

Collabor8 2015

Program Evaluation Report

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Report of the 2015 Collabor8 pilot: a multiple touch point engineering and IT outreach program for junior female students (Years 8 and 9) attending high schools serving low socio-economic (low SES) communities delivered by the UTS Women in Engineering and Information Technology Program (WIEIT) with the support of the Australian Government Department of Education's Higher Education Participation and Partnerships Programme (HEPPP) National Priorities Pool.

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Executive Summary

The overarching aim of *Collabor8* was to address the issue of the progressive decline in female interest and enrolments in science, technology, engineering and mathematics (STEM) subjects at the junior high school level, which impacts the numbers of young women choosing STEM subjects in senior high school. This, in turn, results in fewer female than male enrolments in tertiary STEM-based courses and fewer women than men entering engineering and IT career fields.

This program builds on emerging evidence that it is social norms, rather than abilities that predominantly influence the interest levels of girls in high school in STEM and the subsequent uptake of tertiary STEM study and STEM-related careers. Justman and Méndez (2016) studied 58,000 students in Victoria and identified that unequal gendered STEM participation was not based on prior achievement or comparative advantage of males but instead subject choices were influenced by gender norms and social messaging. Zacharia et al. (2014) followed a similar path of discovery in the UK and found that redressing participation in STEM needs to involve acknowledging and creatively countering gendered messaging that deters young people from recognising the breadth of possibilities open to them.

The program addresses the three key factors identified by Zacharia et al. (2014) as influencing of individuals (male or female) decisions to pursue study or a career in a STEM or STEM related field: relevance of STEM to an individual's sense of identity and future aspirations; an individual's perceived actual and relative ability in STEM subjects; and an individual's 'science capital', their understanding and familiarity with STEM studies and possible careers, that is derived from multiple sources.

At the close of the program in December 2015, **405** female students across the seven *Collabor8* high schools had attended at least one of the program's touch points. Students were selected by the participating schools. About half (n=201; 49.6%) were Year 8 students and 204 (50.4%) were in Year 9.

Across a number of indicators the *Collabor8* program was found to improve girls' perceptions of the relevance of STEM study, confidence in their abilities, and their awareness of pathways and possibilities.

In their overall evaluation of the *Collabor8* program, the majority of girls who participated strongly agreed or agreed that the program:

- Helped them understand what engineers and IT professionals do (88.8%)
- Increased their interest in engineering/IT (76.1%)
- Increased their interest in science, maths or technology subjects (67.7%)
- Gave them ideas about careers/courses they could study at university (79.1%)
- Increased their interest in studying to become to become an engineer or IT professional (66.1%)
- Helped me feel more confident to choose a technology subject (64.5%)
- The UTS *Collabor8* facilitator(s) was/were helpful and friendly (93.1%)
- Participation had been very helpful for them (88.3%)
- Is one that they would recommend to other students (88.8%)

Improving interest in STEM

- Over 50% of girls report reported that each of the four sessions increased their interest in science and technology subjects at high school.
- Interest in maths showed a cumulative effect, taking four sessions before over 50% of the students reported that the *Collabor8* session increased their interest in maths at school.
- The participants were asked to share their interest in studying STEM subjects in Years 11 and 12 in the future. No significant differences appear to have eventuated from their participation in *Collabor8* and so it is recommended that future *Collabor8* efforts be revised to include a stronger focus on the links between engineering and IT careers and the importance of senior science and mathematics.
- An analysis of the responses of students who came to all touch points shows a significant increase in the percentage of participants stating their aspiration to study engineering/IT at university in the future at Touch Point Four compared to Touch Point One, with 77% reporting they were interested or very interested at the end of the program compared with only 25.8% who reported that they were interested before participating in the program.

Relevance of STEM: 'Is it for people like me?'

There was a small statistically significant improvement in the proportion of girls who agreed or strongly agreed that "People who are engineers now were just like me in high school" (8.3%) and a non-statistically significant improvement for "People who

work in IT now were just like me in high school” (5.4%) from pre-program survey to post-program survey.

Comparing pre- and post-survey results, demonstrates a significant positive effect on improving participant perceptions around women in engineering and IT careers, with:

- 16.5% more participants reported strongly agreeing that “Women make good engineers” in the post-program survey in comparison with the pre-program survey.
- 14.7% more participants reported strongly agreeing that “Women make good IT professionals” in the post-program survey in comparison with the pre-program survey.
- 11% more participants reported strongly agreeing that “Engineering is a good career choice for women” in the post-program survey in comparison with the pre-program survey.
- 12.2% more participants reported strongly agreeing that “IT is a good career choice for women” in the post-program survey in comparison with the pre-program survey.

By the end of the program, over 90% agreed or strongly agreed that women make good IT and engineering professionals.

It should be noted that the pre-program survey was undertaken at Touch Point Two, by which time the participants had already experienced one session. Thus it is possible that these results may underestimate this positive effect.

Perceived ability: ‘Do I feel confident?’

The participants recorded higher confidence and getting good marks in STEM subjects in the post-survey program compared with the pre-survey, with mixed results in enjoyment of STEM subjects, mindset and learning styles. However, none of these differences were found to be statistically significant.

A significant positive effect was found in response to the statement “I have what it takes to become an engineer” in the pre-/post-program survey comparison. Only 28.1% agreed or strongly agreed with this statement in the pre-program survey compared with 47.6% in the post-program survey.

Similarly, there was an statistically significant increase in agreement with the statement “I have what it takes to become an IT professional”, with 25% agreeing or strongly agreeing in the pre-program survey compared with 35.3% in the post-program survey.

Comparing the pre-program to post-program surveys, 9.66% fewer participants reported thinking that there were barriers to becoming engineering or IT professionals. However, 64.7% of participants had already reported no barriers at the pre-program survey. As noted, the pre-program survey was undertaken after one session had been completed, thus it may not have captured the full extent of the impact.

Science capital ‘Can I see the possibilities & pathways?’

The participants reported a significant increase in their level of understanding of what engineers and IT professionals do in the post-program survey compared with the pre-program survey:

- The proportion of participants reporting that their understanding of what engineers do as good or very good increased from 61% to 89.2%.
- The proportion of participants reporting that their understanding of what IT professionals do as good or very good increased from 55.5% to 83.3%.

Teacher feedback

Teachers involved in the program were also surveyed, with 100% agreeing, or strongly agreeing, they would recommend the program to other teachers and identifying it as a valuable learning opportunity for both the students and themselves.

The *Collabor8* Program in 2015

Collabor8 is an engineering and information technology (IT) outreach program for junior female students (Years 8 and 9) attending high schools serving low socio-economic (low SES) communities piloted by the UTS Women in Engineering and Information Technology Program (WIEIT) in 2015. This was made possible by funding from the Australian Government Department of Education's Higher Education Participation and Partnerships Programme (HEPPP) National Priorities Pool.

The overarching aim of *Collabor8* is to address the issue of the progressive decline in female interest and enrolments in science, technology, engineering and mathematics (STEM) subjects at the junior high school level, which impacts the numbers of young women choosing STEM subjects in senior high school. This, in turn, results in fewer female than male enrolments in tertiary STEM-based courses and fewer women than men entering engineering and IT career fields.

WIEIT approached the design of *Collabor8* with the assumption that higher elective enrolment levels in STEM related subjects in junior years (i.e. Years 9 and 10) will transpire into higher levels of enrolment in STEM and STEM enabling subjects (i.e. Advanced Mathematics, Physics, Engineering Studies, etc.) in Years 11 and 12 and in turn lead to a subsequent higher enrolments in engineering and IT degrees at the tertiary stage. Alongside the overarching aim of *Collabor8* was the goal of conducting a rigorous evaluation of the effectiveness of the chosen program approach in achieving its objectives (laid out below) and an investigation of participants' subject selection motivators.

In 2015, the program engaged over 400 female students in Years 8 and 9 from seven government schools serving low-socioeconomic communities in Sydney and surrounding regions in a program of four separate activities (referred to as 'touch points' throughout the report) delivered across the school year by WIEIT staff, current UTS engineering and IT students and female professionals

Objectives

Collabor8's objectives were threefold:

1. To broaden the awareness young women in targeted low socioeconomic high schools have of engineering and IT and to increase their overall interest in studying STEM/engineering and IT beyond high school.
2. To evaluate the impact of *Collabor8* against its intended outcomes; and,
3. To identify and investigate the following areas of interest through a rigorous evaluation and research program:
 - Factors that influence subject selection among the cohort,
 - The differences in influencers of subject choice among the cohort,
 - The number of touch points needed to influence subject choice.

Underpinning Theoretical Framework

Justman and Méndez (2016) trace women's under-representation in engineering and information technology to students' choice of advanced STEM subjects in the final years of secondary school. Their longitudinal study of Australian secondary school students' standardised test scores and subject choices found little evidence to support the claims that differences are driven by males' absolute or comparative advantage in mathematics. Rather, they found pronounced gendered patterns of subject selection after controlling for prior performance and socio-economic background, suggesting that these choices are instead shaped by social norms. The implication of this is that ability is not the influencing factor, and that therefore, to improve gender equity in STEM, it is the social norms and stereotypes influencing subject choices and perceptions that need to be addressed.

The approach to designing the *Collabor8* Program of activities, as well as the evaluation framework and complementary research study on subject selection motivators, was inspired by the work of Zecharia et al., who, in 2014, conducted a key stakeholder consultation process to review the current solutions being implemented to increase the interest levels of girls in high school in STEM and the subsequent uptake of tertiary STEM study and STEM-related careers. Through this review they found that it was rare for actors in the space (high schools, universities, career advisors employers, Government) to engage with academic literature when designing their approaches (Zecharia et al., 2014, p. 8).

Central to the work of Zecharia et al. (2014) is the conclusion that there are three influencing factors in play for an individual (male or female) to decide to pursue study or a career in a STEM or STEM related field. These three factors are explained below and shown in Figure 1. The three factors are all underpinned by a single factor: 'the cultural messages that people receive from a very young age' about their identities (including their gender identities), their abilities and about STEM in general – in other words the stereotypes our culture uses to make sense of what it is to be a man or woman; who is good at and does what and what science, technology, engineering and mathematics (and related careers) entail.

Zecharia et al.'s (2014) 3 factors in the pursuit of STEM

1. 'Relevance of STEM'. The relevance of STEM to an individual's sense of identity and future aspirations.
2. 'Perceived ability'. An individual's perceived actual and relative ability in STEM subjects.
3. 'Science capital'. An individual's understanding and experience of STEM, including formal and informal exposure to STEM subjects and careers in the curriculum, at school, in the media, culture and via family and personal connections.

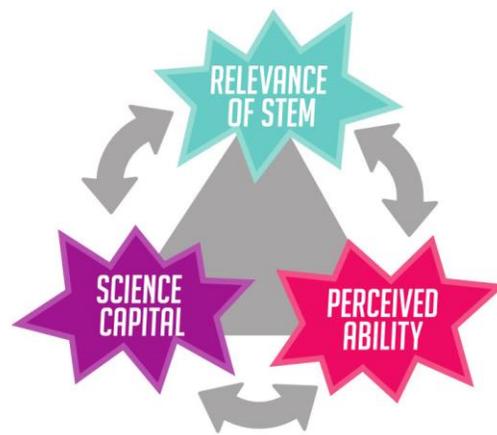


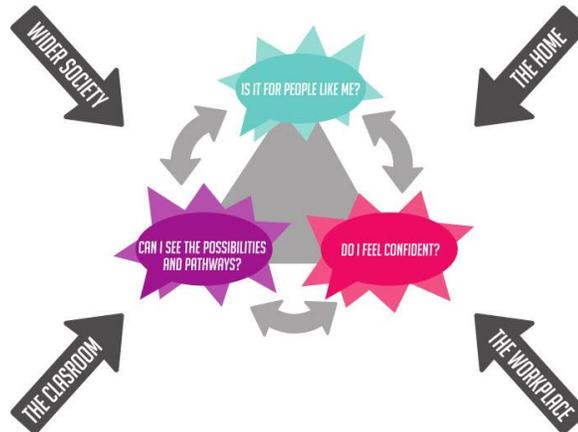
Figure 1: The three factors underpinning an individual's pursuit of study or a career in STEM (Zecharia et al., 2014, p. 9)

Zecharia et al. (2014) translate the three factors outlined above into a 'mental checklist' that is a useful tool for applying their approach as the underpinning evaluation framework for the *Collabor8* Program. The correlations between the 3 factors above and Zecharia et al.'s (2014) 'mental checklist' is explained below and shown in Figure 2. Figure 2 also illustrates the 'interplay of environments' at work as

an individual seeks to answer the questions in the mental checklist, and therefore the way the three factors are subject to stereotypes about gender and STEM careers.

Zecharia et al.'s (2014) 'mental checklist':

1. Relevance of STEM = Is it for people like me?
2. Perceived actual and relative ability = Do I feel confident?
3. Science capital = Can I see the possibilities and pathways?



4.

Figure 2: The 'mental checklist' of questions whose answers determine whether an individual will pursue study in STEM or a STEM related career (Zecharia et al., 2014, p. 10)

It is also the opinion of Zecharia et al. (2014) that many of the solutions that are employed to address the underrepresentation of women in STEM fields try (unsuccessfully) to conflate stereotypes of femininity with STEM career stereotypes, such as a European Union Commission campaign to encourage girls to want to become scientists that created a pseudo-music video with young women in make-up, heels, short dresses and lab coats conducting science experiments. Zecharia et al. write:

The solution as we see it is not to conflate these stereotypes as many disastrous campaigns have attempted, but to smash them open. STEM careers are not all about heavy machinery and oily overalls, and being a woman is not all about being beautiful and caring. These are unhelpful stereotypes that are limiting for everyone.' (2014, p. 10)

UTS Women in Engineering and IT has taken on board the ideas in Zecharia et al.'s (2014) paper as well as their recommendation for an increase in the amount of project-based creative, real world learning in designing the *Collabor8* Program to break open the perception that being male and studying/working in STEM go together (and that being female does not) as well as breaking down stereotypes of what STEM subjects and careers entail and what the women in these fields are like.

Program Structure

The *Collabor8* Program was designed as a multiple touch point program comprising four touch points over approximately eight months.

Touch Point One: Collabor8 at School #1

The *Collabor8* Program's first 'touch point' was a 1 to 2 hour workshop¹ delivered by the UTS Women in Engineering and IT team with UTS female engineering and IT student volunteers called '**Collabor8 at School #1**'. The workshops were delivered to participants at their schools in late May and early June 2015. The learning outcomes of Touch Point One were:

- To expose the participants to female role-models currently studying engineering and IT at university who are not much older than themselves and have recently experienced making decisions about post-school study options and careers;
- To demystify the views participants might have about tertiary study and, in particular, tertiary study in engineering and IT and give them a picture of what it is like;
- To engage the participants in a fun and collaborative engineering-based problem solving and design exercise in an all-female environment.

The workshops involved the students listening to presentations from one female UTS engineering student and one female UTS IT student and participating in the hands-on activity 'Floating Houses' that was developed by Engineers without Borders. The activity was conducted in teams of about 6 girls; each team was allocated a sum of (counterfeit) money to use to buy the materials they would need to build a model of a house that could float. The available types of materials were all priced differently and included aluminium drink cans, corks, plastic straws, cardboard, etc. Once the

¹ The length of the workshop was dependent on each school's timetabling arrangements i.e. how much time was available.

teams had constructed their floating houses, all houses were tested by floating them in water and putting glass marbles into them; the winning team was the one whose floating house held the most marbles before sinking. The activity was contextualised by a case study about the needs of the Tonle Sap communities in Cambodia.

Touch Point Two: *Collabor8* at UTS Day

The *Collabor8* Program’s second touch point (**‘Collabor8 at UTS Day’**) was a full day excursion to the University of Technology Sydney’s city campus for participating students. The day was held on 21 July 2015 for all the schools. The aims of the day were:

- To expose the participants to female role-models currently studying engineering and IT at university who are not much older than themselves and have recently experienced making decisions about post-school study options and careers;
- To demystify the views participants might have about tertiary study and, in particular, tertiary study in engineering and IT and give them a picture of what it is like via an on-campus experience;
- To engage the participants in fun and collaborative engineering-based problem solving and design exercises in an all-female environment.

The day began with inspiring presentations from one female UTS engineering student, one female IT student, and a UTS alumna. Participants were then split into groups for the remainder of the day and each group took part in four hands-on activities (from a possible of 12) led by Women in Engineering and IT trained UTS staff with support from a number of (male and female) trained student volunteers from the Faculty of Engineering and IT.

The four activity workshops attended by the student groups were programmed from the following.

Mars Rover	Introduces students to the basics of coding, computer terminology, team work and logical thinking. Students are divided into teams and write basic instructions (“code”) for a person to make their way through a maze whilst blindfolded. The students are encouraged to think about how to write and structure code in order to achieve the desired output; after one attempt, students are allowed to adjust their instructions and see how minor changes can have a major impact on the overall result.
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Live Lights, Smooth Sound, Cool Code	Introduces participants to the creative possibilities of Arduino electronics and programming. Arduino microcontrollers are used to teach students how to program LED lights and a sound buzzer. Engaging and immediate, this workshop introduces the basics of the Arduino programming language as well as some of the key concepts of circuit building used in electronics and robotic projects.
Robobowls	Introduces basic physics and mechatronics engineering principles which students, in teams, then apply to build a robotic arm using K'Nex and Arduino boards. The activity leader explains how the arm is an example of mechatronics in action and leads the teams to test their robot arms by competing in a modified game of lawn bowls.
Robo-Cars	An interactive activity that introduces students to robotics, electronics and mechanics. Beginning with an introduction to electrical circuits that builds on students' high school science knowledge, students are assisted to build their own basic electrical circuit. In groups, they then build an electric race car from their circuits, cardboard, straws, skewers, tape and plastic and use it to compete in a knockout style race to determine the best designed and fastest cars. In this session, students also learn the definition of a robot and are shown examples of robots in everyday life, how they work and how they can get involved in robotics. The activity concludes with a demonstration of a Lego Mindstorm robot
Python	Gives students a basic introduction to programming using the Python programming language which can be used for web development, writing desktop applications and creating games. The activity leader talks through fundamental programming concepts and then gives students the opportunity to experiment in programming a short piece of code to demonstrate the concepts.
Rube Goldberg	The 'Rube Goldberg' activity challenges the mind and imagination; students learn about real life examples of how engineers have solved complex problems using creative thinking and why it's the foundation of engineering. Students then use their creativity, imagination, team work, design and critical thinking skills to create their own 'Rube Goldberg Machine': a device that solves a simple goal, usually mechanical engineering concepts, in a complicated or intricate way. In this case the goal is to construct a machine out of a range of resources that knocks something over, includes an item free falling and ends with a ball dropping and bell ringing. The group with the most creative machine that achieves these goals is declared the winner.
STEMSEL	STEMSEL is a fun hands-on activity that works to promote STEM and how it can be used to solve problems in the real world. Students are given an 'inventors tool kit' and taught about the basics of programming. They learn how to code and use this knowledge to program microchips. Students can reproduce everyday systems such as traffic lights, musical buzzers and

	alarm systems.
Mousetrap	Introduces students to mechanical engineering and challenges them, in groups, to create a device that moves using a mousetrap, skewers and string. Students learn about changing potential energy to kinetic energy and then must use the spring from the mousetrap to propel their device. Problem solving and basic design principles are showcased through the building process as students must adjust their design of their device to make it as efficient possible.
Gone in 60 Seconds	Students experience an area where engineering is used in everyday life: cars. They are introduced to the car built by UTS Motorsports, a group of UTS students who work on formula racing cars to compete in international competitions and learn about the electrical and mechanical engineering used to build it. In the activity, students learn about the engineering involved in building the cars and get a chance to change one of the tires and try out the car simulator. It's an opportunity to experience an area in which multiple types of engineering are used in everyday life.
Game On	Shows students the basics of the program <i>GameMaker</i> , a coding program for creating basic games. Students are able to see some of the most interesting games that have been created using the software, learn about what studying game development involves and get to experiment with the program to begin making their own game with basic coding.
Spaghetti Towers	Begins with an introduction to civil engineering and what it involves and shows students the importance of design, creativity, team work and resourcefulness in engineering. In groups, students create towers out of foil and dry spaghetti, creating their own mini civil engineering projects. They are encouraged to think about design and trial and error processes to create the strongest, tallest tower.

