign targeted students who did not achieve the required ATAR score for university entry to their dream degree. This campaign displayed great timing to solve prospective university students’ dilemma, by offering alternative UTS pathways into their chosen university degree course. TAFE NSW could use a similar approach, to attract young people into ICT at TAFE.
Careers with Code – A publication which targets high school students and promotes ICT careers including their university pathways. TAFE NSW could advertise in the Careers with Code publication and highlight TAFE ICT pathways and outcomes.

Transition pathways – Promote the easy transition from school to post-school ICT pathways at TAFE. Particularly from school delivered Information and Digital Technology (IDT) at Certificate III, to Certificate IV and Diplomas in ICT, which students can complete in one year at TAFE. This would be particularly relevant when promoting IDT VET at school and IDT TAFE delivered VET (TVET).

Innovation and entrepreneurship

Awareness of technology Start-ups – Provide opportunities to raise awareness of technology start-up environments for current TAFE ICT students to foster entrepreneurial skills and innovation. This could potentially provide avenues for students to gain work experience or encourage students to consider self-employment options when they graduate. This could be partially achieved through Data61 ‘Ribit’ program developed to support ICT students to link with small to medium technology enterprises, many of them Start-ups, for ICT students to gain paid work experience while studying, and enhance their opportunities to gain ICT employment on graduation.

Connection with technology innovation hubs – identify and partner with technology innovation hubs to identify opportunities for TAFE NSW ICT students to engage in innovative and entrepreneurial activities. Invite industry representatives to speak to TAFE NSW ICT students about technological innovation, digital disruption and entrepreneurship.

Partnerships with key stakeholders

Inter-school project development – TAFE hosted event – Offer school students the opportunity to work together with other schools to develop an ICT project. The venture could assist with an issue in the local area or community, and possible cooperation with local councils / companies could be considered.

Improve TAFE’s relationship with private schools – Explore improving or developing partnerships between TAFE NSW and NSW Catholic and private schools, especially local relationships to improve the promotion of ICT opportunities offered by the local TAFE college. TAFE IT staff acknowledge that developing a strong relationship with local high schools is very important, and that TAFE could also improve their partnerships with private and Catholic schools.

Promote ICT to all school students – Market ICT careers and training to all school students, not just to students already interested in ICT or studying ICT at school. This currently represents a significant missed promotional opportunity to promote careers in ICT.

Providing work experience and post-TAFE study advice – Liaise with local companies to provide short work placement opportunities for TAFE students. In addition to work experience, this would provide opportunities for students to develop industry networks and potentially find future employment. Utilise virtual workplaces and simulated work tasks to provide TAFE ICT students with work experience.

ICT students demonstrate experience – Consider ways to support TAFE ICT students to demonstrate their ICT skills and abilities to employers. This could be undertaken in a variety of ways, potentially by developing a portfolio throughout the TAFE students ICT training, via students self-employment while studying, to build up a work history, or some type of work placement, work experience or internship, whether paid or unpaid, could be introduced to support TAFE graduates’ transition to employment in the ICT field.

Data61 job-matching platform ‘Ribit’ – engage with Data61 ‘Ribit’ program, once it has been upgraded to include TAFE NSW students and link ICT students with this facility to support them to gain paid work experience while studying, and enhance their opportunities to gain ICT employment on graduation.

Influence employer attitudes – Promote the practical learning ‘hands-on’ aspect provided by TAFE NSW training and that many employers value TAFE ICT graduates’ practical skills and abilities. Highlight ICT TAFE students’ collaborative work, compared with university, and that skills like project management and team work are learned while studying at TAFE.

