UTS ENGINEERING AND IT PROJECTS INFORMATION SHEET

Rationale

The Australian Academy of Science Women in STEM Decadal Plan makes the case for change by presenting the workforce needs of the future:

- 50% of workers will need to know how to use, build and configure digital systems
- 18% of workers have a serious chance of losing their job because of technology
- 70% are training for a job set to be replaced by automation
- STEM skilled jobs are growing at 1.5 times faster than any other job sector
- Australian workers will spend 77% more time using science and maths skills
- In 2018, Australia had skills shortages in geology and geophysics, agricultural science, mechanical, aeronautical and civil engineering, surveying and architecture, some for the first time in over five years

UTS has the social responsibility to ensure future students, particularly underrepresented groups, are formally educated to develop Engineering and IT skills and gain awareness of the possible career opportunities. These groups include women, Aboriginal and Torres Strait Islander, rural and regional, low socio-economic, LGBTQI, and those with disabilities.

Structure and delivery

- Delivered in class time over 4 weeks (approximately 8 hours in total).
- Structured around project-based learning and design thinking
- Students apply knowledge to solve authentic problems
- Students use innovative technology and equipment to prototype solutions
- Co-delivered by trained UTS Facilitators who are currently studying Engineering and IT and classroom teachers
- Industry professionals are also invited as mentors to share their expertise and be role models for students.
- Students showcase their prototypes to other students and parents

Involvement of parents is important to influence their perceptions of their child's ability and interest in STEM.

Evidence base for design

UTS' programs:

- UTS' existing high school outreach program, which involves a day of hands-on activities, was effective in increasing the likelihood of girls to consider a career in engineering or IT (increase of 24% in 2018).
- UTS' primary school program (piloting in 2019) increased girls' interest in solving problems and building things, and confidence in designing and building things.
- Literature:
- Meadows (2016) recommends that educators "encourage young girls to ask questions about the world, to problem solve, and to develop creativity through play and experimentation".
- Egbue et al. (2015) state that "Early exposure to meaningful engineering experiences for young girls may boost interest and the eventual pursuit of engineering and technology education paths". Girls opt-out of STEM subjects when they choose their electives in Year 9 so by targeting stage 4, we aim to increase participation in stage 5 and 6 STEM.
- The National Centre for Women and Information Technology in the US identifies micro- and macro-influencers on girls pursuing STEM, including parents, teachers and industry professionals (micro) and formal/informal education, peers and role models (macro) (Holmes et al., 2018). The projects provide visibility of women in STEM by giving students the opportunities to interact and build rapport with current UTS students and industry professionals.

Role and commitment from teachers

The role of teachers in these projects is to be an active co-facilitator who can provide valuable links to other classroom content and curriculum areas.

Engaging in these projects is a great professional development opportunity for teachers who can increase their confidence and capacity with Engineering and IT knowledge and skills.

It is encouraged that teachers deliver the project to another class in the following term, with the support of UTS volunteers and industry professionals. Therefore, teacher engagement is essential for the sustainability and impact of the program. Please communicate to staff that their participation is highly encouraged.

Expected outcomes for teachers and students

Teachers

- Increase confidence in teaching Stage 4 Engineered Systems and Digital Technology Curriculum
- Increase awareness of authentic applications of Engineering and IT skills to offer career pathway advice to students
- Increase interest and curiosity in Engineering and IT and development of a growth mindset in Engineering and IT activities

Students

- Increase confidence in learning Engineering and IT
- Increase awareness of authentic applications of Engineering and IT skills and pathways to careers including Year 9-12 subjects
- Increase interest in exploring Engineering and IT and curiosity to learn more about subject areas
- Gain women role models in Engineering and IT whom they can relate to

Funding

UTS Engineering and IT program is funded by the Faculty of Engineering and IT and Dell Technologies. The program does not incur a cost for schools or students.

Impact evaluation

For continual improvement and evaluation of program impact:

Students will complete:

- A project presentation which will reflect on the learnings
- Pre- and post-program surveys
- A survey 6-months after the completion of the program to determine medium term impact

Teachers will complete:

- Pre- and post-program surveys
- A survey 6-months after the completion of the program to determine medium term impact
- Observations of their students' engagement and learning
- An analysis of subject selection data year on year to measure impact of the program on subject selection
- Any further feedback on the program delivery

Contact

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