Touch Point Three: *Collabor8* at School #2

The *Collabor8* Program's third touch point ('***Collabor8* at School #2**') was a one to two hour session again delivered to participants at school. The focus of this second school visit was interaction with female engineers and IT professionals who presented about their experience of their industry. The sessions were held between early September and mid-October 2015. The aims were:

- To expose the participants to female engineers and IT professional role-models currently working in their fields;
- To demystify the views participants might have about engineering and IT careers and give them a picture of what it is like;
- To engage the participants in a fun and collaborative IT-based problem solving and design exercise in an all-female environment.

The presenters were women currently working in firms such as Cisco, Lend Lease and NSW Roads and Maritime Services. They assisted the UTS Women in Engineering and IT team and female UTS engineering and IT student volunteers to facilitate the hands-on activity *In the Clouds*.

In the Clouds engages students with many core elements of working in IT including team work, design, problem solving and creativity. The activity sees students complete three challenges in teams. The first challenge is to take a photograph of their group and upload this to the cloud. The second challenge sees each member of the group completing one level of a simple coding game and uploading proof to the cloud. In the final step the team select a problem from a list of options and pitch an idea for an app to solve the problem. The activity concludes with a debrief uncovering links between the activity and the IT industry.

Touch Point Four: *Collabor8* Industry Tour

The *Collabor8* Program's fourth and final touch point ('**Collabor8 Industry Tour**') was a full day excursion involving a tour of an IT workplace and unique examples of engineering at the University of Technology Sydney's city campus. The UTS Women in Engineering and IT team, and current student volunteers led the sessions in collaboration with representatives from industry between the end of November and mid-December 2015. It aimed:

- To expose the participants to female role models currently working as professionals in the fields of engineering and IT and to engineering and IT workplaces;
- To erode stereotypes associated with these careers and workplaces (i.e. that engineers are all men; all engineers work on construction sites, etc.);
- To demystify the views participants might have about engineering and IT careers;
- To engage the participants in fun and engaging tour of engineering and IT workplaces in an all-female environment.

Each school group's industry tour began at an IT workplace – either Cisco or Optus – where students were introduced to a number of IT professionals from different business units and projects. Students heard from women working in the company about what working in IT can involve. This was combined with a tour of the offices and IT labs. Students also participated in an activity where they were divided into groups and given a question (e.g. how can technology improve education at your

school?). Industry professionals and the WIET team facilitated a discussion with each group and then students pitched their ideas to the other groups via teleconferencing.

The second half of the day took place on the UTS campus and focused on engineering with industry representatives from a number of engineering companies (Arup, HIFraser Group, AECOM, Roads and Maritime Services, Lend Lease) speaking to students about their professional experience. They focused on the relevance of problem solving to their jobs, how sustainability and environmental factors influence engineering, and the UTS buildings and campus revival projects they had been involved in. Students then toured some of the innovative, newly constructed UTS sites (i.e. UTS Faculty of Engineering and IT, Building 11 and the UTS Science Graduate School of Health, Building 7) that the engineers had discussed.

Evaluation Framework

Collabor8 will be evaluated against outcomes that align with its three objectives and with Zecharia et al.'s (2014) theoretical framework.

The objectives and their respective outcomes are as follows (also shown in Table 1).

Relevance of STEM

1. To increase the level to which participants relate their own identity and future aspirations with engineering and IT (so that they can see themselves as engineers or IT professionals in the future).
 - 1.1. Increased association between sense of identity and STEM.
 - 1.2. Increased association between STEM study and future (study and career) aspirations.

Perceived ability

2. To increase participants' confidence in their own capacity to achieve and succeed in STEM studies and STEM related career fields (so that achievement in the field is perceived as a real possibility).
 - 2.1. Increased level of confidence in abilities in STEM subjects.
 - 2.2. Increased level of confidence in the skills required for success in STEM fields.

Science capital

3. To increase participants' understanding of engineering and IT (so that they can know how to navigate the system).

3.1. Increased understanding of engineering and IT study pathways.

3.2. Increased understanding of engineering and IT as a career.

Aim: Raise participants' interest in study in STEM in junior high school and aspirations for STEM study in senior high school; university; and/or career field.

Objective	Outcome
<p>Relevance of STEM 'Is it for people like me?'</p> <p>To increase the level to which participants relate their own identity and future aspirations to engineering and IT</p>	<p>1.1 Increased level of association between sense of identity and STEM.</p> <p>1.2 Increased level of association between STEM study and future (study and career) aspirations.</p>
<p>Perceived ability 'Do I feel confident?'</p> <p>To increase participants' confidence in their own capacity to achieve and succeed in STEM studies and STEM related career fields</p>	<p>2.1 Increased level of confidence in abilities in STEM subjects.</p> <p>2.2 Increased level of confidence in the skills required for success in STEM fields.</p>
<p>Science capital 'Can I see the possibilities & pathways?'</p> <p>To increase participants' understanding of engineering and IT</p>	<p>3.1 Increased understanding of engineering and IT study pathways.</p> <p>3.2 Increased understanding of engineering and IT as a career.</p>

Table 1: The aim, objectives and outcomes of the Collabor8 program.

Evaluation and Research Design

Data to support the evaluation of the *Collabor8* program model using the evaluation framework and to inform the investigation of participants' subject selection motivations was collected from the student participants and their accompanying teachers using the following survey and interview tools. There is a copy of all of the surveys and interview schedules included in the appendices of this report.

Students

Event Survey – A paper-based survey (two A4 pages) completed by participants at the end of each of the four touch points. Survey questions were focussed on the effect of the session on their interest in science, maths and technology subjects at school; their enjoyment of the day including their favourite aspect; their opinions on what could be improved and their perspectives of how the session changed their understanding of what engineers and IT professionals do. There were also four questions dedicated to students' interest in future study at university and future study at university in engineering or IT before and after attending the session (i.e. a

retrospective pre-/post-testing methodology). The response rates for the Event Survey across touch points are shown in the table below.

<i>Touch Point</i>	No. of surveys completed	No. of participants in total	% of participants to complete survey
One	338	339	99.7%
Two	287	319	90.0%
Three	279	280	99.6%
Four	200	209	95.7%

Table 2: Event survey response rates across the four touch points.

Pre-Program Survey – A three A4 page survey for Year 8 students and a five A4 page survey for Year 9 students focusing on students’ interest in future university level studies; their favourite subject at school and future career aspirations; their desired elective subject choices for Years 9 and 10 (if Year 8) or their actual elective subject choices and motivations for these choices (if Year 9). The survey also collected demographic data and asked students about the education levels of their parents and siblings and if they knew anyone working as an engineer or IT professional.

The Pre-Program Survey was completed by students who attended Touch Point Two due to program logistics. Exactly 296 (out of 319 Touch Point Two participants/ 92.8%) completed the survey.

Post-Program Survey – A three A4 page survey completed by students at the end of Touch Point Four which asked the same questions posed in the Pre-Program Survey minus the demographic questions. The Year 9 students were not questioned again about their actual electives. One hundred percent of the Touch Point Four participants completed the Post-Program Survey.

Grade	Pre-Program Surveys	Post-Program Surveys
Year 8	151	115
Year 9	145	94
Total	296	209

Table 3: Pre- and Post-Program Survey response rates.

Teachers

At two of the four Touch points (Two and Four), the teachers who were accompanying the students to UTS for *Collabor8* were asked to complete a two A4

page survey asking about their observations of their students' engagement and interest in the *Collabor8* sessions and for any feedback on session/program content.

The teachers who were the *Collabor8* key contacts were also interviewed over the phone about the response of their students and fellow staff members to the *Collabor8* program, their students' interest in science, technology and mathematics subjects at school and challenges they themselves face engaging girls in these subjects.

Survey Data and the *Collabor8* Evaluation Framework

All of the surveys outlined above were designed to elicit information useful to both the evaluation of the *Collabor8* program model and its effectiveness at achieving its aims, objective and outcomes and the research questions about subject selection motivations.

The table below shows the alignment of the data drawn from each of the questions on the surveys and the program aims, objectives and outcomes.

The 4 elements of the aim:		QUANTITATIVE ANALYSIS	QUALITATIVE ANALYSIS
a. Interest/aspiration for study in STEM subjects in junior high school		Event survey: <ul style="list-style-type: none"> 7b: Interest in maths 7c: Interest in science 7d: Interest in technology Pre/post survey: <ul style="list-style-type: none"> 14 – Yr8 only: Subjects for Yr9 electives 	Pre/post survey: <ul style="list-style-type: none"> 1: Favourite subject at school
b. Interest/aspiration for STEM study in senior high school		Pre/post survey: <ul style="list-style-type: none"> 15: Yr 11-12 math 16: Yr 11-12 science 17: Yr 11-12 technology 	
c. Interest/aspiration for STEM study at university		Event survey: <ul style="list-style-type: none"> 3: University - after 4: Eng/IT @ uni - after 5: University - before 6: Eng/IT @ uni - before 7f: Study to become Eng/IT prof Pre/post survey: <ul style="list-style-type: none"> 3a: Post school uni 3b: Post school TAFE 3c: Post school job 	
d. Interest/aspiration for an engineering or IT career		Event survey: <ul style="list-style-type: none"> 7a Pre/post survey: <ul style="list-style-type: none"> 2a / 2b: Job aspiration 3d: Career Eng/IT 3e: Parental influence 	
Objective	Outcome		
Relevance of STEM <i>'Is it for people like me?'</i>			
1: To increase the level to which participants relate	1.1 Increased level of association	Pre/post survey: <ul style="list-style-type: none"> 8c: Engineers were like me 8d: IT profs were like me 	Pre/post survey: <ul style="list-style-type: none"> 6a: Engineers need to be... 6b: IT professionals need to

their own identity and future aspirations with engineering and IT	between sense of identity and STEM	<ul style="list-style-type: none"> 8e: Women good engs 8f: Women good at IT 8g: Eng good choice for women 8h: IT Good choice for women 	be... <ul style="list-style-type: none"> 9a: Barriers to be Eng/IT 9b: What barriers are for you
	1.2 Increased level of association between STEM study and future (study and career) aspirations	Pre/post survey: <ul style="list-style-type: none"> 10a: Imp to study math 10b: Imp to study science 10c: Imp to study tech 10d: Parents think STEM imp 10e: Teachers encourage 10f: Link between STEM & desired study path 10g: Link between STEM & desired career 	
Perceived ability <i>'Do I feel confident?'</i>			
2: To increase participants' confidence in their own capacity to achieve and succeed in STEM studies and STEM related career fields	2.1 Increased level of confidence in abilities in STEM subjects	Pre/post survey: <ul style="list-style-type: none"> 11a: Confident in math 11b: Confident in science 11c: Confident in tech 11e: Good marks math 11f: Good marks science 11g: Good marks tech 11h: Enjoy math 11i: Enjoy science 11j: Enjoy tech 	
	2.2 Increased level of confidence in the skills required for success in STEM fields	Pre/post survey: <ul style="list-style-type: none"> 4a: Hard work gets results 4b: Fixed mindset (negative) 5a: Solve problems 5b: Team work 5c: Real world impact 5d: Learn by doing 5e: Make models 5f: Learn facts 5g: Experiments 8a: Have what it takes to be engineer 8b: I have what it takes to be an IT prof 9a 9b: Barriers to be eng/IT 	Pre/post survey: <ul style="list-style-type: none"> 9a: Barriers to be Eng/IT 9b: What barriers are for you
Science capital <i>'Can I see the possibilities & pathways?'</i>			
3: To increase participants' understanding of engineering and IT	3.1 Increased understanding of engineering and IT study pathways	Event survey: <ul style="list-style-type: none"> 7g: Gained ideas about uni courses 	Event survey: <ul style="list-style-type: none"> 1: Favourite part of the day 8: Further comments
	3.2 Increased understanding of engineering and IT as a career	Event survey: <ul style="list-style-type: none"> 2a: Session helped with understanding of what Eng/IT profs do 7e: Helped understand what Eng/IT professionals do. Pre/post survey: <ul style="list-style-type: none"> 7a: Level of understanding of what engineers do 7b: Level of understanding of what IT profs do 	Event survey: <ul style="list-style-type: none"> 2b: How has the session helped with understanding

Table 4: The alignment of the survey questions with Collabor8 aims, objectives and outcomes.

Research Approval

The *Collabor8* program gained approval for the evaluation and research component of the program using data collected from students and teachers through both the:

- UTS Human Research Ethics Committee (HREC).
- NSW Department of Education and Communities – State Education Research Applications Process (SERAP).

The official approval letters are attached in Appendix 1.

Collabor8 Schools

Seven (7) NSW Government sector schools participated in *Collabor8* in 2015. All 7 schools were chosen on the basis of appearing in the UAC Educational Access Schemes list of schools; these lists identify the most socio-economically disadvantaged schools in the state². Four (4) of the participating schools are located in the Sydney metropolitan area – in Sydney’s western, southern and south-western suburbs – and 3 in regional NSW, to the south and north of Sydney.

More information about each of the school contexts is described in Appendix 2 along with a summary table of school characteristic data taken from the www.myschool.edu.au website.

² The schools on the lists have been identified by either the NSW Department of Education (DEC) or Catholic Education Commission of NSW as the most socio-economically disadvantaged; have been identified by DEC as geographically isolated or participating in the Connected Communities program; or were formerly included in the Australian Government’s National Partnership for Low-Socio-economic Status School Communities Program.

Participant and Attendance Information

At the close of the program in December 2015, **405** female students across the seven *Collabor8* high schools had attended at least one of the program's touch points.

Characteristics of the Participant Cohort

Students were selected by the participating schools. About half (n=201; 49.6%) were Year 8 students and 204 (50.4%) were in Year 9. The break down by school is show in the table below.

<i>Collabor8 Registrations (2015)</i>			
<i>School</i>	<i>Year 8</i>	<i>Year 9</i>	<i>Total</i>
School 1	19	48	67
School 2	33	24	57
School 3	33	29	62
School 4	25	30	55
School 5	30	29	59
School 6	31	28	59
School 7	30	16	46
Totals	201	204	405

Table 5: Collabor8 Registrations across schools.

The cohort came from a diversity of ethnic backgrounds. While the majority of participants were born in Australia (83%) and just 3% (the next largest proportion) were born in China, the proportion of students for whom both parents were born overseas was 46% (compared with 38% of participants with both parents being born in Australia). Additionally, 16% of participants had at least one parent who was born overseas.

Eleven students identified as Aboriginal (4% of the cohort); there were no students identifying as Torres Strait Islander.

Of the cohort, 31% can be classified as 'first in family' i.e. neither of their parents attended university.

Attendance

Not all participants came to all four *Collabor8* touch points – the table below shows how many students came to all four touch points, how many came to (any) three of the touch points; (any) two of the touch points; and just one touch point. The reasons students did not attend all four touch points may have included: being absent from school on the day of the touch point, pulling out of the program, not having parental permission to attend an off-site excursion, etc.

Number of touch points attended by an individual	Number of students
4	145
3	108
2	73
1	70

Table 6: Attendance across number of touch points.

Touch Point One

The total number of girls participating in the Touch Point One was 339 from across Years 8 and 9 from the seven participating schools.

Attendance: *Collabor8* Touch Point One

School	Year 8	Year 9	Total	Absent	Total C8 participants
School 1	18	35	53	9	67
School 2	29	22	51	6	57
School 3	27	24	51	6	62
School 4	20	17	37	20	55
School 5	29	25	54	5	59
School 6	30	27	57	2	59
School 7	21	15	36	10	46
Totals	174	165	339	67	405

Table 7: Attendance *Collabor8* Touch Point One across schools.

Touch Point Two

The total number of girls participating in the second touch point was 319 from across Years 8 and 9 from the seven participating schools.

Attendance: *Collabor8* Touch Point Two

<i>School</i>	<i>Year 8</i>	<i>Year 9</i>	<i>Total</i>	<i>Absent</i>	<i>Total C8 participants</i>
School 1	17	31	48	19	67
School 2	30	23	53	4	57
School 3	20	16	36	26	62
School 4	23	19	42	13	55
School 5	30	27	57	2	59
School 6	31	23	54	5	59
School 7	20	9	29	17	46
<i>Totals</i>	171	148	319	86	405

Table 8: Attendance *Collabor8* Touch Point Two across schools.

Touch Point Three

The total number of girls participating in the third touch point was 280 from across Years 8 and 9 from the seven participating schools.

Attendance: *Collabor8* Touch Point Three

<i>School</i>	<i>Year 8</i>	<i>Year 9</i>	<i>Total</i>	<i>Absent</i>	<i>Total C8 participants</i>
School 1	15	39	54	13	67
School 2	28	15	43	14	57
School 3	21	14	35	27	62
School 4	20	13	33	22	55
School 5	19	20	39	21	59
School 6	30	25	55	4	59
School 7	19	2	21	25	46
<i>Totals</i>	128	152	280	125	405

Table 9: Attendance *Collabor8* Touch Point Three across schools.

Touch Point Four

The total number of girls participating in the fourth touch point was 209 from across Years 8 and 9 from the seven participating schools.

Attendance: *Collabor8* Touch Point Four

<i>School</i>	<i>Year 8</i>	<i>Year 9</i>	<i>Total</i>	<i>Absent</i>	<i>Total C8 participants</i>
School 1	16	35	51	16	67
School 2	25	12	37	20	57
School 3	24	14	38	24	62

School 4	15	14	29	26	55
School 5	20	5	25	34	59
School 6	15	14	29	30	59
School 7	0	0	0	46	46
Totals	115	94	209	196	405

Table 10: Attendance Collabor8 Touch Point Four across schools.

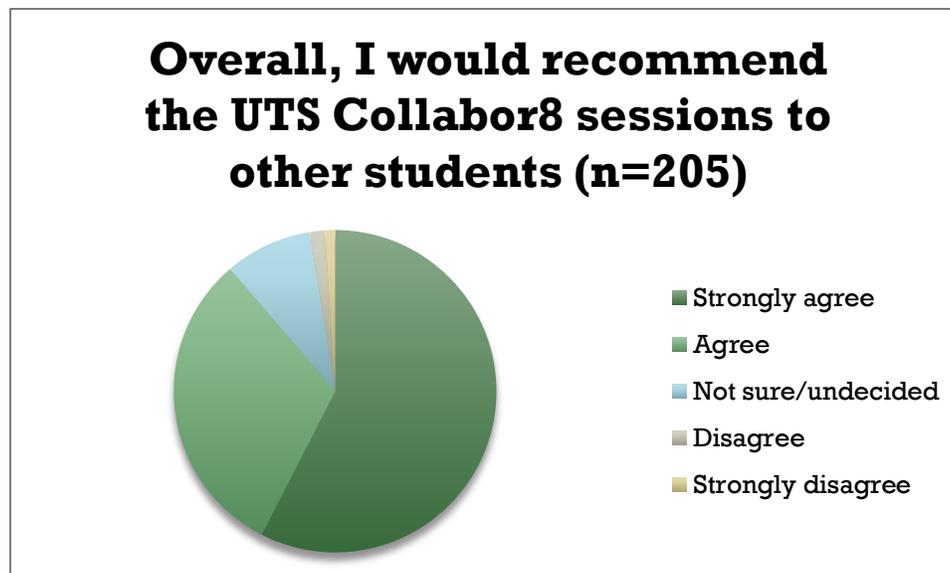
Collabor8 Program Evaluation

Below is an overview of the evaluation of the *Collabor8* program:

1. Overall
2. Against its stated aims
3. Against its stated objectives and outcomes

1. *Collabor8* - Overall Evaluation

The *Collabor8* program was well received by both student participants and teachers and, significantly, had an effect on participants interest in and knowledge of STEM related study and career paths, participants' understanding of what engineering and IT professionals do, and participants engagement in engineering and IT. Furthermore, the majority of students indicated they strongly agreed or agreed that



they would recommend the UTS *Collabor8* sessions to other students.

Figure 3. Overall, I would recommend the UTS *Collabor8* sessions to other students (Post-Program Survey Questions 25 i)

- **Participants' interest in and knowledge of STEM related study and career paths**

The *Collabor8* program delivered participants valuable career and course information, had an effect on participant interest in STEM subjects at school and its delivery was well received by students.

This effect is shown in the high level of agreement with the statements in the graph below (Post-Program Survey: Q25 a – i).