TAFE / employer connection – consider how TAFE ICT course offerings could be used to better meet the needs of local employers in the digital age.
Long term implementation

Improved ICT career information

Maintain updated ICT career advice – TAFE ensures that ICT career information which has been developed is maintained and updated to reflect advances in ICT occupations and the industry. Maintain the broad range of ICT opportunities, current ICT job market trends, ICT roles in high demand, specific job roles and potential range of remuneration. Ensure that ICT roles are well classified, that new or emerging occupations are included. This information could be provided to support high school careers advisers and ICT school staff, to inform school students about ICT careers, including TAFE ICT pathways. ICT career information could be developed as pamphlets, fliers and for social media.

Partnerships with key stakeholders

Careers Advisers Networks – develop a relationship with the NSW & ACT Careers Advisers Association (CAA) and school Careers Advisers Networks. General career advice from various universities is provided periodically throughout the year to school career advisers via the CAA. Additionally within NSW high schools a system of Careers Advisers Networks operate. Both of these networks could potentially provide communication channels to deliver TAFE developed up-to-date career information about the Information and Communications Technology (ICT) field, to school career advisers and school ICT teachers, with ICT content aimed at school students and their parents. Develop comprehensive ICT career advice, in formats which appeal to Generation Zed, the target audience, and strategically coordinate the provision of this advice to high school students, potentially via existing school career advisers’ networks.

Refocus on ICT curriculum at school – Link with the government’s initiative to restore the focus on Science, Technology, Engineering and Mathematics (STEM), with a focus on Technology and ICT. Partner with schools to promote the Information and Digital Technology (IDT) VET unit at school. Highlight the benefits of TAFE delivery (TVET), to encourage school students to experience the TAFE environment first hand.

ICT events to engage primary school students, Years 3 to 5 – TAFE could visit primary schools or invite school students to an excursion at TAFE NSW to participate in coding taster events. Schools can also host competitions and encourage students to solve problems using coding.

Influencing recruiters and employers – The expectation of many recruitment agencies and ICT employers that candidates will hold a degree level qualification creates a challenge for new graduates. It highlighted the Catch 22 situation for many graduates, where ‘To apply for a job, you need to have a few years of experience. But in order to gain experience, you need to get a job first.’ This could be challenged by promoting the unique benefits of TAFE delivered ICT training and qualifications to recruiters and employers.

ICT industry partnerships – TAFE NSW to develop strategic partnerships with the ICT industry including large, medium and small enterprises to gain current ICT industry advice to incorporate into ICT occupational and course information career advice to prospective TAFE NSW ICT students.

ICT industry work experience partnerships – TAFE to develop strategic partnerships with the ICT industry including large, medium and small enterprises to negotiate stronger industry connections with ICT training and broker better work experience schemes for TAFE NSW ICT students to enhance graduate employment outcomes.

ICT industry mentoring partnerships – TAFE NSW to develop strategic partnerships with the ICT industry including large, medium and small enterprises to negotiate stronger industry connections to develop ICT industry mentors for TAFE NSW ICT students. Mentors could enhance students training and career opportunities and help them identify aspirational interests and specific aptitudes in the ICT field.
Innovation and entrepreneurship

Cultivating innovation and entrepreneurial thinking in ICT among young people – Young people have great creativity which may be under-utilised. Young people need to be made aware of the opportunities for innovation available through ICT, be it through entrepreneurial ventures, start-up businesses. Suggestions to motivate young people to utilise their creativity for innovation include:

- sharing success stories from ICT people
- sharing ideas that had an impact in the world (e.g., Facebook, Minecraft)
- incubation programs
- ICT or technology meet-ups.

Promote ICT and TAFE NSW

TAFE brand ambassador for ICT – Identify ICT industry brand ambassador, potentially current TAFE student or TAFE graduate with high profile, to promote TAFE NSW as high quality ICT training provider. This could be promoted on TAFE NSW and Institute websites. A generic example is Dr Tim Robards, Disturb your Universe campaign, promoting OTEN training on the TAFE Western Sydney Institute website.

Identify STEM funding – Identify government funding opportunities to promote or support students into STEM related ICT training at TAFE and highlight these initiatives and possibilities to prospective students.