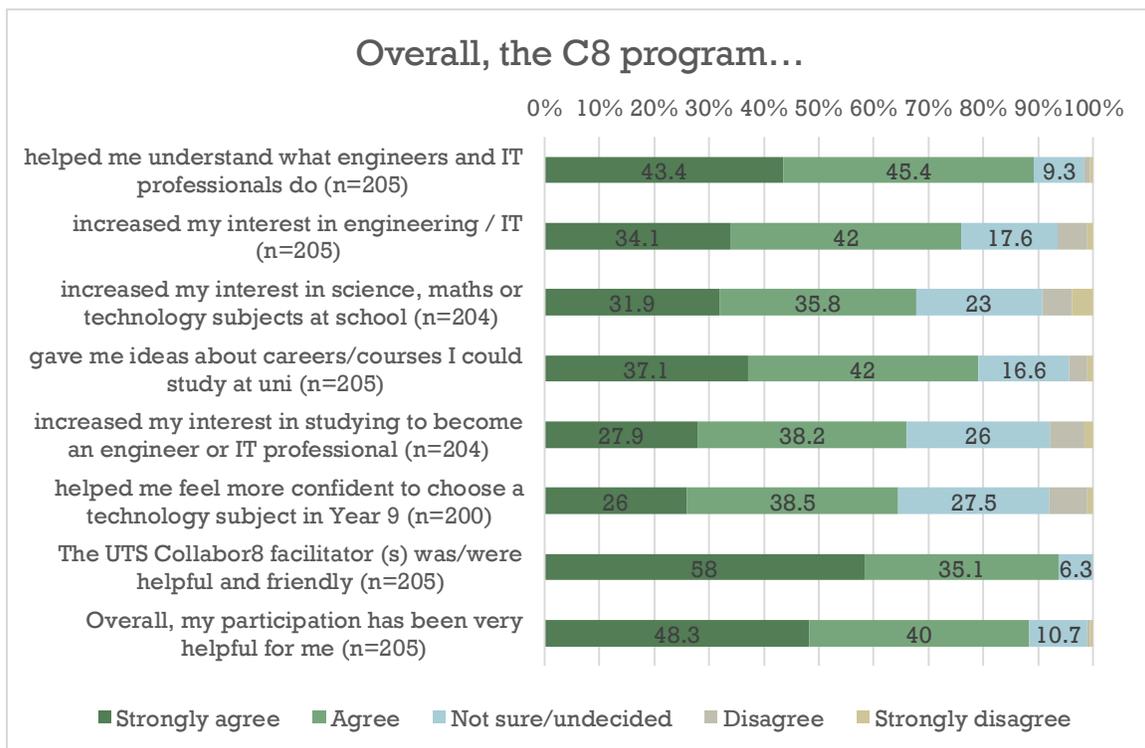


Figure 4. Overall evaluation of the *Collabor8* program (Post-Program Survey Questions 25 a – h)

- **Participants' understanding of what engineers and IT professionals do**

When participants were asked 'Have the UTS *Collabor8* sessions helped you with your understanding of what engineers and IT professionals do?' as a Yes/No question the majority of participants said 'Yes'. This can be compared with the first part of Figure 4 that asks the same question but with a scale of response options.

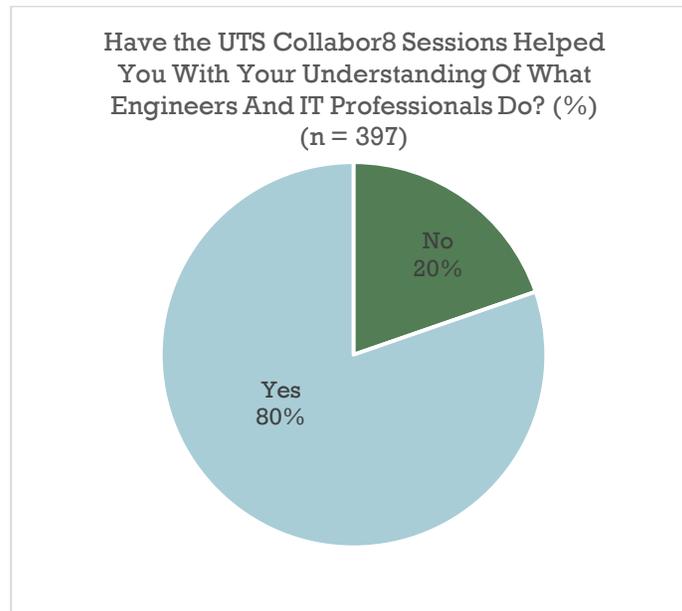


Figure 5. Have the UTS Collabor8 sessions helped you with your understanding of what engineers and IT professionals do? (Post-Program Survey Question 22).

When asked ‘...if yes, how?’ the responses, in order of frequency, were clustered around the following themes:

- Tasks engineers and IT professionals do on a daily basis.
- Different fields of engineering and aspects of IT.
- Career pathways that can be taken in engineering and IT.
- Engineering process of problem-solving and solution design.
- University courses that are available to lead to careers in engineering and IT.
- University life and what it includes and can be like.
- Engineering and IT are careers in which people design solutions to help people, improve processes and contribute to society.
- That a previously held perception or stereotype has been changed.
- Gendered aspects of engineering and IT fields.

Some example responses to this question include:

It helped me understand more about uni, different jobs in the fields and their work.

The different types of people who talked to us had different jobs and they were inspiring. Teaching us the main parts of their jobs and what they do.

[I learnt about] the many fields they could work in and it's just not one specific field. They are also very creative people who help(s) (sic) improve the quality of living.

[Engineers and IT professionals] are very creative people who help improve the quality of living.

It has helped me to understand the processes that they [engineers] go through to construct different types of things.

Yes, it has, it has helped me fully understand the role of engineers and IT pros, practice teamwork and problem solving skills.

Engineers help with everything we do in life i.e. roads, buildings. IT professionals work with technological things. They aren't hackers.

I now understand that engineering isn't just about building but creating.

- **Participants' engagement in engineering and IT content**

The hands-on activity and problem-based learning approach taken by the *Collabor8* program was very effective at engaging the participants in the STEM-related engineering and IT-based content. When asked 'What was the best part of the UTS *Collabor8* sessions you attended?' in the Post-Program Survey, participants highlighted the below.

Category	Freq.	Example responses
<p>The hands-on activities The majority of girls said that the hands-on nature of the activities was their favourite part of the <i>Collabor8</i> program.</p>	59	<ul style="list-style-type: none"> • <i>I liked the activities and what we learned during the UTS Collabor8 sessions.</i> • <i>The hands on stuff we get to do and the fact I understand them.</i>
<p>Learning Many girls mentioned that they enjoyed learning about new concepts and how they apply to their lives; careers they previously did not know about; or, what engineers and IT professionals do.</p>	32	<ul style="list-style-type: none"> • <i>Learning more about [engineering and IT] and seeing there's more than you see behind a subject.</i> • <i>I liked learning new things and being able to see things in an engineering and IT point of view.</i>
<p>Engineering tour at UTS The engineering focused tour of the UTS campus was preferred by more girls than the IT workplace tour. Many girls said they</p>	29	<ul style="list-style-type: none"> • <i>Taking a tour at UTS and learning that every part of engineering has a reason. E.g. curving of walls.</i> • <i>I got to see what engineers do which was</i>

liked learning about the different functions every aspect of a building has and how engineers plan this.		<i>amazing & also the structure of the buildings where very appealing. I got to learn the history of them.</i>
Presentations and speakers The biographical nature of the presentations was the most frequently mentioned aspect by girls who specified presentations as their favourite part of the program. Others also mentioned they enjoyed the element of discussion with presenters and mentors and how inspirational, friendly and approachable they were.	17	<ul style="list-style-type: none"> • <i>The discussions of the life of IT [professionals] and engineers in high school, the difficulties, uncertain choices, interests & scores [have] given ideas & courage for other people.</i> • <i>I enjoyed learning about people's experiences and what they currently do in the real world.</i>
University life and the university system Quite a few girls mentioned that their favourite part of <i>Collabor8</i> was learning about how universities operate, what happens inside of them and who goes there.	17	<ul style="list-style-type: none"> • <i>Getting a different perspective of UTS and what they do. It is truly amazing.</i> • <i>Learning about design and engineering courses.</i>
Other Those whose answers said that they enjoyed everything about the program fell into this category.	13	<ul style="list-style-type: none"> • <i>The volunteers, the food, the activities, the tours, around UTS</i>
Touch Point Four - Tours These girls enjoyed both of the Touch Point Four tours.	10	<ul style="list-style-type: none"> • <i>The tour of UTS as well as the cisco video calling</i>
IT workplace Tour These young women enjoyed the Touch Point Four IT workplace tour the most, including using the conference calling equipment at Cisco and Optus.	9	<ul style="list-style-type: none"> • <i>The best part of the UTS Collabor8 was the time went to Optus Centre.</i>

Table 11: What was the best part of the UTS Collabor8 sessions you attended? (Open-ended responses).

Teacher Survey data

The teachers who accompanied the Year 8 and 9 students to Touch Point Two and Four were all asked to complete a paper-based evaluation survey of the sessions. A summary of these results is below.

Touch Point Two

All of the teachers attending Touch Point Two (n=14) were surveyed and:

- 86% (n=12) said that their expectations of the day were met or exceeded. For example: *It has been better than what I expected due to the lovely activities conducted and Yes - the activities were challenging which required students to use critical thinking.*
- 100% (n=14) agreed or strongly agreed that they would recommend this UTS Collabor8 session to other teachers.

Touch Point Four

Eleven of the 14 teachers who attended the fourth touch point were surveyed at the end of the day.

All (100%) agreed or strongly agreed that they would recommend the session to other teachers and many mentioned the valuable learning opportunity it presented both the students and themselves.

For example teachers wrote:

- *The session today was very informative about professional opportunities for girls particularly in engineering.*
- *Good to understand work experience, trades and other courses that eventually lead to engineering.*

Teacher Telephone Interview

When interviewed over the phone at the mid-point of the *Collabor8* program, all teachers (n = 7) spoke about the value of *Collabor8* for their students. One mentioned that she'd seen improvement in engagement and more motivation, for example, more of her students signed up for an accelerated Chemistry class than in the past. She also reported an increase in the way the students from selective stream and mainstream at her school are collaborating.

In terms of the outcomes for teachers, the telephone interviews revealed that the majority of the teachers attending the *Collabor8* touch points have been motivated by the activities and intend to borrow ideas from *Collabor8* for their own teaching practice. For example, one teacher said (paraphrased): *[our teachers] also came back inspired by the activities themselves and will 'steal' the ideas for their own teaching practice and for other classes.* Another mentioned that activities and workshops can be copied and adapted by teachers to use in future years and with non-*Collabor8* students.

When asked if teachers' workloads had been impacted by their schools' participation in *Collabor8* no teachers said that their workloads were increased. One teacher said: *Just before each event someone would get back to me for numbers, catering, travelling. So it was very well organised and there was no point in time when I didn't know what my role was. It's been very helpful for the [financial] cover for teachers to have cover for two teachers to go. Of course with travel – not having to pay for travel. [It's] a huge weight off our shoulders.*

2. Evaluation against Program Aims

Current interest in STEM

The aim of *Collabor8* was to raise participant's interest in study in STEM in junior high school and aspiration for STEM study in senior high school, university and/or career field.

The following three graphs show the impact of each touch point on interest in mathematics, science and technology subjects and show that different touch points had a different effect by subject. Interestingly, interest in maths showed a cumulative effect, taking four sessions before over 50% of the students reported that the *Collabor8* session increased their interest in maths at school.

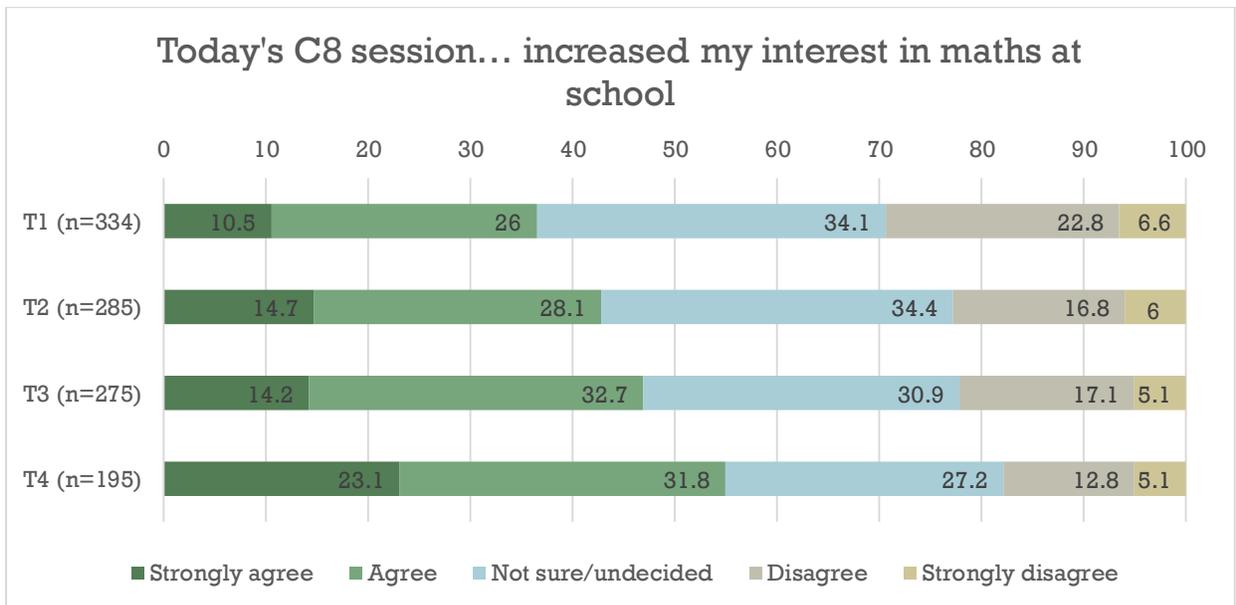


Figure 6. Today's *Collabor8* session... increased my interest in maths at school at Touch Points 1-4. (Event Survey Question 7b).

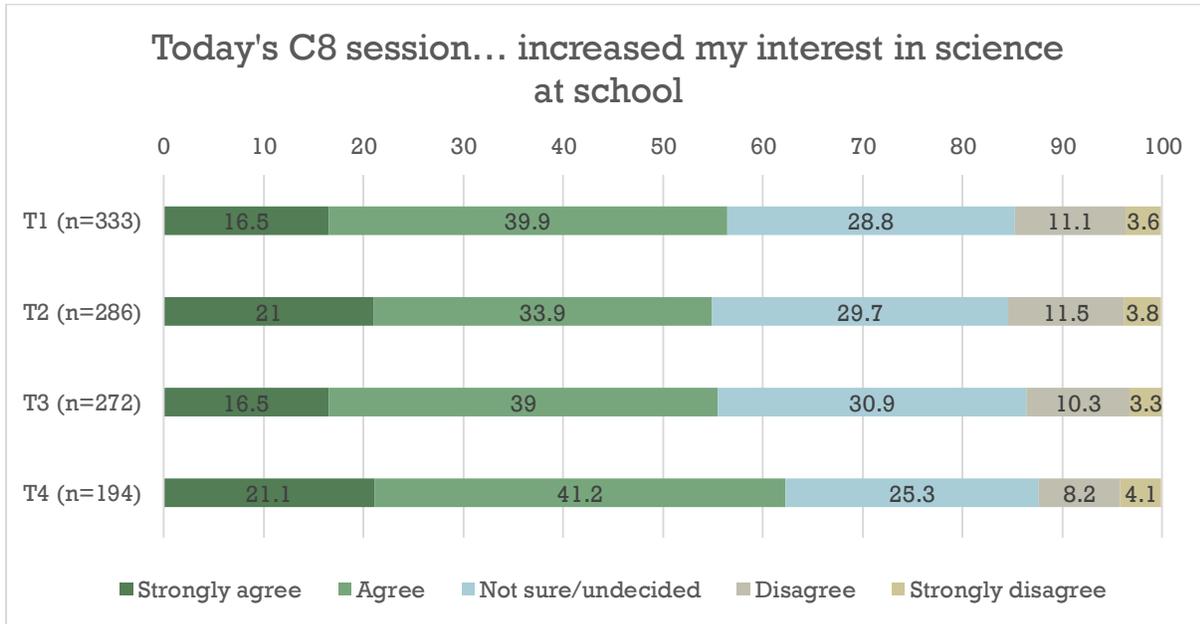


Figure 7. Today's Collabor8 session... increased my interest in science at school at Touch Points 1-4. (Event Survey Question 7c).

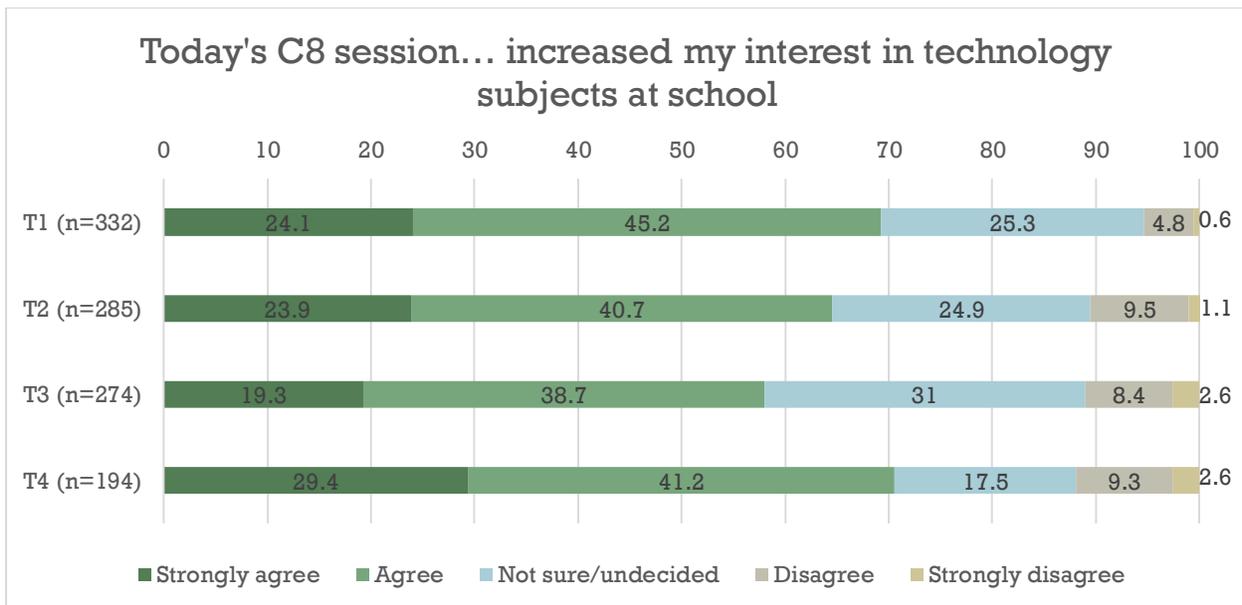


Figure 8. Today's Collabor8 session... increased my interest in technology subjects at school at Touch Points 1-4. (Event Survey Question 7d).

Interest/aspiration for STEM study in senior high school

The participants were asked to share their interest in studying STEM subjects in Years 11 and 12 in the future. No significant differences appear to have eventuated from their participation in *Collabor8* and so it is recommended that future *Collabor8* efforts be revised to include a stronger focus on the links between engineering and IT careers and the importance of Year 11 and 12 science and mathematics.

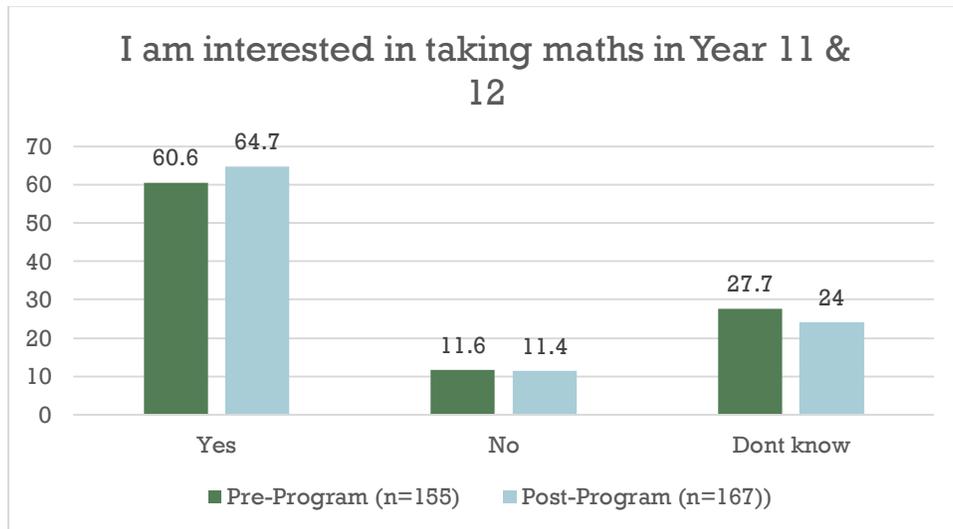


Figure 9. I am interested in taking maths in Year 11 & 12 (Pre-Survey Question 15 and Post-Survey Question 17).

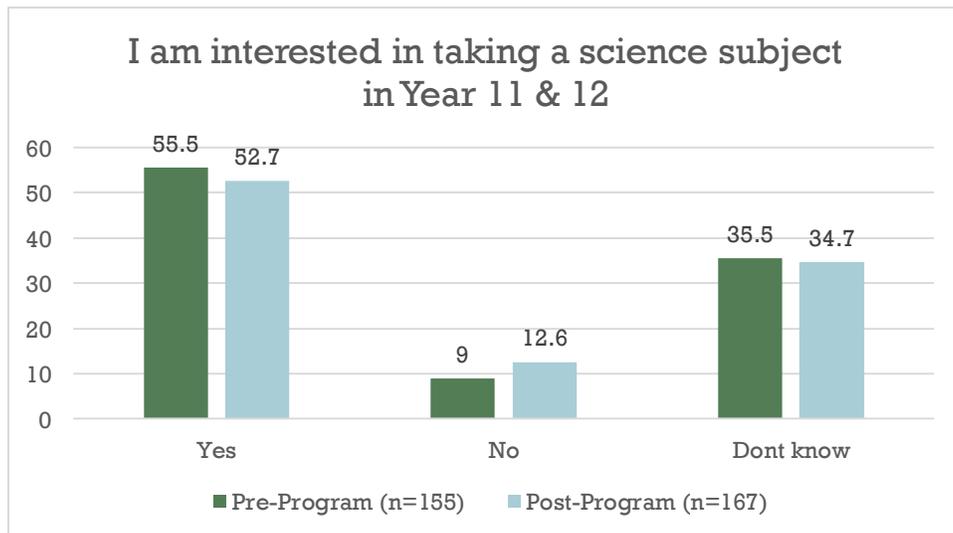


Figure 10. I am interested in taking a science subject in Year 11 & 12 (Pre-Survey Question 16 and Post-Survey Question 18).

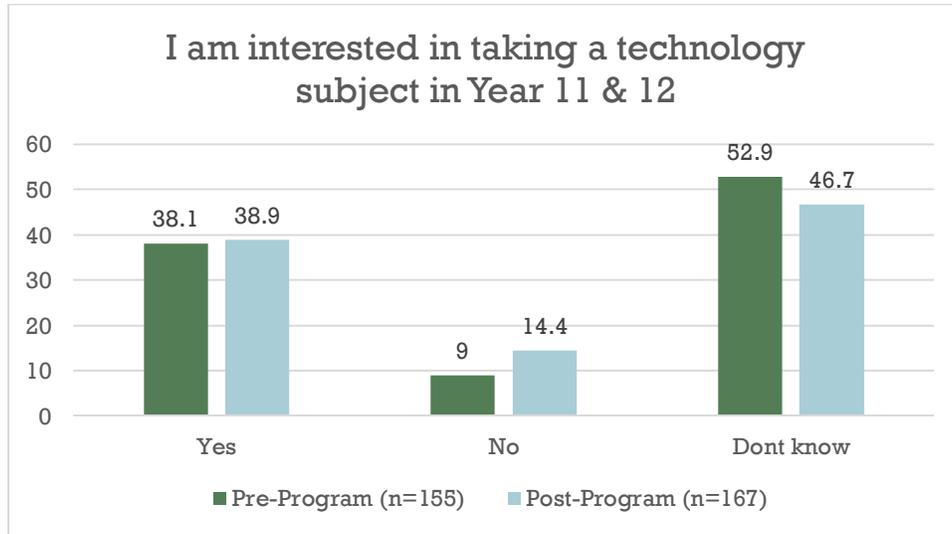


Figure 11. I am interested in taking a technology subject in Year 11 & 12 (Pre-Survey Question 17 and Post-Survey Question 19).

Interest/aspiration for STEM study at university AND interest/aspiration for studying engineering and IT at university

An analysis of the responses of students who came to all touch points shows a significant increase in the percentage of participants stating their aspiration to study at university in the future at Touch Point Four compared to Touch Point One.

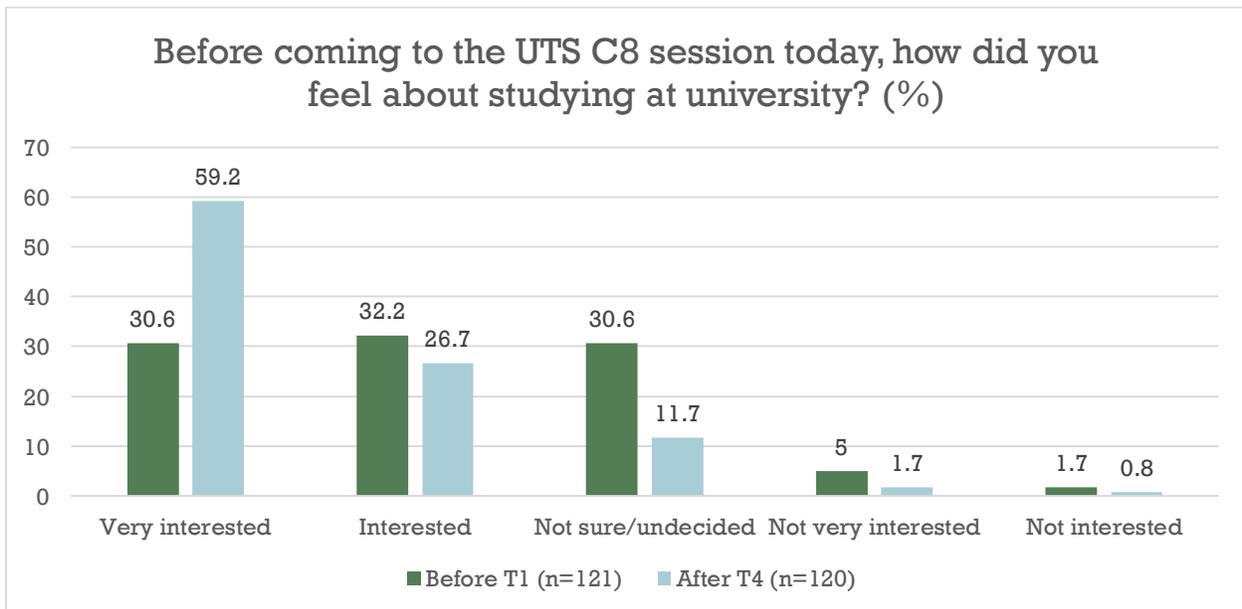


Figure 12. Before/After coming to the UTS C8 session today, how did you feel about studying at university? (Event Survey Questions 3 & 5).

Similarly, there is a very large increase in the proportion of students who state they are interested in future university level study in engineering or IT after *Collabor8* compared with before it.

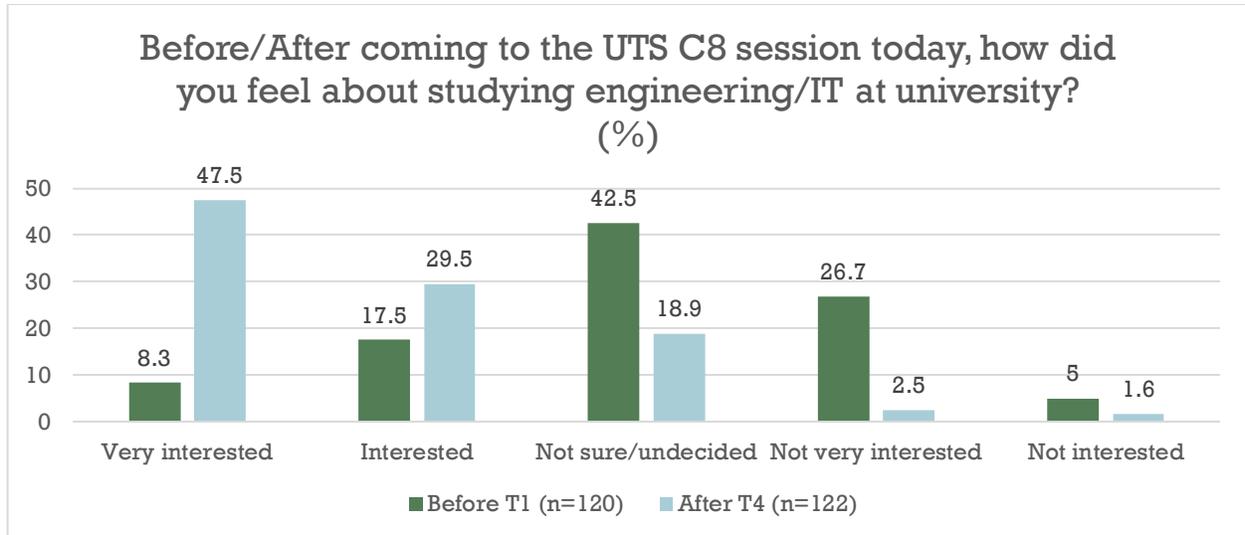


Figure 13. Before/After coming to the UTS C8 session today, how did you feel about studying engineering/IT at university? (Event Survey Questions 4 & 6).

Looking at participants' responses after each touch point shows that there was variation in responses across touch points possibly due to their content and structure (Event Survey - 7f).

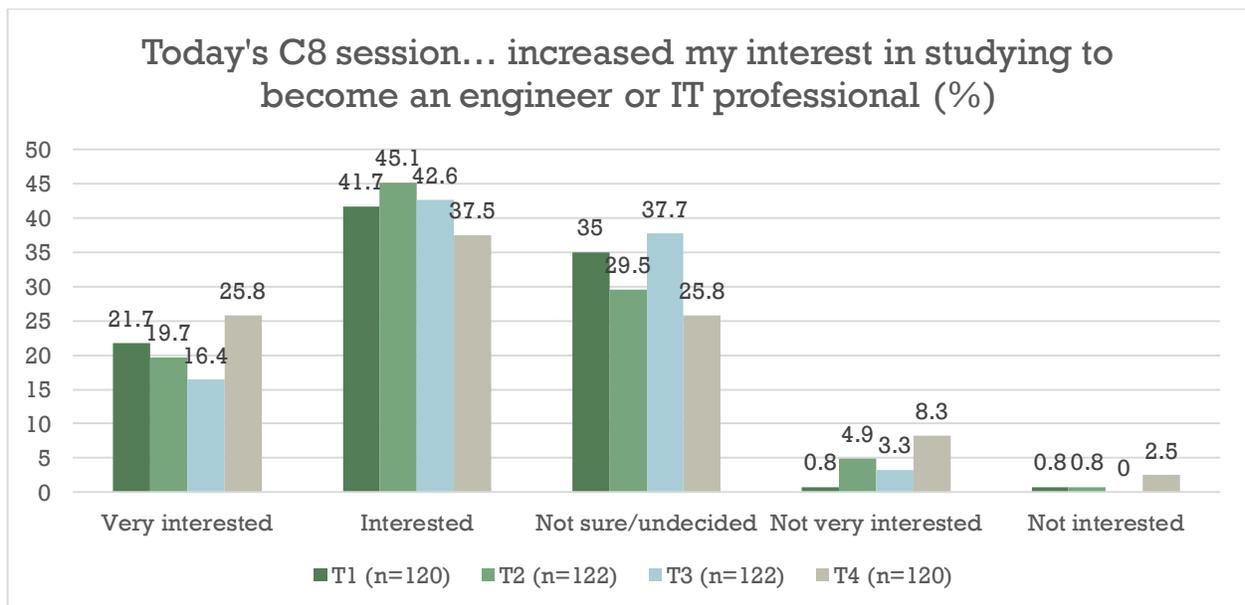


Figure 14. Today's C8 session... increased my interest in studying to become an engineer or IT professional (Event Survey Questions 7f).

Interest/aspiration for an engineering or IT career

The majority of students reported that all *Collabor8* sessions increased their interest in engineering or IT.

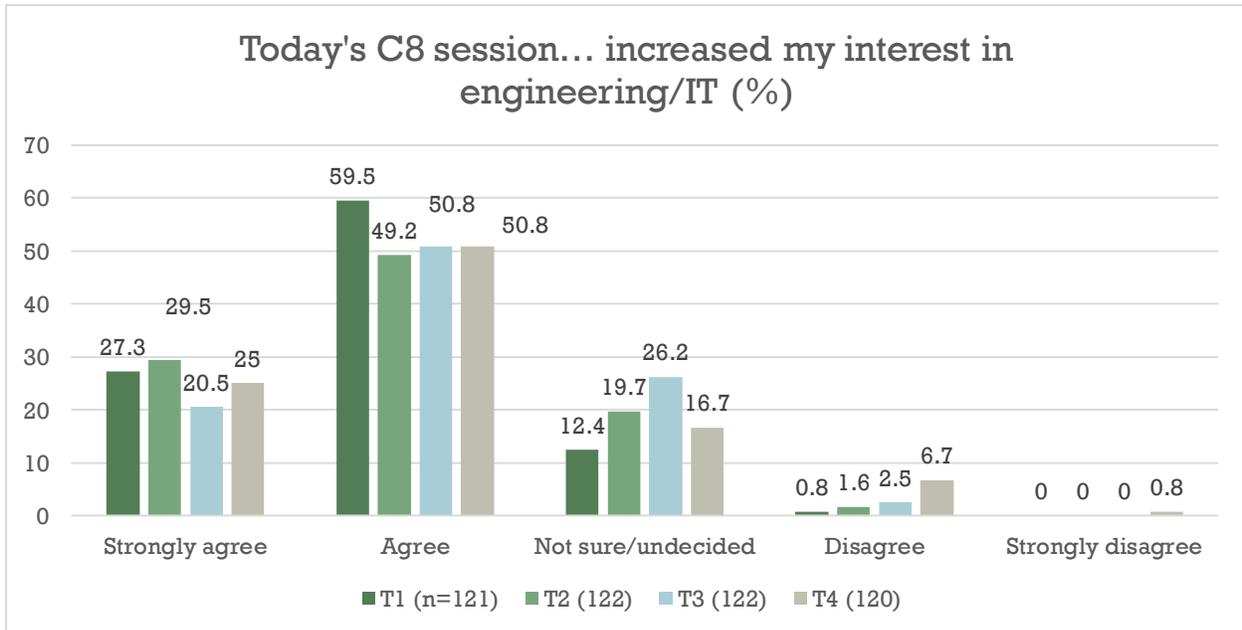


Figure 15. Today's C8 session... increased my interest in engineering/IT (Event Survey Questions 7a).

3. Evaluation against Program Objectives and Outcomes

The *Collabor8* program was evaluated against outcomes aligned with Zecharia et al.'s (2014) theoretical framework, to determine if there was evidence that the program improved the following perceptions amongst the participants:

1. Relevance of STEM = Is it for people like me?
2. Perceived actual and relative ability = Do I feel confident?
3. Science capital = Can I see the possibilities and pathways?

Relevance of STEM: 'Is it for people like me?'

The sessions had a significant positive effect ($p < .05$) on the number of participants who agree with the statement "People who are engineers now were just like me in high school", with 60.8% agreeing or strongly agreeing in the post-survey compared with 52.5% in the pre-survey.

There was also a positive effect on the number of participants who agreed with the statement "People who work in IT now were just like me in high school", with 55.4%

agreeing in the post-survey compared with 50% in the pre-survey, however this difference was not significant.

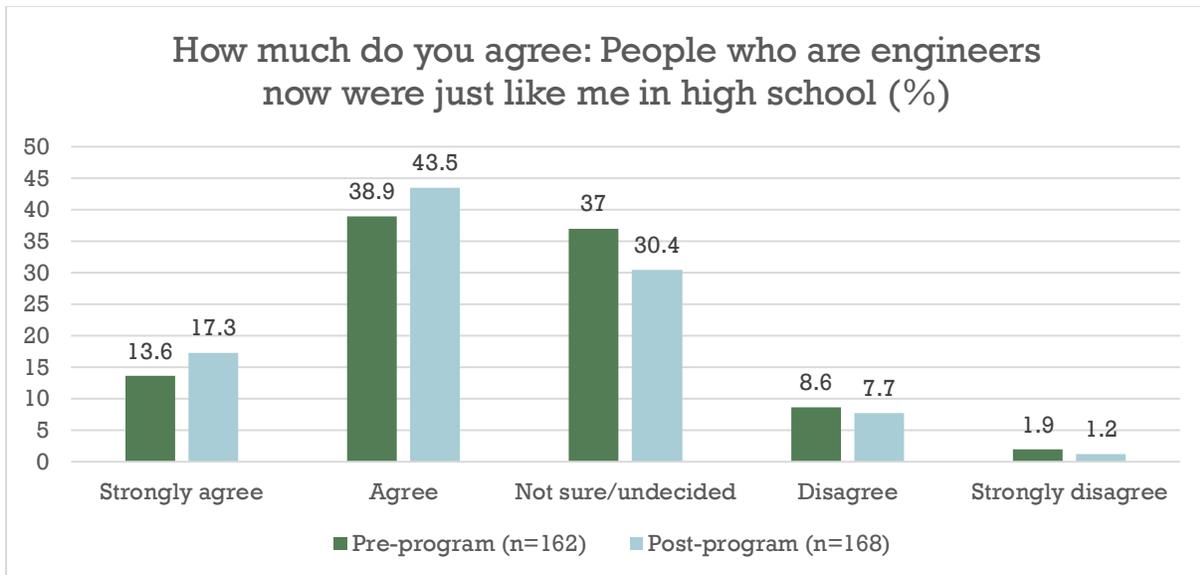


Figure 16. How much do you agree? People who are engineers now were just like me in high school (Pre-/Post-Survey Question 8c).

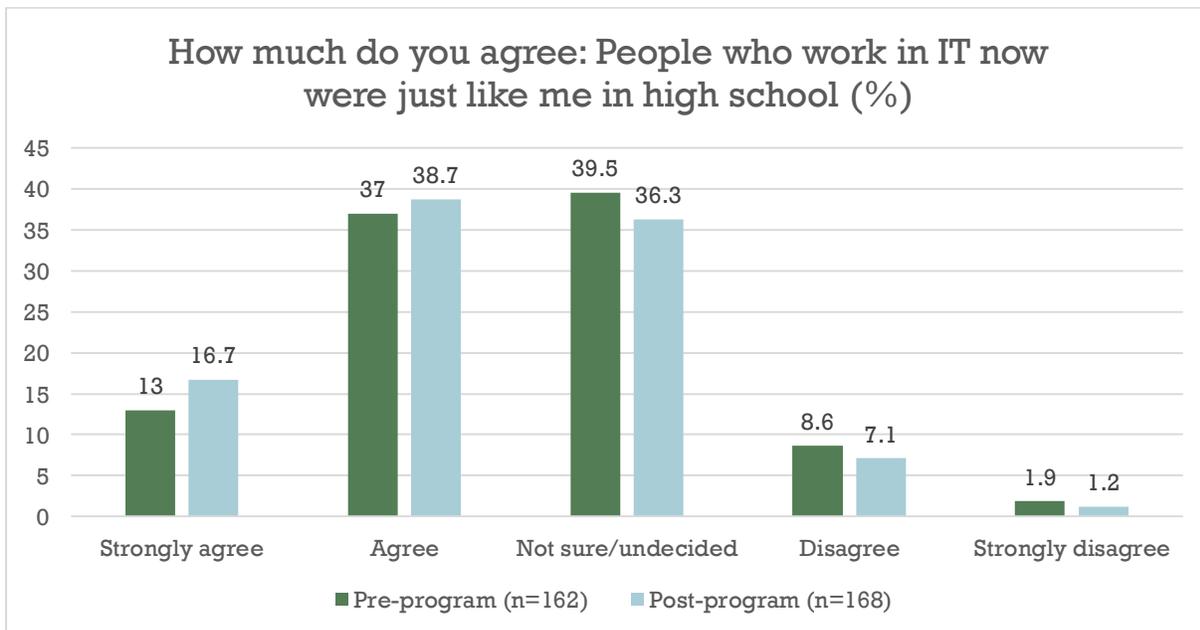


Figure 17. People who work in IT now were just like me in high school (Pre-/Post-Survey Question 8d).