Raise the status of TAFE / VET – Increasing the recognition of TAFE / VET pathways to both higher education and careers is important. Information on TAFE options, and the way that this information is presented to young people should be inclusive of all students.

Improve ICT’s image – Promote the profile of ICT to address its sometimes ‘nerdy’ image, or that ICT is only for students with superior academic ability. Market the pervasiveness of ICT in every industry and the exponential growth and therefore career opportunities available in the ICT field.

Improve ICT’s image to girls – Promote ICT to girls and young women by identifying female ICT role models, highlighting their success, to encourage girls and young women to consider the ICT field, and to improve women’s participation in ICT. Girls at school need to receive positive reinforcement for work they do in Science, Technology, Engineering and Mathematics (STEM) study areas.

Promote ICT to young women – Identify or develop programs which promote, engage and support girls and young women in ICT training including strategies such as:

- Tech Girls Movement (TGM) 2016 Search for the Next Tech Girl Superhero national competition. Tech Girls Movement targets girls and young women students in Years 4 – 12 at school
- DigiGirls – TAFE NSW programs which target girls and young women at school to try a technology program at TAFE in a ‘Taster’ style environment.

Promoting ICT courses to disengaged young people – Young people without post-school study plans, or who have dropped out of school could be a group to target to promote the value of TAFE ICT courses and employment. ICT workers are in demand and this group could represent an untapped human resource. TAFE ICT courses hold the potential to engage young people, providing them with practical experience and skills to help them develop a career in ICT.
Resources

There are a range of ICT promotions and activities to promote Information and Communications Technology (ICT) to students and potential post-school training and education opportunities. These provide some examples of the types of resources and activities that are available.

STEM training initiatives

Restoring the focus on stem in schools initiative

Restoring the focus on STEM is about increasing student uptake of science, technology, engineering and mathematics (STEM) subjects in primary and secondary schools nationally. Encouraging school students to study STEM subjects and showing them some of the great careers built on science, engineering, maths and technology will encourage this interest at the school level to help increase the number of students taking up STEM subjects in higher education and in their careers and help keep Australia competitive internationally in these important fields. Restoring the focus on STEM subjects aims to ensure that Australia’s young adults are equipped with the necessary skills for the economy of the future.

The *Restoring the focus on STEM in schools initiative* includes four key elements:

- providing innovative mathematics curriculum resources for primary and secondary school students, focusing on inquiry-led teaching
- supporting the introduction of computer coding across different year levels in Australian schools leading to greater exposure to computational thinking, and, ultimately, expanding the pool of ICT-skilled workers
- an innovative approach to education based on the United States ‘Pathways in Technology Early College High School’ (P-TECH) model
- Summer schools for STEM students, to increase the number of girls and disadvantaged students attending—including Indigenous students and those from regional and remote areas.

P-TECH – Pathways in Technology Early College High School (P-TECH)

The Australian Government’s P-TECH styled pilot tests an innovative model of education-industry collaboration that provides students studying for their Senior Secondary Certificate with an industry supported pathway to a science, technology, engineering and mathematics (STEM) related diploma, advanced diploma or associate degree.

The first P-TECH school was established in the US by IBM in collaboration with the New York City Department of Education, The City University of New York, and the New York City College of Technology. IBM is providing an Impact Grant, valued at $250,000, to support the introduction of P-TECH to Australia. IBM has also committed to lead the establishment of a second pilot site in Ballarat in Victoria.

The P-TECH model is based on a partnership between education and industry that is focused on supporting young people to make a successful transition from school to work, which includes further education or employment opportunities with industry partners. The P-TECH pilot will utilise existing Australian qualifications and enlist the expertise of industry to enhance the learning experience for students.

The Australian P-TECH pilot will feature key aspects of P-TECHs operating in the US, such as:

- collaboration between the education and industry sectors
- innovative curriculum design
- hands-on workplace experience
- industry mentoring and support
- supported pathways for disadvantaged students to achieve a post-school qualification; and
- supporting disadvantaged students to make a successful transition from school to work.
Activities

Tech meetups
http://www.meetup.com/find/

Tech meetups, which are special interest group informal events, which focus on specific interests, in this case technology. Meetups are informal get-togethers to learn something, do something or share something. Attendance at Tech meetups by parents, school career advisers and students could provide better insight into the IT industry and participant motivation, and provide an environment which cultivates entrepreneurial thinking in students. These could be held in a school student friendly environment or location (ie not the pub).

Code camp

Code camp is teaching kids to code through Australian school holiday programs which target students in Years K-8, sponsored by Westpac Bank. Code camp promotes computational thinking, logic, fun, creativity, user experience, app development and game building. The activities aim to build confidence, create mentors and develop entrepreneurial thinking.

Any questions? Get in touch with Ben on 0402 256 846 or ben@codecamp.com.au

What Most Schools Don’t Teach – YouTube videos – https://www.youtube.com/watch?v=nKlu9yen5nc

Code.org
https://code.org/

Code.org is a USA site launched in 2013. Code.org® is a non-profit dedicated to expanding access to computer science, and increasing participation by women and under-represented students of colour. Our vision is that every student in every school should have the opportunity to learn computer science. We believe computer science should be part of core curriculum, alongside other courses such as biology, chemistry or algebra.

Promotion training and activities

Digital careers
http://digitalcareers.edu.au/about/

Digital Careers aims to increase the number and quality of ICT graduates in Australia while building a robust and sustainable ICT capability for the future digital economy. Operating as a collaborative initiative of industry, research, primary, secondary, and tertiary institutions (universities and TAFE), and government, Digital Careers is focused on reducing the critical shortage of Australian ICT professionals by:

- raising awareness and interest in ICT careers; and
- growing and diversifying the pool of tertiary students preparing for a career in the ICT industry.

The program focuses on primary and secondary school students (school years 5-10), parents, teachers and school-based career advisors.

Digital Careers concentrates on the start of the ICT pipeline by targeting school students, parents and teachers. Digital Careers:

- focuses on improving awareness and promoting the benefits of ICT careers
- enhances and amplifies engagement activities that develop and maintain student interest in ICT
- develops collateral and online resources
- enables professional development opportunities for ICT teachers

The Digital Careers Program has three elements:
1. Activities and events for students
2. Teacher professional development
3. Promotion and diversity of the ICT industry.

Through its events and activities one of the aims of the Digital Careers program is to reach a large number of school aged students, many of whom would normally not be interested in ICT.
Tech girls movement
http://www.techgirlsmovement.org/superherosearch/

Australian search for the Next Tech Girl Superhero, is a global competition, an innovation IT challenge to engage young women in developing IT. Teams of girls and young women, from primary and secondary school, are challenged to identify a problem, create an app to solve it, code the app, build a company to launch the app in the market, and pitch their pan to experts. School girls can learn tech entrepreneurial skills through this challenge. The 2016 competition theme is solve a problem in your local community. It launches at Google in Sydney on 8 March 2016, to coincide with International Women’s Day (IWD).

Hour of code
https://hourofcode.com/au

Worldwide programming campaign for young people called the Hour of Code. The campaign features one-hour programming tutorials designed for students as young as four years old. Lessons taught to children includes using code to make coloured circles and other shapes, before encouraging them to experiment by drawing faces, animals and snowmen. Some tutorials features characters from popular child-friendly pop culture eg Frozen, Star Wars and Angry birds.

Introducing programming at a young age is seen to help improve mathematics, and logical, creative and critical thinking. Brown (2015)\(^1\) cites that learning computer languages is similar to learning foreign language or musical instruments. Previous research established that the more languages children learn at a young level, the more they use these languages in the future. This provides an opportunity to create potential IT professionals in the future. The Hour of Code has seen positive feedback from children. Brown mentions that a student aged twelve went as far as thinking of pursuing programming in the future and developing something new that could change the world.