Comparing pre- and post-survey results, demonstrated a significant positive effect ($p < .001$) on improving the participant's perceptions around women in engineering and IT careers, with:

- 16.5% more participants reported strongly agreeing that “Women make good engineers” in the post-program survey in comparison with the pre-program survey.
- 14.7% more participants reported strongly agreeing that “Women make good IT professionals” in the post-program survey in comparison with the pre-program survey.
- 11% more participants reported strongly agreeing that “Engineering is a good career choice for women” in the post-program survey in comparison with the pre-program survey.
- 12.2% more participants reported strongly agreeing that “IT is a good career choice for women” in the post-program survey in comparison with the pre-program survey.

It should be noted that the pre-program survey was undertaken prior to Touch Point Two, thus the participants had already experienced one session. Thus it is possible that these results may underestimate this positive effect.

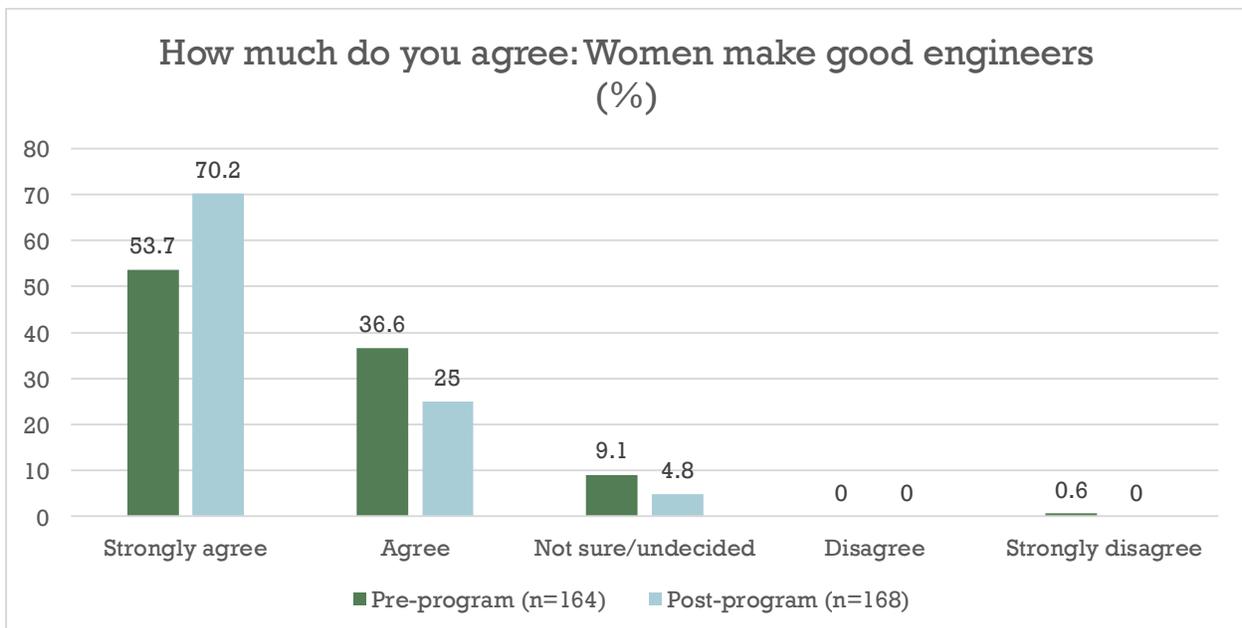


Figure 18. Women make good engineers (Pre-/Post-Survey Question 8e).

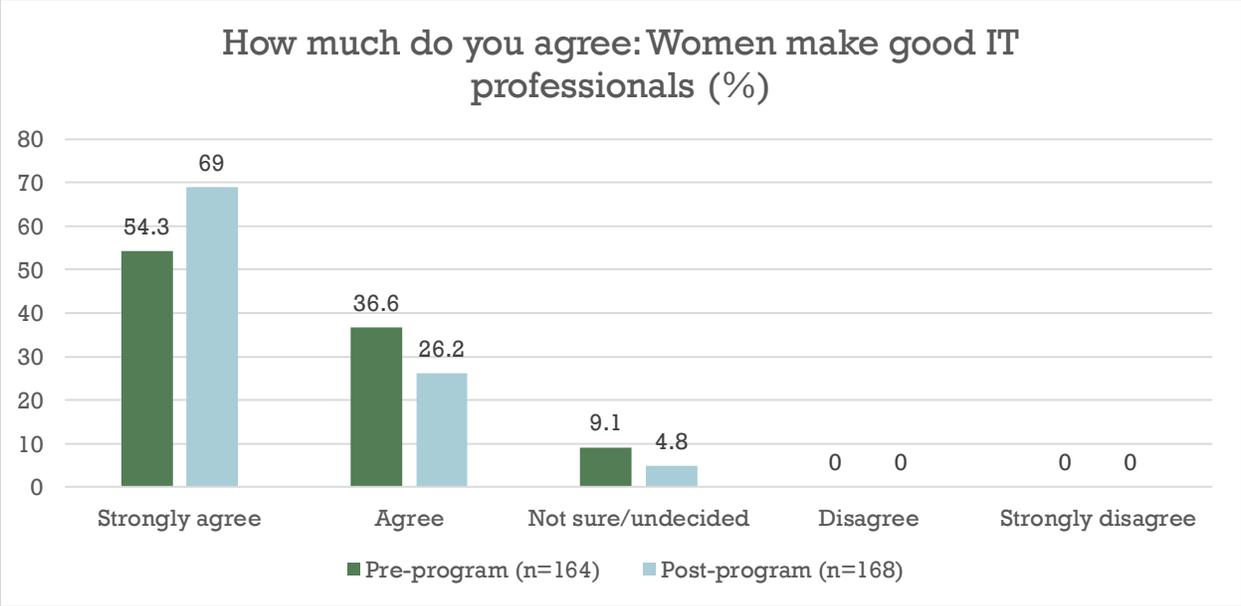


Figure 19. Women make good IT professionals (Pre-/Post-Survey Question 8f).

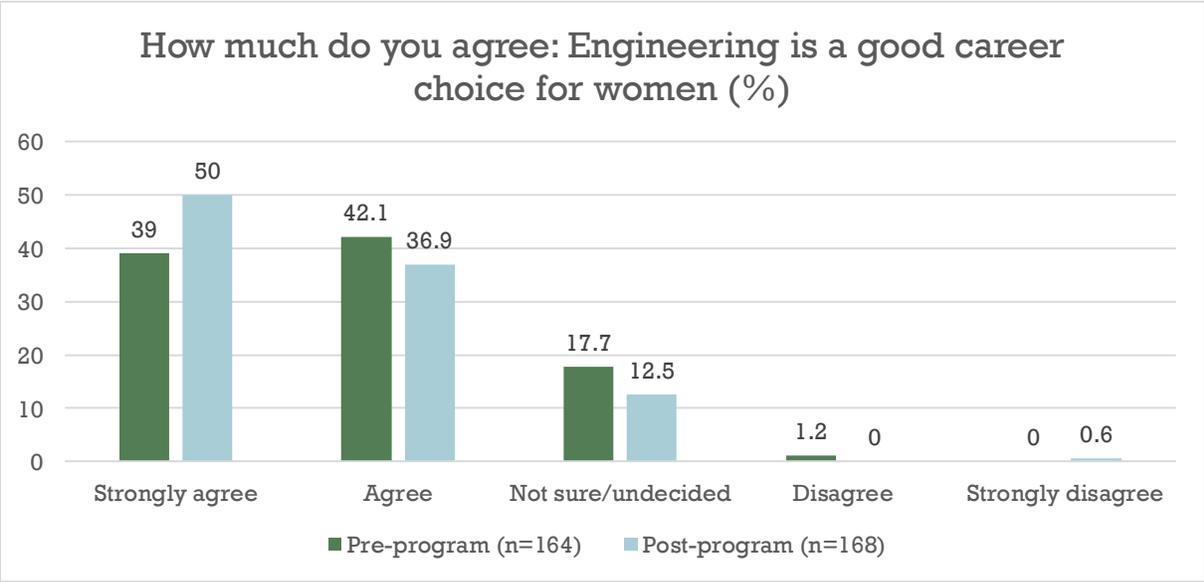


Figure 20. Engineering is a good career choice for women (Pre-/Post-Survey Question 8f).

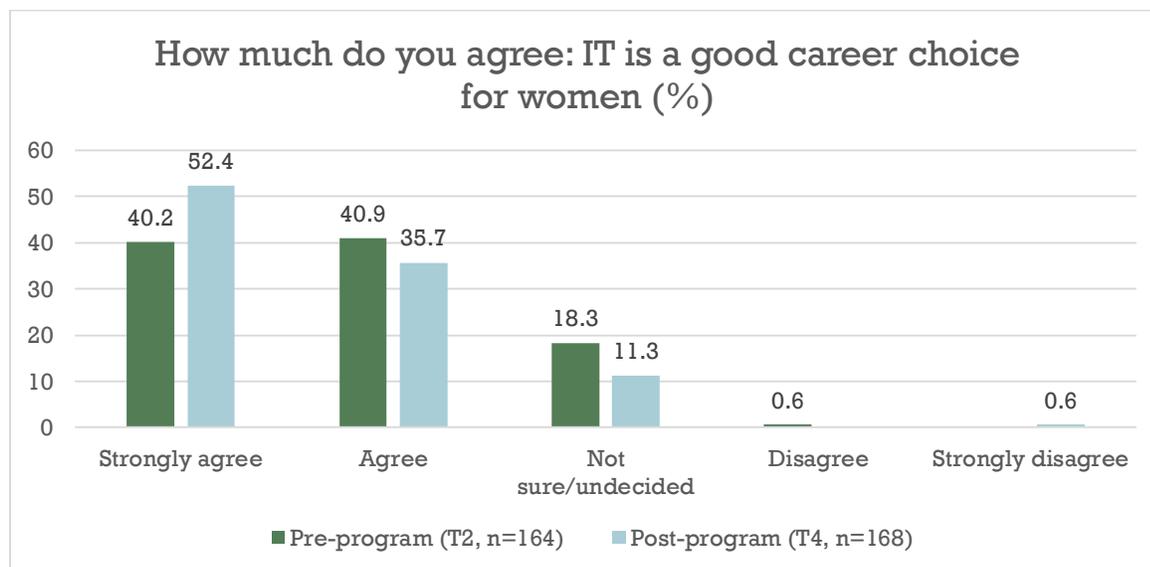


Figure 21. IT is a good career choice for women (Pre-/Post-Survey Question 8i).

Perceived ability: 'Do I feel confident?'

The participants recorded higher confidence and getting good marks in STEM subjects in the post-survey program compared with the pre-survey, with mixed results in enjoyment of STEM subjects, mindset and learning styles. However, none of these differences were found to be statistically significant.

Statement	Percentage who agreed or strongly agreed	
	Pre-program Survey	Post-program Survey
How do you feel in STEM subjects...		
I am confident in my ability in maths	56.5%	59.3%
I am confident in my ability in science	58.3%	63.9%
I am confident in my ability in technology subjects	49.7%	55.8%

Table 12. Confidence in STEM subject ability (Pre-/Post-Survey Questions 11 a-c).

Good marks

Statement	Percentage who agreed or strongly agreed	
	Pre-program Survey	Post-program Survey
I get good marks in maths	56.4%	66.3%
I get good marks in science	60.8%	67.1%
I get good marks in technology subjects	56.5%	60.5%

Table 13. Good marks in STEM subjects (Pre-/Post-Survey Questions 11 d-f).

Enjoyment

Statement	Percentage who agreed or strongly agreed	
	Pre-program Survey	Post-program Survey
I enjoy learning maths	59.5%	62.1%
I enjoy learning science	70.6%	74.2%
I enjoy learning technology subjects	68.1%	64.5%

Table 14. Enjoyment of STEM subjects (Pre-/Post-Survey Questions 11 g-i).

Mindset

Statement	Percentage who agreed or strongly agreed	
	Pre-program Survey	Post-program Survey
I can do anything if I put my mind to it and work hard	92.9%	94.0%
I am either good at something or I am not good at it	62.9%	53.6%

Table 15. Mindset (Pre-/Post-Survey Questions 4a-b).

Learning Style

Statement	Percentage who agreed or strongly agreed	
	Pre-program Survey	Post-program Survey
How do you feel in STEM subjects...		
I like to solve problems	66.7%	76.2%
I like to work in teams	77.2%	77.3%
I like to see the 'real world' impact of what I learn at school	79.8%	89.9%
I like to learn by doing	89.2%	92.9%
I like to make models of things I am learning about	51.2%	61.7%
I like to learn facts	78.6%	88.1%
I like to do experiments	93.5%	89.3%

Table 16. Learning Style (Pre-/Post-Survey Questions 5a-g).

A significant positive effect ($p < .001$) was found in response to the statement “I have what it takes to become an engineer” in the pre-/post-program survey comparison. Only 28.1% agreed or strongly agreed with this statement in the pre-program survey compared with 47.6% in the post-program survey.

Similarly, there was an increase ($p < .05$) in agreement with the statement “I have what it takes to become an IT professional”, with 25% agreeing or strongly agreeing in the pre-program survey compared with 35.3% in the post-program survey.

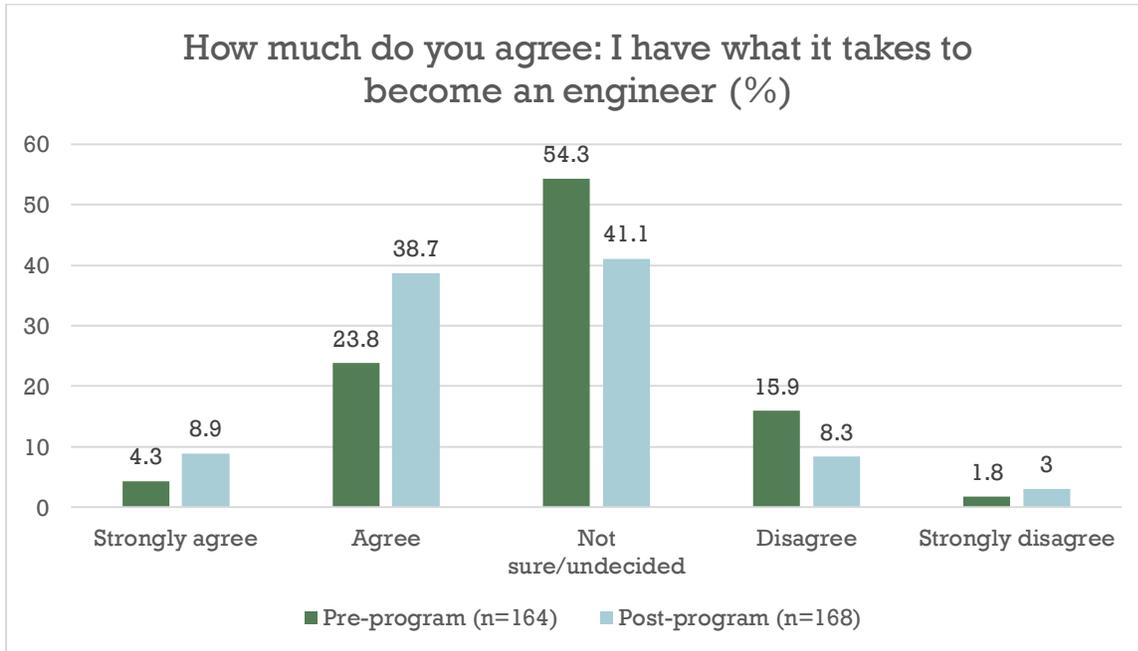


Figure 22. I have what it takes to become an engineer (Pre-/Post-Survey Question 8a).

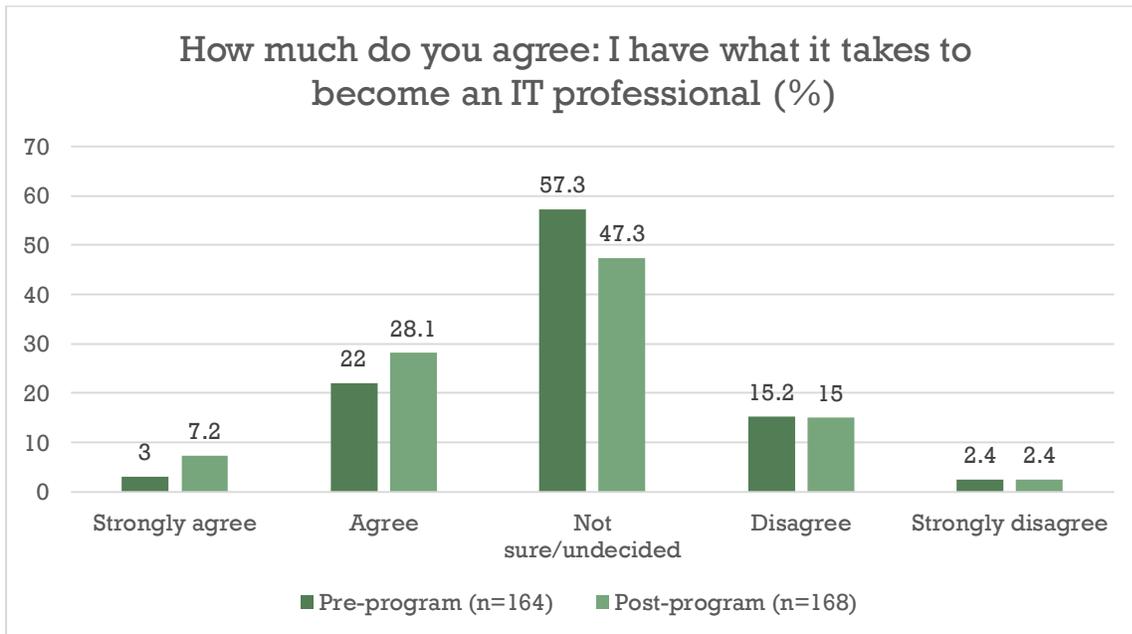


Figure 23. I have what it takes to become an IT professional (Pre-/Post-Survey Question 8b).

Comparing the pre-program to post-program surveys, 9.66% fewer participants reported thinking that there were barriers to becoming engineering or IT professionals. However, 64.7% of participants had already reported no barriers at the pre-program survey. As noted, the pre-program survey was undertaken after one session had been completed, thus it may have not captured the full extent of the impact.

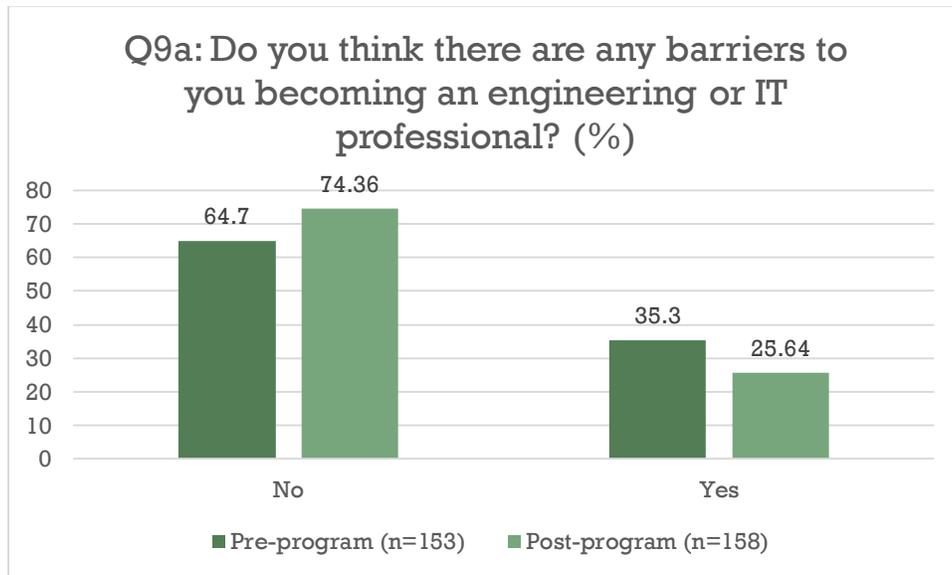


Figure 24. Do you think there are any barriers to you becoming an engineer or IT professional? (Pre-/Post-Survey Question 9a).

Science capital 'Can I see the possibilities & pathways?

The participants reported a significant increase ($p < .001$) in their level of understanding of what engineers and IT professionals do in the post-program survey compared with the pre-program survey:

- The proportion of participants reporting that their understanding of what engineers do as good or very good increased from 61% to 89.2%.
- The proportion of participants reporting that their understanding of what IT professionals do as good or very good increased from 55.5% to 83.3%.

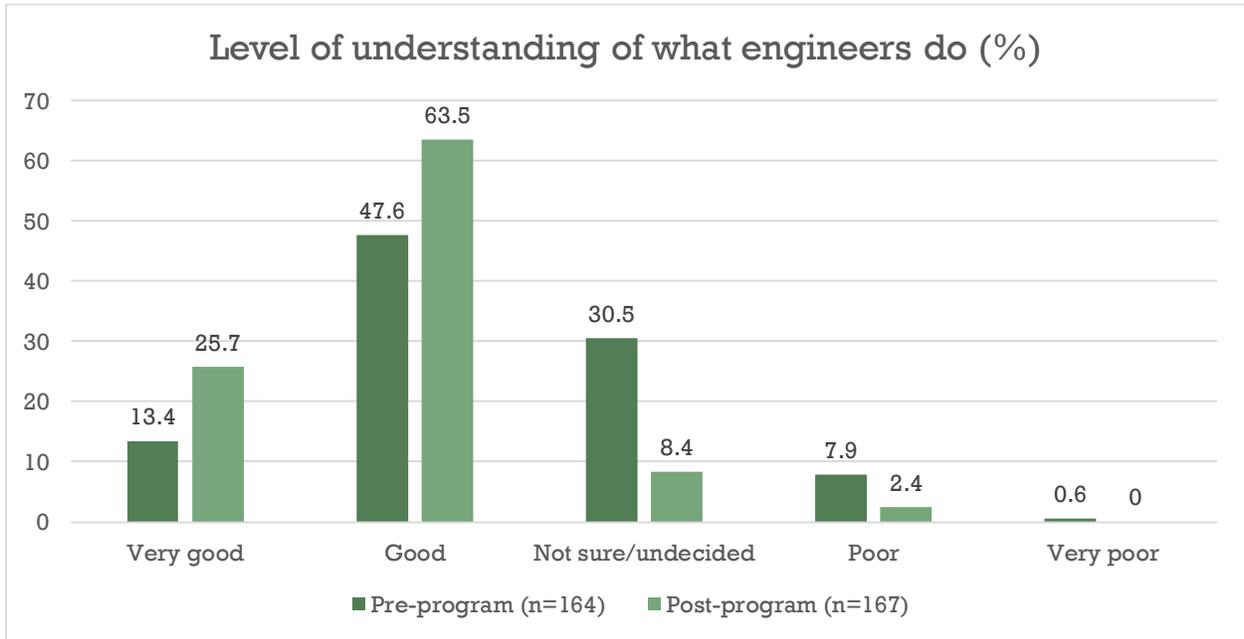


Figure 25. Level of understanding of what engineers do (Pre-/Post-Survey Question 7a).

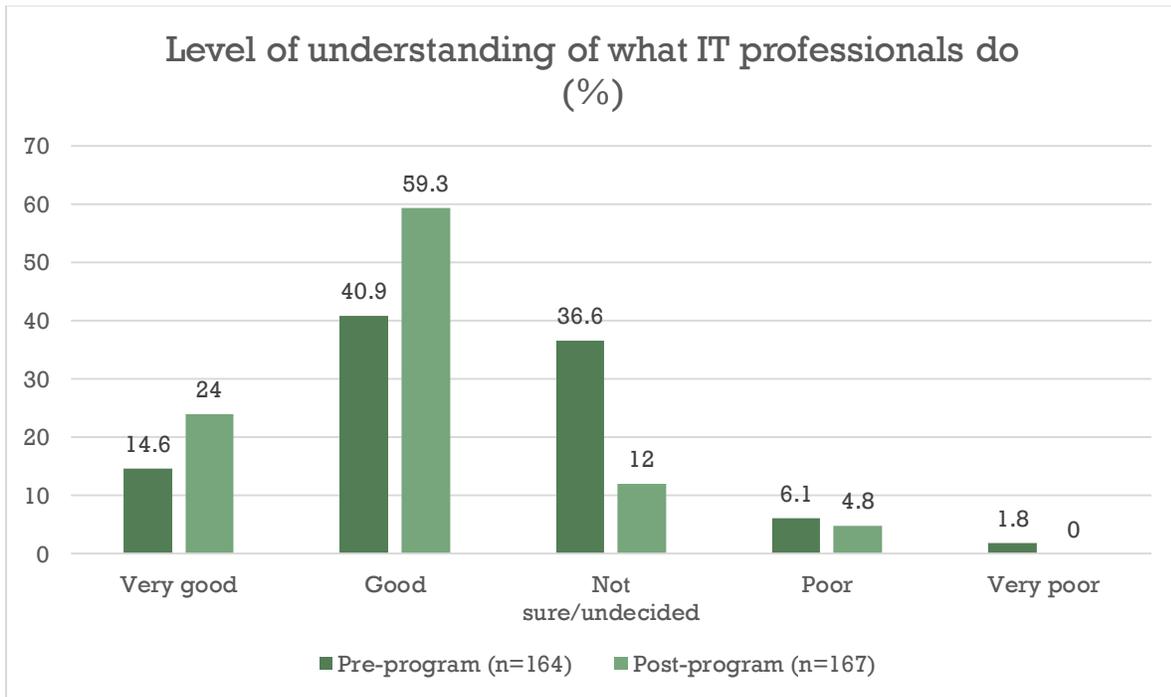


Figure 26. Level of understanding of what IT professionals do (Pre-/Post-Survey Question 7b).

Comparative Evaluation of the Touch Points

There was evidence of some cumulative effects across the *Collabor8* touch points on a number of variables:

- The proportion of students stating an increased interest in STEM subjects, with the exception of a dip at the third touch point, potentially due to it being very similar in format to the first touch point (and for science and technology at the second touch point).
- The proportions of students agreeing or strongly agreeing with the statement that ‘Today’s *Collabor8* session ... helped me feel more confident to choose a science, maths or technology subject in future.’

The cumulative effects on how students feel about STEM subjects after each touch point were inverse to the cumulative effect on the statement ‘Today’s *Collabor8* session ... helped me understand what engineers and IT professionals do’ which possibly reflects a ceiling effect i.e. each subsequent touch point could not teach more about what engineering and IT professionals do is that the previous due to students being exposed to this in the previous touch point. There is no cumulative effect on the statement ‘Today’s *Collabor8* session ... increased my interest in engineering / IT’.

Statement	Proportion agreeing at each <i>Collabor8</i> touch point			
	Touch Point 1	Touch Point 2	Touch Point 3	Touch Point 4
Today’s <i>Collabor8</i> session...				
...increased my interest in maths at school	36.6%	42.8%	46.9%	54.9%
...increased my interest in science at school	56.4%	54.9%	55.5%	62.4%
...increased my interest in technology subjects at school	69.2%	64.6%	58.0%	70.6%
... helped me feel more confident to choose a science, maths or technology subject in future.	62.4%	64.2%	64.4%	70.8%
... helped me understand what engineers and IT professionals do	92.2%	93.4%	81.6%	88.7%
... increased my interest in engineering / IT	80.4%	78.0%	69.7%	74.3%

Table 17. Comparative evaluation across touch points (Event Survey Questions 7a-d, e, h).

The proportions of participants reporting their interest in studying at university was lower at Touch Point Four compared with Touch Point One, however this difference is not statistically significant. Given the high baseline, there may also be a ceiling effect operating here.

There is a significant positive difference ($p < .001$) between Touch Point One and Touch Point Four, with 11.7% more participants reporting they were interested or very interested in studying engineering/IT at university.

Statement	Proportion reporting interested or very interested at each <i>Collabor8</i> touch point			
	Touch Point 1	Touch Point 2	Touch Point 3	Touch Point 4
After coming to the UTS C8 session today...				
how do you feel about studying at university?	88.5%	90.3%	82.0%	85.9%
how do you feel about studying engineering/IT at university?	65.3%	70.5%	75.4%	77.0%

Table 18. Comparative evaluation across touch points (Event Survey Questions 3 & 4).

Further Exploration of Research Questions

Further exploration of research questions and analyses is included in the Appendix.

Conclusion

Collabor8 aimed to address the issue of the progressive decline in female interest and enrolments in science, technology, engineering and mathematics (STEM) subjects at the junior high school level. It builds on emerging evidence that it is social norms that predominantly influence the interest levels of girls in high school in STEM and the subsequent uptake of tertiary STEM study and STEM-related careers. Across a number of indicators the *Collabor8* program was found to improve girls' perceptions of the relevance of STEM study, confidence in their abilities, and their awareness of pathways and possibilities.

Recommendations

- The evaluation has found the *Collabor8* program has been successful in improving the perceptions of high school girls towards study and careers in engineering and IT, thus it is recommended that the *Collabor8* program be used as a foundation for future outreach.
- It is recommended that the *Collabor8* program be reviewed for areas which can be improved in future iterations, including increasing links between mathematics, science and technology school curriculum and *Collabor8* activities and reinforcement of the importance of Year 11 and 12 science and mathematics subject selection.
- It is recommended that future iterations of *Collabor8* ensure the cohort includes girls who are 'disengaged' from STEM and evaluates any difference the program makes for them by comparison with girls who have demonstrated prior interest in STEM subjects.
- It is recommended that follow-up research is conducted to measure any longitudinal effects of participation in the *Collabor8* program.
- It is recommended that an overarching and coordinated data strategy be developed for supporting female participation in STEM, including the establishment of benchmarks and the collection of standardised data.
- While this evaluation has found a program like *Collabor8* can make a difference to high school girls' perceptions, it is recommended that other barriers to female participation in STEM be investigated, for example, barriers to enrolling in STEM subjects such as lack of access and 'gendered subject menus' in schools. The evaluation noted that the way in which subjects were categorised as STEM was potentially gendered (e.g. woodwork is considered STEM, while textiles and design is not, despite scientific content). This intervention is supported by the findings of Joensen and Nielsen that minor changes to the way courses were bundled in Danish schools led to changes in subject choice and increased female STEM participation. (2015 cited in Justman and Mendez 2014, p.6) It is recommended that subject categorisation be reviewed to better highlight existing STEM content, and that there be investigation of opportunities to embed STEM into relevant subjects.
- It is recommended that *Collabor8* findings be packaged for gender equity STEM outreach and shared with a diversity of stakeholders and relevant groups.

- It is recommended that further targeted outreach and resources be invested in improving gender equity in STEM.

Reference List

Australian Curriculum, Assessment and Reporting Authority (2015). *My School*. URL: www.myschool.edu.au

Justman, M., & Méndez, S.J. (2016) Gendered Selection of STEM Subjects for Matriculation, Melbourne Institute Working Paper Series, Working Paper No. 10/16, Melbourne Institute of Applied Economic and Social Research, The University of Melbourne.

Zecharia, A., Cosgrave, E., Thomas, L., & Jones, R. (2014). *Through Both Eyes: The case for a gender lens in STEM, SCIENCE GRRL*, United Kingdom.

Appendix 1: HREC and SERAP Approval Documentation

UTS Human Research Ethics Committee – Approval, July 2015



17 July 2015

Melissa Ronca
Widening Participation Coordinator
Equity and Diversity Unit
CB01.17.16

Research & Innovation
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PO Box 123 Broadway
NSW 2007 Australia
T: +61 2 9514 9681
F: +61 2 9514 1244
Research.Ethics@uts.edu.au
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UTS CRICOS PROVIDER CODE: 00089R

Dear Applicant

Thank you for your response to the Committee's comments for your project titled, "Collabor8 Women in Engineering & IT Program evaluation and research: Young women's high school subject selection and engagement in STEM". Your response satisfactorily addresses the concerns and questions raised by the Committee who agreed that the application now meets the requirements of the NHMRC National Statement on Ethical Conduct in Human Research (2007). I am pleased to inform you that ethics approval is now granted.

Your approval number is UTS HREC REF NO. 2015000383.

Approval will be for a period of five (5) years from the date of this correspondence subject to the provision of annual reports.

Please note that the ethical conduct of research is an on-going process. The National Statement on Ethical Conduct in Research Involving Humans requires us to obtain a report about the progress of the research, and in particular about any changes to the research which may have ethical implications. This report form must be completed at least annually from the date of approval, and at the end of the project (if it takes more than a year). The Ethics Secretariat will contact you when it is time to complete your first report.

I also refer you to the AVCC guidelines relating to the storage of data, which require that data be kept for a minimum of 5 years after publication of research. However, in NSW, longer retention requirements are required for research on human subjects with potential long-term effects, research with long-term environmental effects, or research considered of national or international significance, importance, or controversy. If the data from this research project falls into one of these categories, contact University Records for advice on long-term retention.

If you have any queries about your ethics approval, or require any amendments to your research in the future, please do not hesitate to contact Research.Ethics@uts.edu.au.

Yours sincerely,

Professor Marion Haas
Chairperson
UTS Human Research Ethics Committee
C/- Research & Innovation Office
University of Technology, Sydney
E: Research.Ethics@uts.edu.au

THINK.CHANGE.DO

UTS Human Research Ethics Committee – Extension Approval, March 2016

Melissa Ronca

From: Research.Ethics@uts.edu.au
Sent: Thursday, 5 May 2016 1:23 PM
To: Melissa Ronca; Bronwyn Holland; Research Ethics; Julia Prior
Subject: UTS HREC Approval - ETH16-0438

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Applicant

UTS HREC REF NO. ETH16-0438

The UTS Human Research Ethics Expedited Review Committee reviewed your amendment application for your project titled, "Amendment- Collabor8 Women in Engineering & IT evaluation and research: Young women's high school subject selection and engagement in STEM", and agreed that the amendments meet the requirements of the NHMRC National Statement on Ethical Conduct In Human Research (2007). I am pleased to inform you that the Committee has approved your request to amend the protocol as follows:

1. To request the participating schools to provide data about their Year 9 (2015 & 2016) elective subject enrolments.

You should consider this your official letter of approval. If you require a hardcopy please contact the Research Ethics Officer (Research.Ethics@uts.edu.au).

To access this application, please follow the URLs below:

* if accessing within the UTS network: <https://rm.uts.edu.au>

* if accessing outside of UTS network: <https://remote.uts.edu.au>, and click on "RM6 - ResearchMaster Enterprise" after logging in.

We value your feedback on the online ethics process. If you would like to provide feedback please go to:
<http://surveys.uts.edu.au/surveys/onlineethics/index.cfm>

If you wish to make any further changes to your research, please contact the Research Ethics Officer in the Research and Innovation Office, Ms Valeria Passo on 02 9514 2478.

In the meantime I take this opportunity to wish you well with the remainder of your research.

Yours sincerely,

Professor Marion Haas
Chairperson
UTS Human Research Ethics Committee
C/- Research & Innovation Office
University of Technology, Sydney
E: Research.Ethics@uts.edu.au

NSW Department of Education – State Education Research Approval Process (SERAP)
– Approval, August 2015



Ms Melissa Ronca
PO Box 123
BROADWAY NSW 2007

CORP15/15606
DOC15/634538
SERAP 2015348

Dear Ms Ronca

I refer to your application to conduct a research project in NSW government schools entitled *Collabor8 Women in Engineering & IT Program evaluation and research: Young women's high school subject selection and engagement in STEM*. I am pleased to inform you that your application has been approved.

You may contact principals of the nominated schools to seek their participation. You should include a copy of this letter with the documents you send to principals.

This approval will remain valid until 12-Aug-2016.

The following researchers or research assistants have fulfilled the Working with Children screening requirements to interact with or observe children for the purposes of this research for the period indicated:

Researcher name	WWCC	WWCC expires
Melissa Ronca	WWC0639784E	09-Mar-2020

I draw your attention to the following requirements for all researchers in NSW government schools:

- The privacy of participants is to be protected as per the NSW Privacy and Personal Information Protection Act 1998.
- School principals have the right to withdraw the school from the study at any time. The approval of the principal for the specific method of gathering information must also be sought.
- The privacy of the school and the students is to be protected.
- The participation of teachers and students must be voluntary and must be at the school's convenience.
- Any proposal to publish the outcomes of the study should be discussed with the research approvals officer before publication proceeds.
- All conditions attached to the approval must be complied with.

When your study is completed please email your report to: serap@det.nsw.edu.au
You may also be asked to present on the findings of your research.

I wish you every success with your research.

Yours sincerely

Dr Susan Harriman
Leader, Quality Assurance
13 August 2015



Policy, Planning and Reporting Directorate
NSW Department of Education
Level 1, 1 Oxford Street, Darlinghurst NSW 2010 – Locked Bag 53, Darlinghurst NSW 1300
Telephone: 02 9244 5060 – Email: serap@det.nsw.edu.au

NSW Department of Education – State Education Research Approval Process (SERAP)
– Variation Approval, May 2016



Ms Melissa Ronca
PO Box 123
BROADWAY NSW 2007

CORP15/15606
DOC16/417006
SERAP 2015348

Dear Ms Ronca

I refer to your application for variation to the research project being conducted in NSW government schools entitled *Collabor8 Women in Engineering & IT Program evaluation and research: Young women's high school subject selection and engagement in STEM*. I am pleased to inform you that your application has been approved.

This approval will remain valid until 12-Jul-2016.

The following researchers or research assistants have fulfilled the Working with Children screening requirements to interact with or observe children for the purposes of this research for the period indicated:

Researcher name	WWCC	WWCC expires
Melissa Ronca	WWC0639784E	09-Mar-2020

When your study is completed please email your report to serap@det.nsw.edu.au.

Yours sincerely

A handwritten signature in black ink, appearing to read "R. Stevens".

Dr Robert Stevens
Manager, Research
6 May 2016



School Policy and Information Management
NSW Department of Education
Level 1, 1 Oxford Street, Darlinghurst NSW 2010 – Locked Bag 53, Darlinghurst NSW 1300
Telephone: 02 9244 5060 – Email: serap@det.nsw.edu.au

Appendix 2: School Contexts and Data Tables

School 1

Located in the most multicultural local government area (LGA) in Australia³, School 1 caters for girls in Years 7 to 12. In 2014, the school's enrolments were at 780 students with a (full-time) teacher to student ratio of one teacher to 11.9 students. Just 1% of the school population is Indigenous and 98% come from a language background other than English.

With the majority of students at School 1 being from language backgrounds other than English, the school has a series of proactive programs that develop students' English language skills. There is also an extension program for academically talented girls and individualised support for those girls who need more help with their studies.

From 2013 School 1 was partially selective, starting with one academically selective class in Year 7. The school states that of its HSC students, 75% pursue further study at university or TAFE.

School 1 has an overall ICSEA⁴ value of **898**. The distribution of its students' individual ICSEA scores (which do not include the school variables of proportion of Indigenous students and geographical remoteness) as they fit into the Australian average quartiles is:

³At the 2011 Census, 54.2% of the population of the School 1 local government area (LGA) in Sydney's western suburbs, were born overseas, making it the LGA with the highest proportion of population born overseas nationally.

⁴ The Index of Community Socio-Educational Advantage (ICSEA) was created by the Australian Curriculum, Assessment and Reporting Authority (ACARA) specifically to enable meaningful comparisons of National Assessment Program – literacy and numeracy (NAPLAN) test. The Australian mean is set at 1,000 and the standard deviation is 100. An ICSEA score of 800 or less represents a relatively disadvantaged student population (in terms of socio-educational background) and a score of 1,200 is relatively high compared with the national average (i.e. 2 standard deviations away from the national mean). The index takes into account key factors in students' family backgrounds (parents' occupation, school education and non-school education) that influence students' educational outcomes at school. In addition to these student-level factors, research has shown that school-level factors (a school's geographical location and the proportion of Indigenous students a school caters for) need to be considered when summarising educational advantage or disadvantage at the school level. ICSEA is not a measure of student academic performance and does not measure school wealth. NB: The student ICSEA scores do not include the school measures of indigeneity and remoteness.