Big day in

The BiG Day In™ is building opportunities for successful students. The BiG Day In is an IT careers conference designed by students for students. It is designed for both high school (Years 9-12) and University students interested in careers in technology. In 2016, The BiG Day In™ roadshow will be run in at least 12 locations nationwide.

National science week
http://www.scienceweek.net.au/

What is National Science Week and who is it for? National Science Week – 13-21 August 2016. National Science Week is Australia’s annual celebration of science and technology and thousands of individuals – from students, to scientists to chefs and musicians – get involved, taking part in more than 1000 science events across the nation. Science Week is designed for everyone – it’s definitely not restricted to schools and universities – with events and activities and talks and shows for every age group. It provides an opportunity to acknowledge the contributions of Australian scientists’ to the world of knowledge. It also aims to encourage an interest in science pursuits among the general public, and to encourage younger people to become fascinated by the world we live in.

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Game-changing jobs of tomorrow. Careers with Code guide showed the wide variety of careers that computer science can lead to, from art and music to medicine and agriculture. Demand for skilled computer scientists has grown rapidly, and now extends to fields such as sport, gaming, health, sustainability, and more. We need technically-capable graduates with a passion to solve the really tough challenges facing the world. This guide aims to inspire students to take up the challenge and become the change makers, innovators, and creators of the future. Careers with Code promotes IT careers to young people and has links to relevant university pathways. TAFE NSW could advertise in the Careers with Code publication.

Double Helix
https://doublehelixshop.csiro.au/

Double Helix magazine is published by the Commonwealth Scientific and Industrial Research Organisation (CSIRO). Double Helix is an educational publication with a reputation for delivering expertly written fascinating and fun science material. The publication is designed to foster an interest in science, maths, engineering and technology in school aged children. CSIRO promotes it as Australia’s leading science magazine for a youth audience.
Career guidance resources

Australian Apprenticeships Pathways
Provides searchable information and resources covering a huge range of potential apprenticeship and traineeship career pathways.

Careers Advisory Service
Provides useful links to information and resources to support school leavers.

Career Blueprint
Helps young people to understand and develop 21st Century capabilities and create a clear vision for their penultimate career.

Career Information
Provides information on a range of jobs, get advice on what might suit you, and pathways to get you there.

Dusseldorp Forum
http://dusseldorp.org.au/
Our work is focused on championing approaches to learning that are more engaging, inclusive and creative – to meet the diverse strengths, needs and interests of young people across Australia, particularly those who have experienced disadvantage. We do this to improve outcomes for young people and to influence systemic change.

Job Guide
Provides an in-depth look at a range of occupations, and their education and training pathways.

Job Outlook
Provides useful information about possible careers, you can also take a quick quiz to help you identify what types of work you most like doing.

myfuture
http://myfuture.edu.au/
Is an interactive site designed to start you on your career journey. The site lists detailed career resources. The site has a career explorer which allows you to drill down to the type of job that may appeal to you based on your interests and skill level.

My Skills
Contains training information and the type of skills gained in a training course and links to Registered Training Organisations offering a range of courses.

MyUniversity
Lists universities across Australia as well as degree programmes and degree course design that each university offers. Some universities specialise in certain areas of study and only some courses are offered at particular universities.

Youth Central
Victorian website – covers jobs and education including a wide range of youth related issues.
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TAFE NSW ICT STUDENT FOCUS GROUPS

TAFE NSW Information and Communications Technology (ICT) students

TAFE current students

ENGAGEMENT questions

1. How old were you when you first became interested in ICT? (eg What age? What grade at school?)

EXPLORATION questions

About CAREER ADVICE

2. Who, or what, particularly influenced you to think about studying ICT and having a career in ICT?

3. Where did you get the stuff you know, information about ICT and ICT careers from? (School, Google, YouTube, TAFE NSW, TAFE college/website)

4. At school, when would you have liked to get more career information about ICT? (What age or grade?)

5. Did anyone study an ICT vocational course at school? (Yes / still am / no) If yes, did this / will this influence you to undertake ICT studies at TAFE?