	Bottom quarter	Middle quarters	Top quarter	
School distribution	70%	16%	10%	3%

School 2

Located in a regional town (population 12,154⁵) in the NSW, School 2 is a coeducational high school catering for Year 7 to 12. The total enrolment in 2014 was 851 students and the teacher to student ration in 2014 was one teacher to every 13.5 students. A relatively low proportion of the student population originate from non-English language backgrounds (6%) and 4% identify as Indigenous. In 2014, the gender split among students was female 47% to male 53%.

Students in Year 7 and 8 are supported to aim high through ASPIRE, a program that uses the school's strong links with the University of Canberra and the University of Wollongong. The ASPIRE program includes campus visits, team teaching with university staff and students and professional learning for teachers. ASPIRE also places year 7 and 8 students into learning-teams that connect the learning of their class to focus areas such as performing arts, sport or technology.

School 2 has an overall ICSEA value of **986** and the distribution of its students' individual ICSEA scores is:

	Bottom quarter	Middle quarters	Top quarter	
School distribution	32%	34%	23%	11%

School 3

Located in the western suburbs of Sydney, School 3 is a Year 7 to 12 coeducational high school with a multicultural population. In 2014 there were 715 enrolled students and a teaching ration of one teacher to 12.1 students. Girls made up 41% of the student population. Two percent (2%) of students are Indigenous and 72% from a language background other than English.

There are Gifted and Talented opportunities as well as enrichment programs from Years 7 to 10 in every subject across all years and, according to the school, it has partnerships with over 30 external organisations including universities, businesses,

⁵ Source: 2011 Census, Australian Bureau of Statistics

community and educational providers to create opportunities for students to enrich their personal, social and academic life. This includes business mentoring, university bridging courses, civic participation and career pathways for tertiary study and future employment.

The school is on the Priority Schools Program and the Priority Action School program with key emphasis on increasing students' learning capacity in literacy and numeracy.

School 3 has an overall ICSEA value of **936** and the distribution of its students' individual ICSEA scores is:

	Bottom quarter	Middle quarters	Top quarter
School distribution	56%	27%	13%

School 4

School 4 is located in southern Sydney and caters for Years 7 to 12. The school student population was 380 female students in 2014. The teacher to student ration in 2014 was one teacher per 9.6 students. Eighty-one percent of students came from a language background other than English and 2% of students are Indigenous.

The school population is diverse and the school states that it is proud of its strong multicultural tradition and the values students learn about tolerance of diversity and inclusivity. It is the school's vision to inspire young women to be leaders in their chosen field.

School 4 has an overall ICSEA value of **984** and the distribution of its students' individual ICSEA scores is:

	Bottom quarter	Middle quarters	Top quarter
School distribution	38%	27%	23%

School 5

School 5 is a coeducational high school serving a rural town (population 4,595 in 2014⁶) in the Macarthur region of NSW south of Sydney catering for Years 7 to 12. The school had 1,170 students enrolled in 2014 and a (full-time equivalent) teacher

⁶ Source: 2011 Census, Australian Bureau of Statistics

ratio of one teacher to 13.8 students in 2014. Eight per cent (8%) of the student population is Indigenous and 5% come from language background other than English. Girls make up 47% of the student body.

School 5 was established in the 1950s as a co-educational comprehensive school and services a semi-rural growing community. The school has strong links with its local community and feeder primary schools. The school has a tradition of sporting and academic achievement and is recognised within the district for its innovative approach to curriculum, extensive student welfare and learning support programs. The school has a Trade Training School, Trade Training Centre, multi-purpose hall, modern science laboratories and a well-equipped library. Facilities for photography, information technology, drama, dance and creative arts are well established.

School 5 has an overall ICSEA value of **955** and the distribution of its students' individual ICSEA scores is:

	Bottom quarter	Middle quarters	Top quarter	
School distribution	46%	32%	17%	6%

School 6

School 6 is located in a suburb in Sydney's south west. It was established in the 1980s and is a partially selective comprehensive coeducational high school catering to Years 7 to 12. In 2014, the student population was 1,119 and there was a teacher to student ratio of one teacher to 14.1 students. Girls make up 48% of the student body with 2% of students identifying as Indigenous and 79% hailing from a non-English speaking background.

Sixty academically selective places are available on a competitive basis in each of the years 7 to 12 and demand for placement is high. Demand is also high for out-of-area enrolments but availability is very limited.

The student population is almost 80% from a non-English speaking language background with the largest cultural groups being Vietnamese and Arabic at about 17% of the student population each. The multicultural diversity of students and staff (representing almost fifty different cultural backgrounds) fosters the development of

an inclusive and harmonious environment that acknowledges and celebrates cultural difference.

School 6 offers students a diverse curriculum which includes innovative Stage 5 electives such as Astronomy, Dig it and Eat and Philosophy as well the full complement of HSC courses including extension 1 and 2. A comprehensive range of VET, Board Developed and Board Endorsed courses are also offered allowing the school to personalise learning options for individual students. The school states that, academic performance across the whole student body has shown steady improvement in all measures over the 4 years to 2015 with some talented and hard-working students achieving outstanding results.

There is a strong school focus on student welfare and wellbeing with a team of more than thirty staff involved in providing wellbeing and learning support to students.

School 6 has an overall ICSEA value of **972** and the distribution of its students' individual ICSEA scores is:

	Bottom quarter	Middle quarters	Top quarter
School distribution	41%	29%	9%

School 7

School 7 is a coeducational middle-years campus (catering for Years 7 to 10) in a rural setting in the Central Coast region of NSW north of Sydney. A total of 1,045 students were enrolled at the campus in 2014 and there was a (full-time equivalent) teacher to student ratio of one teacher to every 14.2 students. Of the total student population 49% are female, 10% are Indigenous and 8% come from a non-English speaking background.

The school focuses on developing literacy and numeracy as well as being (among other things) at the cutting edge in the use of technology as a Microsoft Lead School; lifting student access to university through its AVID Program; leading the education of students for the Asian Century as an Access Asia and BRIDGE Project school with a sister school exchange with a school in Japan.

School 7 Campus has an overall ICSEA value of **946** and the distribution of its students' individual ICSEA scores is:

	Bottom quarter	Middle quarters		Top quarter
School distribution	47%	31%	17%	5%

Source: www.MySchool.edu.au (December 2015)

Enrolments (2014)

<i>School</i>	<i>Total enrolments</i>	<i>Girls</i>	<i>Boys</i>	<i>Indigenous students</i>	<i>Language background other than English</i>
School 1	780	780	0	1%	98%
School 2	851	399	452	4%	6%
School 3	715	292	423	2%	72%
School 4	380	380	0	2%	81%
School 5	1170	551	619	8%	5%
School 6	1119	534	585	2%	79%
School 7	1045	517	528	10%	8%

Teaching staff (2014)

<i>School</i>	<i>Teaching staff (no.)</i>	<i>Full-time equivalent teaching staff</i>	<i>Non-teaching staff</i>	<i>Full-time equivalent non-teaching staff</i>
School 1	67	65.4	14	13.1
School 2	62	63.2	16	14.9
School 3	51	59	13	9.7
School 4	40	39.7	8	9.4
School 5	82	84.6	20	19.4
School 6	79	79.4	17	16.6
School 7	70	73.5	18	15.6

School finances (2013)

<i>School</i>	<i>Total net recurrent income</i>	<i>Per student net recurrent income</i>	<i>Total capital expenditure</i>
School 1	\$11,205,316	\$14,274	\$199,479
School 2	\$10,844,445	\$12,453	\$174,772
School 3	\$10,529,920	\$14,393	\$259,250
School 4	\$7,043,636	\$17,609	\$97,305
School 5	\$14,531,797	\$11,723	\$383,694
School 6	\$13,564,959	\$13,053	\$1,108,253
School 7	\$12,430,954	\$12,175	\$186,033

Index of Community Socio-Educational Advantage (ICSEA)
School student ICSEA distribution

<i>School</i>	<i>School ICSEA value</i>	<i>Bottom quarter</i>	<i>Middle quarters</i>	<i>Top quarter</i>
School 1	898	70%	16% 10%	3%
School 2	986	32%	34% 23%	11%
School 3	936	56%	27% 13%	4%
School 4	984	38%	27% 23%	12%
School 5	955	46%	32% 17%	6%
School 6	972	41%	29% 21%	9%
School 7	946	47%	31% 17%	5%

	VET 2013		Senior secondary outcomes 2013	
<i>School</i>	<i>VET enrolments</i>	<i>School based apprenticeships & traineeships</i>	<i>NSW HSC awarded</i>	<i>All Year 12 completions</i>
School 1	161	0	112	120
School 2	147	4	93	98
School 3	210	0	84	88
School 4	113	1	68	68
School 5	446	4	123	132
School 6	209	108	110%	
School 7	2	N/A	N/A	N/A

Appendix 3: Collabor8 Questionnaires

Event Survey

Implemented at the conclusion each touch point to student participants; two A4 pages as follows:

	Collabor8 2015 UTS Women in Engineering and IT	Session Survey	TP: ID:
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Thank you for coming to today's Collabor8 session. We would like to hear your feedback about the program and your plans for the future. This survey is voluntary but we hope you will complete it so we can plan better programs. If you do not feel comfortable answering any questions, please leave them blank. UTS will keep all your answers confidential. **Thank you for your feedback!**

ABOUT YOU

<small>FIRST NAME</small>	<small>FAMILY NAME</small>	<small>YEAR</small>	<small>HOME POSTCODE</small>
<small>SCHOOL</small>		<small>TODAY'S DATE (Day, Month, Year)</small>	<small>YOUR DATE OF BIRTH (Day, Month, Year)</small>

YOUR FEEDBACK ON TODAY'S COLLABOR8 SESSION

1. What was the best part of the UTS Collabor8 session today?

2. Has the UTS Collabor8 session today helped you with your understanding of what engineers and IT professionals do? Yes No

If yes, please say how (e.g. types of tasks they do; where they work; who they might be, etc.):

3. After coming to the UTS Collabor8 session today, how do you feel about studying at university?

<small>VERY INTERESTED</small>	<small>INTERESTED</small>	<small>NOT SURE/ UNDECIDED</small>	<small>NOT VERY INTERESTED</small>	<small>NOT INTERESTED</small>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. After coming to the UTS Collabor8 session today, how do you feel about studying engineering/IT at university?

<small>VERY INTERESTED</small>	<small>INTERESTED</small>	<small>NOT SURE/ UNDECIDED</small>	<small>NOT VERY INTERESTED</small>	<small>NOT INTERESTED</small>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. Before you came to the UTS Collabor8 session today, how did you feel about studying at university?

<small>VERY INTERESTED</small>	<small>INTERESTED</small>	<small>NOT SURE/ UNDECIDED</small>	<small>NOT VERY INTERESTED</small>	<small>NOT INTERESTED</small>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. Before you came to the UTS Collabor8 session today, how did you feel about studying engineering/IT at university?

<small>VERY INTERESTED</small>	<small>INTERESTED</small>	<small>NOT SURE/ UNDECIDED</small>	<small>NOT VERY INTERESTED</small>	<small>NOT INTERESTED</small>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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7. <u>TODAY'S</u> COLLABOR8 SESSION...	STRONGLY AGREE	AGREE	NOT SURE/ UNDECIDED	DISAGREE	STRONGLY DISAGREE
a. ... increased my interest in engineering / IT	<input type="radio"/>				
b. ... increased my interest in maths at school	<input type="radio"/>				
c. ... increased my interest in science at school	<input type="radio"/>				
d. ... increased my interest in technology subjects at school	<input type="radio"/>				
e. ... helped me understand what engineers and IT professionals do	<input type="radio"/>				
f. ... increased my interest in studying to become an engineer or IT professional	<input type="radio"/>				
g. ... gave me ideas about careers/courses I could study at uni	<input type="radio"/>				
h. ... helped me feel more confident to choose a science, maths or technology subject in future	<input type="radio"/>				
i. The UTS Collabor8 facilitator(s) was/were helpful and friendly.	<input type="radio"/>				
j. Overall, my participation today has been enjoyable.	<input type="radio"/>				
k. I would recommend this UTS Collabor8 session to others.	<input type="radio"/>				

7. Would you suggest any changes to today's UTS Collabor8 sessions? Yes No

If yes, please say what we can improve:

Thank you for completing this form!

Please give it to your UTS Collabor8 Program Facilitator.

Pre-Program Survey – Year 8 version

Implemented at the beginning of Touch Point 2 to student participants; Year 8 version (three A4 pages) as follows:

Thank you for coming to today's Collabor8 at UTS Day! We would like to get your feedback about Collabor8 and ask about your experiences at school and your future plans for the research part of the Collabor8 Program. If you and your parent/guardian have signed the consent form to participate in the Collabor8 research, please complete this survey.

This survey is voluntary. If you do not feel comfortable answering any questions, please leave them blank. UTS will keep all your answers confidential. Your responses in no way affect your ability to participate fully in Collabor8 activities.

FIRST NAME	FAMILY NAME	YEAR	HOME POSTCODE
SCHOOL	EVENT / DATE	DATE OF BIRTH (Day, Month, Year)	

YOUR SUBJECTS AT SCHOOL

1. What is your favourite subject at school? Why?

YOUR FUTURE PLANS

2. a. Is there a job that you'd really like to do after you leave school? No I haven't decided Yes

b. If yes, what is it? _____

c. Why do you want to do this job? What do you find interesting and appealing about it?

3. How much do you agree with the following statements?

After I finish school...	STRONGLY AGREE	AGREE	UNDECIDED / DON'T KNOW	DISAGREE	STRONGLY DISAGREE
a. I'd like to go to university	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. I'd like to go to TAFE or VET College (Vocational Education & Training)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. I'd like to get a job straight away	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. I'd like to work as an engineer or in information technology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. My parents would like me to be an engineer or work in IT	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

YOUR LEARNING STYLE

4. How much do you agree with the following?

	STRONGLY AGREE	AGREE	NOT SURE / UNDECIDED	DISAGREE	STRONGLY DISAGREE
a. I can do anything if I put my mind to it and work hard	<input type="radio"/>				
b. I am either good at something or I am not good at it	<input type="radio"/>				

5. How much do you agree with the following?

	STRONGLY AGREE	AGREE	NOT SURE / UNDECIDED	DISAGREE	STRONGLY DISAGREE
a. I like to solve problems	<input type="radio"/>				
b. I like to work in teams	<input type="radio"/>				
c. I like to see the 'real world' impact of what I learn at school	<input type="radio"/>				
d. I like to learn by doing	<input type="radio"/>				
e. I like to make models of things I am learning about	<input type="radio"/>				
f. I like to learn facts	<input type="radio"/>				
g. I like to do experiments	<input type="radio"/>				

UTS Women In Engineering and IT 2015

ENGINEERING AND INFORMATION TECHNOLOGY

6. Please complete the sentences below:

a. To work in the field of engineering, I think you need to.....

b. To work in the information technology field, I think you need to.....

7. I think my understanding of...	VERY GOOD	GOOD	NOT SURE/ UNDECIDED	POOR	VERY POOR
a. ... what engineers do is:	<input type="radio"/>				
b. ... what IT professionals do is:	<input type="radio"/>				

8. How much do you agree with the following statements?	STRONGLY AGREE	AGREE	UNDECIDED / DON'T KNOW	DISAGREE	STRONGLY DISAGREE
a. I have what it takes to become an engineer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. I have what it takes to become an IT professional	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. People who are engineers now were just like me in high school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. People who work in IT now were just like me in high school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Women make good engineers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Women make good IT professionals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Engineering is a good career choice for women	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. IT is a good career choice for women	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. a. Do you think there are any barriers to you becoming an engineer or IT professional? No Yes

b. If yes, what are they? _____

SCIENCE, TECHNOLOGY & MATHS

10. How much do you agree with the following statements?	STRONGLY AGREE	AGREE	UNDECIDED / DON'T KNOW	DISAGREE	STRONGLY DISAGREE
a. I think it is important for me to study maths	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. I think it is important for me to study science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. I think it is important for me to study technology subjects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. One or both of my parents think these subjects are important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. My teachers encourage me to study these subjects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. There are links between these subjects and what I'd like to study after school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. There are links between these subjects and jobs I'd like to do after school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. Think about how you feel in your maths, science and technology subjects (like D&T or ICT).	STRONGLY AGREE	AGREE	NOT SURE/ N/A	DISAGREE	STRONGLY DISAGREE
a. I am confident in my ability in maths	<input type="radio"/>				
b. I am confident in my ability in science	<input type="radio"/>				
c. I am confident in my ability in technology subjects (e.g. ICT,D&T)	<input type="radio"/>				
e. I get good marks in maths	<input type="radio"/>				
f. I get good marks in science	<input type="radio"/>				
g. I get good marks in technology subjects (e.g. ICT; D&T)	<input type="radio"/>				
f. I enjoy learning maths	<input type="radio"/>				
h. I enjoy learning science	<input type="radio"/>				
j. I enjoy learning in my technology subjects (e.g. ICT; D&T)	<input type="radio"/>				

YEAR 8 – ELECTIVE SUBJECT SELECTION

12. Do you know that you can select elective subjects in Year 9? No Yes

13. Do you already know which subjects you will choose? No Yes

14. If you already know which subjects you will select for Year 9, please tell us what they are below:

•	•
•	•

Year 11 and 12 INTENDED SUBJECT SELECTION

15. I am interested in taking maths in Year 11 & 12 No Don't know Yes

16. I am interested in taking a science subject in Year 11 & 12 No Don't know Yes
E.g. Physics, Chemistry, Biology

17. I am interested in taking a technology subject in Year 11 & 12 No Don't know Yes
E.g. Design and Technology, Engineering Studies, etc.

ABOUT YOU AND YOUR FAMILY

18. Are you an Aboriginal or Torres Strait Islander person? No Yes, Aboriginal Yes, Torres Strait Islander

19. Where were you and your parents born?

	AUSTRALIA	OTHER COUNTRY	If other, which country?
ME	<input type="radio"/>	<input type="radio"/>	
FATHER	<input type="radio"/>	<input type="radio"/>	
MOTHER	<input type="radio"/>	<input type="radio"/>	

20. What language(s) do you and your parents speak at home most of the time?

	ENGLISH	OTHER LANGUAGE	If other, which language(s)?
ME	<input type="radio"/>	<input type="radio"/>	
FATHER	<input type="radio"/>	<input type="radio"/>	
MOTHER	<input type="radio"/>	<input type="radio"/>	

21. Have one or both of your parents completed a university course?

	No	YES	If yes, what did they study?
MOTHER	<input type="radio"/>	<input type="radio"/>	
FATHER	<input type="radio"/>	<input type="radio"/>	

22. Do you have brothers or sisters who have been to or is at university?

	No	YES	If yes, what do /did they study?
SISTER/S	<input type="radio"/>	<input type="radio"/>	
BROTHER/S	<input type="radio"/>	<input type="radio"/>	

23. Do you know anyone who is working, or has worked, as an engineer or in the information technology sector, or a related field?

E.g. Civil engineer; software or app developer

	YES	NO	If yes, who and what is their job?
MOTHER	<input type="radio"/>	<input type="radio"/>	
FATHER	<input type="radio"/>	<input type="radio"/>	
BROTHER / SISTER	<input type="radio"/>	<input type="radio"/>	
AUNT / UNCLE	<input type="radio"/>	<input type="radio"/>	
OTHER	<input type="radio"/>	<input type="radio"/>	

24. a. During high school, have you attended any other engineering or IT activity days? No Yes

b. If yes, were any of them just for girls? No Yes

Pre-Program Survey – Year 9 version

Implemented at the beginning of Touch Point 2 to student participants; Year 8 version (five A4 pages) as follows:



Thank you for coming to today's Collabor8 at UTS Day! We would like to get your feedback about Collabor8 and ask about your experiences at school and your future plans for the research part of the Collabor8 Program. If you and your parent/guardian have signed the consent form to participate in the Collabor8 research, please complete this survey.

This survey is voluntary. If you do not feel comfortable answering any questions, please leave them blank. UTS will keep all your answers confidential. Your responses in no way affect your ability to participate fully in Collabor8 activities.