6. How do you think we (TAFE) should better promote ICT courses to young people? Explain.

About your current STUDY

7. Do you think that the ICT skills you are learning at TAFE, are up-to-date and relevant to the type of skills needed for an ICT job? (if no, then explain)

8. Do you think that you will get a job with your ICT qualification, once you graduate?

9. Why did you choose to study ICT at TAFE rather than at university?

EXIT question

10. Is there anything else you would like to add about ICT career advice, or your ICT study at TAFE?
TAFE NSW STUDENT ONLINE SURVEY

Engaging young people in ICT training

The TAFE NSW Industry Liaison Unit is conducting a research to find ways to attract young people into ICT training and work. Please take a few minutes to answer the survey questions. Thank you!

1. At what age did you first consider choosing ICT as your future career?

2. Who influenced you the most to pursue ICT? (Check as many boxes as apply to you)
   - Parents
   - Siblings
   - Friends
   - School teachers or career counsellors
   - The media (eg news, the web)
   - Famous ICT figures (eg Mark Zuckerberg, Bill Gates)
   - I developed an interest in ICT all on my own without external factors
   - Other (please specify)

3. Where did you get ICT career information that really piqued your interest? (Check as many as apply to you)
   - Career expos
   - School talks
   - Exposure to real ICT work
   - People working in the ICT industry (family, friends, etc)
   - Media (news, articles, the web etc)
   - TAFE website/ TAFE course information
   - I have always been interested in ICT
   - Other (please specify)

4. Before studying in TAFE, did you find problems in the career information you received about ICT? (Check as many boxes that apply to you)
   - The broadness of ICT was not covered. Some areas of ICT was not promoted (eg digital media technology)
   - Information was not up-to-date, newer and more immersive technology had come out that I didn’t know about
   - Poor classification of ICT roles, only mainstream roles were discussed with us (eg programmers)
   - Gender-roles stereotypes (ICT is for guys)
   - I feel the career information was unreliable
   - I simply did not receive career information about ICT (please specify)
5. How has your understanding of ICT as a career change while taking the TAFE course?
- It changed a lot. My understanding of ICT as a career was poor and lacking
- Somewhat changed. There were some things I did not know about ICT as a career
- Nothing changed. I received good information about ICT as a career even before the course began

6. I am aiming to get an ICT job as a: (Check one box that applies to you)
- Web designer
- Networking and security
- System administration
- Big Data/ Analytics
- Programmer
- Mobile developer
- Digital Media Technology/Graphic design
- Game development/design
- Other (please specify)

7. What are your plans after your studies in TAFE?
- Further education in ICT (University)
- Find a job in the ICT industry
- Move into a new field, other than ICT (study or work)
- I’m unsure at this point
- Other (please specify)

8. Overall, how satisfied or dissatisfied are you with your studies in TAFE?
- Very satisfied
- Quite satisfied
- Somewhat satisfied
- Somewhat dissatisfied
- Quite dissatisfied
- Very dissatisfied

9. Now we just need to know a little bit more about you~ How old are you?
- Below 15 years of age
- 15-19
- 20-24
- 25-29
- Over 30 years of age

10. I am:
- Male
- Female
11. I am studying in a location best described as:
   - City or metropolitan area
   - Regional area
   - Rural or Isolated area
   - Other (please specify)

12. I am studying in the following area:
   - Web design
   - Networking and security
   - Game design
   - Digital Media Technology
   - Programming
   - Big Data/ Analytics
   - Other (please specify)

Done
HIGH SCHOOL STUDENT ONLINE SURVEY

Engaging young people into Information and Communications Technology (ICT) training and work – High school student survey

The TAFE NSW Industry Liaison Unit, ITELG is undertaking research to find ways to attract young people into Information and Communications Technology (ICT) training and work. We are interested in your views. Please take a couple of minutes to complete the following survey questions. We greatly appreciate your input and thank you for your time and effort. This survey is totally confidential.

1. Are you interested in studying Information and Communications Technology (ICT)?
   - Not interested
   - Moderately interested
   - Very interested

2. If you are interested in studying Information and Communications Technology (ICT), how old were you when you first became interested in ICT?
   - Below 10 years old
   - 10-12 years old
   - 13-15 years old
   - 16-19 years old
   - I am not interested in ICT

3. Are Information and Communications Technology (ICT) vocational units available at your school?
   - Yes
   - No
   - Not sure

4. Are you currently studying any Information and Communications Technology (ICT) units?
   - At school
   - At TAFE
   - At a private college
   - I am not studying any ICT units

5. If you are currently studying any Information and Communications Technology (ICT) units, which ICT units are you currently taking? (Choose as many as apply to you)
   - Information and Digital Technology (IDT VET)
   - Information and Software Technology (IST)
   - Information Process and Design (IPD)
   - Software Design and Development (SDD)
   - I am not currently studying ICT units
   - Other (please specify)

6. Have you been offered the opportunity to study computer coding or programming at school?
   - Yes
   - No
   - Not sure
7. Are you considering Information and Communications Technology (ICT) as a career path?
   ○ Yes
   ○ No
   ○ Not sure

8. Could you please write a few lines to describe your understanding of Information and Communications Technology (ICT) in your own words?

9. How well do you understand Information and Communications Technology (ICT)?
   I don’t really understand Information and Communications Technology (ICT)
   ○
   I have a partial understanding of Information and Communications Technology (ICT)
   ○
   I have a great understanding of Information and Communications Technology (ICT)
   ○

10. How have you received general career information? (Choose as many as apply to you)
    □ The media (e.g. news)
    □ Online websites
    □ School teachers
    □ School career advisors
    □ Career expos, talks or events
    □ Family
    □ Friends or mates
    □ I haven’t received any general career information
    □ Other (please specify)

11. Have you received Information and Communications Technology (ICT) career information?
    □ The media (eg news)
    □ Online websites
    □ School teachers
    □ School career advisors
    □ Career expos, talks or events
    □ Family
    □ Friends or mates
    □ I have not received any ICT career information
    □ Other (please specify)
12. Is a career in Information and Communications Technology (ICT) promoted in your school? If so, to what extent?

<table>
<thead>
<tr>
<th>Not promoted at all</th>
<th>Slightly promoted</th>
<th>Highly promoted</th>
</tr>
</thead>
<tbody>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

13. After completing my HSC/studies, I plan to:

- ○ Study at a University
- ○ Study at TAFE
- ○ Study at a private college
- ○ Work
- ○ Undecided
- ○ Other (please specify)

Now we just need a little bit of information about you please.

14. How old are you?

- ○ Below 13 years old
- ○ 13-15 years old
- ○ 16-19 years old

15. I am in the following Year at high school:

- ○ Year 9
- ○ Year 10
- ○ Year 11
- ○ Year 12

16. I am:

- ○ Male
- ○ Female

17. My school is in a location best described as:

- ○ City or Metropolitan area
- ○ Regional area
- ○ Rural or isolated area
- ○ Other (please specify)

Done
TAFE NSW ICT STAFF INTERVIEWS

INTERVIEW QUESTIONS – TAFE ICT STAFF

Purpose: To investigate ways to attract and engage young people in ICT training and work, predominantly Generation Zed (15-24 years old).

Recently, the enrolment rates for ICT related VET courses have been decreasing. We are undertaking research in order to investigate ways to promote and attract young people to undertake vocational training in ICT at TAFE.