FIRST NAME	FAMILY NAME	YEAR	HOME POSTCODE
SCHOOL	EVENT / DATE	DATE OF BIRTH (Day, Month, Year)	

YOUR SUBJECTS AT SCHOOL

1. What is your favourite subject at school? Why?

YOUR FUTURE PLANS

2. a. Is there a job that you'd really like to do after you leave school? No I haven't decided Yes

b. If yes, what is it? _____

c. Why do you want to do this job? What do you find interesting and appealing about it?

3. How much do you agree with the following statements?

After I finish school...	STRONGLY AGREE	AGREE	UNDECIDED / DON'T KNOW	DISAGREE	STRONGLY DISAGREE
a. I'd like to go to university	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. I'd like to go to TAFE or VET College (Vocational Education & Training)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. I'd like to get a job straight away	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. I'd like to work as an engineer or in information technology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. My parents would like me to be an engineer or work in IT	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

YOUR LEARNING STYLE

4. How much do you agree with the following?

	STRONGLY AGREE	AGREE	NOT SURE / UNDECIDED	DISAGREE	STRONGLY DISAGREE
a. I can do anything if I put my mind to it and work hard	<input type="radio"/>				
b. I am either good at something or I am not good at it	<input type="radio"/>				

5. How much do you agree with the following?

	STRONGLY AGREE	AGREE	NOT SURE / UNDECIDED	DISAGREE	STRONGLY DISAGREE
a. I like to solve problems	<input type="radio"/>				
b. I like to work in teams	<input type="radio"/>				
c. I like to see the 'real world' impact of what I learn at school	<input type="radio"/>				
d. I like to learn by doing	<input type="radio"/>				
e. I like to make models of things I am learning about	<input type="radio"/>				
f. I like to learn facts	<input type="radio"/>				
g. I like to do experiments	<input type="radio"/>				

UTS Women in Engineering and IT 2015

ENGINEERING AND INFORMATION TECHNOLOGY

6. Please complete the sentences below:

a. To work in the field of engineering, I think you need to.....

b. To work in the information technology field, I think you need to.....

7. I think my understanding of...	VERY GOOD	GOOD	NOT SURE/ UNDECIDED	POOR	VERY POOR
a. ... what engineers do is:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. ... what IT professionals do is:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. How much do you agree with the following statements?	STRONGLY AGREE	AGREE	UNDECIDED / DON'T KNOW	DISAGREE	STRONGLY DISAGREE
a. I have what it takes to become an engineer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. I have what it takes to become an IT professional	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. People who are engineers now were just like me in high school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. People who work in IT now were just like me in high school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Women make good engineers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Women make good IT professionals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Engineering is a good career choice for women	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. IT is a good career choice for women	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. a. Do you think there are any barriers to you becoming an engineer or IT professional? No Yes

b. If yes, what are they? _____

SCIENCE, TECHNOLOGY & MATHS

10. How much do you agree with the following statements?	STRONGLY AGREE	AGREE	UNDECIDED / DON'T KNOW	DISAGREE	STRONGLY DISAGREE
a. I think it is important for me to study maths	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. I think it is important for me to study science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. I think it is important for me to study technology subjects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. One or both of my parents think these subjects are important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. My teachers encourage me to study these subjects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. There are links between these subjects and what I'd like to study after school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. There are links between these subjects and jobs I'd like to do after school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. Think about how you feel in your maths, science and technology subjects (like D&T or ICT).	STRONGLY AGREE	AGREE	NOT SURE/ N/A	DISAGREE	STRONGLY DISAGREE
a. I am confident in my ability in maths	<input type="radio"/>				
b. I am confident in my ability in science	<input type="radio"/>				
c. I am confident in my ability in technology subjects (e.g. ICT; D&T)	<input type="radio"/>				
e. I get good marks in maths	<input type="radio"/>				
f. I get good marks in science	<input type="radio"/>				
g. I get good marks in technology subjects (e.g. ICT; D&T)	<input type="radio"/>				
f. I enjoy learning maths	<input type="radio"/>				
h. I enjoy learning science	<input type="radio"/>				
j. I enjoy learning in my technology subjects (e.g. ICT; D&T)	<input type="radio"/>				

YEAR NINE – ELECTIVE SUBJECT SELECTION

12. When you were in Year 8, did you know that you could select elective subjects for Year 9? No Yes

13. How many elective subjects do you have? One Two Three Four

14. a. Please tell us what they are in the spaces below (in no particular order):

•	•
•	•

b. For each elective subject please think about how important the factors in the tables below were to you when you chose it. Write the name of the subject next to 'elective name'.

Elective name:	VERY IMPORTANT	IMPORTANT	NOT SURE/ NEUTRAL	NOT VERY IMPORTANT	NOT IMPORTANT AT ALL
a. I was interested in the subject	<input type="radio"/>				
b. The subject was available at my school	<input type="radio"/>				
c. I see the link between the subject and what I want to study after school	<input type="radio"/>				
d. I see the link between the subject and the job I want in future	<input type="radio"/>				
e. My parents wanted me to do it	<input type="radio"/>				
f. I have a brother/sister who did the subject before me	<input type="radio"/>				
g. I have friends who chose the subject	<input type="radio"/>				
h. I like the teacher and their teaching style	<input type="radio"/>				
i. It looks like fun	<input type="radio"/>				
j. I am really good at the subject	<input type="radio"/>				
k. I felt I would 'fit in' in the class	<input type="radio"/>				
j. Please tell us about any other reasons you chose the subject not listed here.					

Elective name:	VERY IMPORTANT	IMPORTANT	NOT SURE/ NEUTRAL	NOT VERY IMPORTANT	NOT IMPORTANT AT ALL
a. I was interested in the subject	<input type="radio"/>				
b. The subject was available at my school	<input type="radio"/>				
c. I see the link between the subject and what I want to study after school	<input type="radio"/>				
d. I see the link between the subject and the job I want in future	<input type="radio"/>				
e. My parents wanted me to do it	<input type="radio"/>				
f. I have a brother/sister who did the subject before me	<input type="radio"/>				
g. I have friends who chose the subject	<input type="radio"/>				
h. I like the teacher and their teaching style	<input type="radio"/>				
i. It looks like fun	<input type="radio"/>				
j. I am really good at the subject	<input type="radio"/>				
k. I felt I would 'fit in' in the class	<input type="radio"/>				
j. Please tell us about any other reasons you chose the subject not listed here.					

Elective name:

	VERY IMPORTANT	IMPORTANT	NOT SURE/ NEUTRAL	NOT VERY IMPORTANT	NOT IMPORTANT AT ALL
a. I was interested in the subject	<input type="radio"/>				
b. The subject was available at my school	<input type="radio"/>				
c. I see the link between the subject and what I want to study after school	<input type="radio"/>				
d. I see the link between the subject and the job I want in future	<input type="radio"/>				
e. My parents wanted me to do it	<input type="radio"/>				
f. I have a brother/sister who did the subject before me	<input type="radio"/>				
g. I have friends who chose the subject	<input type="radio"/>				
h. I like the teacher and their teaching style	<input type="radio"/>				
i. It looks like fun	<input type="radio"/>				
j. I am really good at the subject	<input type="radio"/>				
k. I felt I would 'fit in' in the class	<input type="radio"/>				
l. Please tell us about any other reasons you chose the subject not listed here.					

Elective name:

	VERY IMPORTANT	IMPORTANT	NOT SURE/ NEUTRAL	NOT VERY IMPORTANT	NOT IMPORTANT AT ALL
a. I was interested in the subject	<input type="radio"/>				
b. The subject was available at my school	<input type="radio"/>				
c. I see the link between the subject and what I want to study after school	<input type="radio"/>				
d. I see the link between the subject and the job I want in future	<input type="radio"/>				
e. My parents wanted me to do it	<input type="radio"/>				
f. I have a brother/sister who did the subject before me	<input type="radio"/>				
g. I have friends who chose the subject	<input type="radio"/>				
h. I like the teacher and their teaching style	<input type="radio"/>				
i. It looks like fun	<input type="radio"/>				
j. I am really good at the subject	<input type="radio"/>				
k. I felt I would 'fit in' in the class	<input type="radio"/>				
l. Please tell us about any other reasons you chose the subject not listed here.					

YEAR 11 & 12 INTENDED SUBJECT SELECTION

15. I am interested in taking maths in Year 11 & 12 No Don't know Yes
16. I am interested in taking a science subject in Year 11 & 12 No Don't know Yes
E.g. Physics, Chemistry, Biology
17. I am interested in taking a technology subject in Year 11 & 12 No Don't know Yes
E.g. Design and Technology, Engineering Studies, etc.

ABOUT YOU AND YOUR FAMILY

18. Are you an Aboriginal or Torres Strait Islander person? No Yes, Aboriginal Yes, Torres Strait Islander

19. Where were you and your parents born?

	AUSTRALIA	OTHER COUNTRY	If other, which country?
ME	<input type="radio"/>	<input type="radio"/>	
FATHER	<input type="radio"/>	<input type="radio"/>	
MOTHER	<input type="radio"/>	<input type="radio"/>	

20. What language(s) do you and your parents speak at home most of the time?

	ENGLISH	OTHER LANGUAGE	If other, which language(s)?
ME	<input type="radio"/>	<input type="radio"/>	
FATHER	<input type="radio"/>	<input type="radio"/>	
MOTHER	<input type="radio"/>	<input type="radio"/>	

21. Have one or both of your parents completed a university course?

	No	YES	If yes, what did they study?
MOTHER	<input type="radio"/>	<input type="radio"/>	
FATHER	<input type="radio"/>	<input type="radio"/>	

22. Do you have brothers or sisters who have been to or is at university?

	No	YES	If yes, what do /did they study?
SISTER/S	<input type="radio"/>	<input type="radio"/>	
BROTHER/S	<input type="radio"/>	<input type="radio"/>	

23. Do you know anyone who is working, or has worked, as an engineer or in the information technology sector, or a related field?
For example: Civil engineer; software or app developer

	YES	NO	If yes, who and what is their job?
MOTHER	<input type="radio"/>	<input type="radio"/>	
FATHER	<input type="radio"/>	<input type="radio"/>	
BROTHER / SISTER	<input type="radio"/>	<input type="radio"/>	
AUNT / UNCLE	<input type="radio"/>	<input type="radio"/>	
OTHER	<input type="radio"/>	<input type="radio"/>	

24. a. During high school, have you attended any other engineering or IT activity days? No Yes

b. If yes, were any of them just for girls? No Yes

Post-Program Survey

Implemented at the end of Touch Point 4 to student participants; three A4 pages as follows:

Thank you for coming to today's Collabor8 at UTS Day! We would like to get your feedback about Collabor8 and ask about your experiences at school and your future plans for the research part of the Collabor8 Program. If you and your parent/guardian have signed the consent form to participate in the Collabor8 research, please complete this survey.

This survey is voluntary. If you do not feel comfortable answering any questions, please leave them blank. UTS will keep all your answers confidential. Your responses in no way affect your ability to participate fully in Collabor8 activities.

FIRST NAME	FAMILY NAME	YEAR	HOME POSTCODE
SCHOOL	EVENT / DATE	DATE OF BIRTH (Day, Month, Year)	

YOUR SUBJECTS AT SCHOOL

1. What is your favourite subject? Why? _____

YOUR FUTURE PLANS

2. a. Is there a job that you'd really like to do after you leave school? No I haven't decided Yes

b. If yes, what is it? _____

c. Why do you want to do this job? What do you find interesting and appealing about it?

3. How much do you agree with the following statements? After I finish school...

	STRONGLY AGREE	AGREE	UNDECIDED / DON'T KNOW	DISAGREE	STRONGLY DISAGREE
a. I'd like to go to university	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. I'd like to go to TAFE or VET College (Vocational Education & Training)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. I'd like to get a job straight away	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. I'd like to work as an engineer or in information technology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. My parents would like me to be an engineer or work in IT	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

YOUR LEARNING STYLE

4. How much do you agree with the following?

	STRONGLY AGREE	AGREE	NOT SURE / UNDECIDED	DISAGREE	STRONGLY DISAGREE
a. I can do anything if I put my mind to it and work hard	<input type="radio"/>				
b. I am either good at something or I am not good at it	<input type="radio"/>				

5. How much do you agree with the following?

	STRONGLY AGREE	AGREE	NOT SURE / UNDECIDED	DISAGREE	STRONGLY DISAGREE
a. I like to solve problems	<input type="radio"/>				
b. I like to work in teams	<input type="radio"/>				
c. I like to see the 'real world' impact of what I learn at school	<input type="radio"/>				
d. I like to learn by doing	<input type="radio"/>				
e. I like to make models of things I am learning about	<input type="radio"/>				
f. I like to learn facts	<input type="radio"/>				
g. I like to do experiments	<input type="radio"/>				

ENGINEERING AND INFORMATION TECHNOLOGY

6. Please complete the sentences below:

a. To work in the field of engineering, I think you need to.....

b. To work in the information technology field, I think you need to.....

7. I think my understanding of...	VERY GOOD	GOOD	NOT SURE/ UNDECIDED	POOR	VERY POOR
a. ... what engineers do is:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. ... what IT professionals do is:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. How much do you agree with the following statements?	STRONGLY AGREE	AGREE	UNDECIDED/ DON'T KNOW	DISAGREE	STRONGLY DISAGREE
a. I have what it takes to become an engineer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. I have what it takes to become an IT professional	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. People who are engineers now were just like me in high school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. People who work in IT now were just like me in high school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Women make good engineers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Women make good IT professionals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Engineering is a good career choice for women	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. IT is a good career choice for women	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. a. Do you think there are any barriers to you becoming an engineer or IT professional? No Yes

b. If yes, what are they? _____

SCIENCE, TECHNOLOGY & MATHS

10. How much do you agree with the following statements?	STRONGLY AGREE	AGREE	UNDECIDED/ DON'T KNOW	DISAGREE	STRONGLY DISAGREE
a. I think it is important for me to study maths	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. I think it is important for me to study science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. I think it is important for me to study technology subjects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. One or both of my parents think these subjects are important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. My teachers encourage me to study these subjects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. There are links between these subjects and what I'd like to study after school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. There are links between these subjects and jobs I'd like to do after school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. Think about how you feel in your maths, science and technology subjects (like D&T or ICT).	STRONGLY AGREE	AGREE	NOT SURE/ N/A	DISAGREE	STRONGLY DISAGREE
a. I am confident in my ability in maths	<input type="radio"/>				
b. I am confident in my ability in science	<input type="radio"/>				
c. I am confident in my ability in technology subjects (e.g. ICT; D&T)	<input type="radio"/>				
e. I get good marks in maths	<input type="radio"/>				
f. I get good marks in science	<input type="radio"/>				
g. I get good marks in technology subjects (e.g. ICT; D&T)	<input type="radio"/>				
f. I enjoy learning maths	<input type="radio"/>				
h. I enjoy learning science	<input type="radio"/>				
j. I enjoy learning in my technology subjects (e.g. ICT; D&T)	<input type="radio"/>				

SUBJECT SELECTION – YEAR 8

16. a. If you are in Year 8 have you already selected your subjects for Year 9 in 2016? No Yes

b. If yes, which subjects have you selected? (Please write them in the boxes below)

•	•
•	•

YEAR 11 & 12 INTENDED SUBJECT SELECTION

17. I am interested in taking maths in Year 11 & 12 No Don't know Yes

18. I am interested in taking a science subject in Year 11 & 12 No Don't know Yes
E.g. Physics, Chemistry, Biology

19. I am interested in taking a technology subject in Year 11 & 12 No Don't know Yes
E.g. Design and Technology, Engineering Studies, etc.

YOUR FEEDBACK ON COLLABOR8

20. How many UTS Collabor8 sessions have you been to? 1 2 3 4

21. What was the best part of the UTS Collabor8 sessions you attended?

22. Have the UTS Collabor8 sessions helped you with your understanding of what engineers and IT professionals do? *If yes, please say how (e.g. types of tasks they do; where they work; who they might be, etc.):* No Yes

23. Before you came to the UTS Collabor8 sessions, how did you feel about studying engineering/IT at university?

VERY INTERESTED	INTERESTED	NOT SURE/ UNDECIDED	NOT VERY INTERESTED	NOT INTERESTED
<input type="radio"/>				

24. After coming to the UTS Collabor8 sessions, how do you feel about studying engineering/IT at university?

VERY INTERESTED	INTERESTED	NOT SURE/ UNDECIDED	NOT VERY INTERESTED	NOT INTERESTED
<input type="radio"/>				

25. OVERALL THE COLLABOR8 PROGRAM

	STRONGLY AGREE	AGREE	NOT SURE/ UNDECIDED	DISAGREE	STRONGLY DISAGREE
a ...helped me understand what engineers and IT professionals do	<input type="radio"/>				
b ...increased my interest in engineering / IT	<input type="radio"/>				
c ...increased my interest in science, maths or technology subjects at school	<input type="radio"/>				
dgave me ideas about careers/courses I could study at uni	<input type="radio"/>				
eincreased my interest in studying to become an engineer or IT professional	<input type="radio"/>				
f ...helped me feel more confident to choose a technology subject (Digital Technology or Design and Technology) in Year 9	<input type="radio"/>				
g The UTS Collabor8 facilitator (s) was/were helpful and friendly	<input type="radio"/>				
h Overall, my participation has been very helpful for me	<input type="radio"/>				
i I would recommend the UTS Collabor8 sessions to other students	<input type="radio"/>				

24. Would you suggest any changes to the UTS Collabor8 sessions? Yes No
If yes, please say what we can improve:

Teacher Survey

Implemented at the end of Touch Point 2 and Touch Point 4 to accompanying teachers; two A4 pages as follows:

Thank you for coming to today's Collabor8 session. We would like to hear your feedback about Collabor8. If you have signed a consent form to be a participant in the research component of Collabor8, your survey responses will be included in the research study. If not, they will be kept separate and only used to help us plan better programs.

This survey is voluntary. If you do not feel comfortable answering any questions, please leave them blank. UTS will keep all your answers confidential.

YOUR DETAILS

FIRST NAME	FAMILY NAME	
SCHOOL	TODAY'S DATE (Day, Month, Year)	

YOUR FEEDBACK ON TODAY'S COLLABOR8 SESSION

1. What were your expectation of today's session?

2. Has the UTS Collabor8 session today met your expectations? Yes No

Please say why or why not:

3. OVERALL, TO WHAT EXTENT DO YOU FEEL TODAY'S COLLABOR8 SESSION...

	VERY HIGH DEGREE	HIGH DEGREE	NOT SURE/ UNDECIDED	LOW DEGREE	VERY LOW DEGREE
a. ... increased my students' interest in engineering and IT subject matter	<input type="radio"/>				
b. ... increased my students' interest in maths at school	<input type="radio"/>				
c. ... increased my students' interest in science at school	<input type="radio"/>				
d. ... increased my students' in technology subjects at school	<input type="radio"/>				
e. ... helped my students understand what engineers and IT professionals do	<input type="radio"/>				

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f. ... increased my students' interest in studying to become and engineer or IT professional	<input type="radio"/>				
g. ... gave my students ideas about careers/courses I could study at uni	<input type="radio"/>				
h. ... helped my students feel more confident to choose a science, maths or technology subject in future	<input type="radio"/>				
i. ...increased my students' confidence with problem solving	<input type="radio"/>				
j. ...increased my students' confidence with team work	<input type="radio"/>				
k. ...increased my students' confidence with doing experiments	<input type="radio"/>				
l. ...increased my students' ability to see the 'real world' impact of the content they learnt	<input type="radio"/>				
m. ...increased my students' sense of belonging in science, technology, engineering and maths subjects	<input type="radio"/>				
n. ...increased my students' motivation in science, technology, engineering and maths subjects	<input type="radio"/>				

4. TO WHAT EXTENT DO YOU AGREE WITH THE FOLLOWING?	STRONGLY AGREE	AGREE	NOT SURE/ UNDECIDED	DISAGREE	STRONGLY DISAGREE
i. The UTS Collabor8 facilitator(s) was/were helpful and friendly.	<input type="radio"/>				
j. Overall, my participation today has been enjoyable.	<input type="radio"/>				
k. I would recommend this UTS Collabor8 session to others.	<input type="radio"/>				

5. Would you suggest any changes to today's UTS Collabor8 sessions? Yes No

If yes, please say what we can improve:

Thank you