INTERVIEW QUESTIONS FOR TAFE ICT STAFF MEMBERS

Questions about students and ICT career information and promotion, from your experience.

1. Do you think young people, who are prospective students are given adequate career information, advice or guidance about Information and Communications Technology (ICT) before enrolling in a TAFE course? Why?

2. Can you describe some misconceptions from schools about ICT at TAFE which students have?

3. How can better ICT career information be provided to young people? What about at school? (would this be different?)

4. At what age should we/schools start introducing ICT to help stimulate students’ interest?
   a. How could we distribute career information about ICT to this age group?

5. The current generation (Generation Zed) is highly engaged and extremely familiar with technology. Do you think there is a need to change how TAFE provides / promotes ICT career and course information to better engage these young people?

6. Not all high schools provide ICT vocational courses. How can TAFE better promote ICT to High School students, and encourage them to consider ICT VET course at School and potentially ICT courses at TAFE?

7. Do you think that TAFE training can be used as a pathway to higher education? How can the profile of TAFE training for employment, and to employers, be improved?

8. Are you aware of current strategies which successful promote ICT training at TAFE to young people. (Potentially these could be replicated.)

9. Can you think of any external bodies who are / or could promote ICT vocational training in TAFE to young people? Who and how might they do this?

10. FINAL QUESTION: Is there anything else you’d like to add, any thoughts or ideas that this interview has prompted. Are there other questions you think we should be asking?
HIGH SCHOOL STAFF INTERVIEWS

INTERVIEW QUESTIONS – SCHOOL ICT STAFF / school VET teachers / careers advisors

Purpose: Investigate ways to engage young people in Information and Communications Technology (ICT) training and work. Recently, the enrolment rates for ICT related VET courses at TAFE NSW have been decreasing. We are undertaking research in order to investigate ways to promote and attract young people to take vocational training in ICT in the current curriculum.

INTERVIEW QUESTIONS FOR SCHOOL STAFF / CAREERS ADVISORS

Questions about students and career information, career advice on Information and Communications Technology (ICT) specifically and the promotion of ICT careers, to students while at high school.

Questions to School Staff

1. **In what School Year/s** (or at what age) is career information first and subsequently provided at school? Is this general careers information only or does it include specific career information about **Information and Communications Technology (ICT)**?

2. Is career information about Information and Communications Technology (ICT) provided to students? If so is this to **all** students, or only students **interested in ICT**? (Is ICT well promoted, marginally or not really promoted at all)

3. What types of career information or advice about Information and Communications Technology (ICT) is provided to school students? What medium – school talks, career expos, ICT industry speakers, web searches, career websites?

4. **Where do careers advisors, ICT teachers source** Information and Communications Technology (ICT) career advice? Are you aware of the broad and diverse range of potential ICT careers available in the job market?

5. Do you consider that you have **adequate support** gaining up-to-date and relevant Information and Communications Technology (ICT) career advice and information, to pass on to school students? If not what additional support would you like?

6. Do you consider a **career in Information and Communications Technology (ICT)** of **equal importance** to other careers? Would you promote a career in ICT as strongly as other careers to your students?

7. How could **career advice** about Information and Communications Technology (ICT) be improved and provided to both young people, and their parents, while at school?
Questions to TAFE connections

8. Does your high school have an active, positive relationship or partnership, with TAFE in your area? If yes, who is the relationship between?

9. How well are VET Information and Digital Technology (IDT) courses at school, (VEiS or TVET) promoted by your school? (well promoted, marginally, or not really promoted at all).

10. Is Information and Digital Technology (IDT) delivered by TAFE as TVET at your school or is IDT only delivered at school ie VEiS?

11. How well is TAFE promoted as a favourable post-school study option to ICT students? (versus university pathway?) How can we raise TAFE’s profile as a post-school study option?

12. Anything else you would like to add?