Women in STEM Strategy submission

In2science background

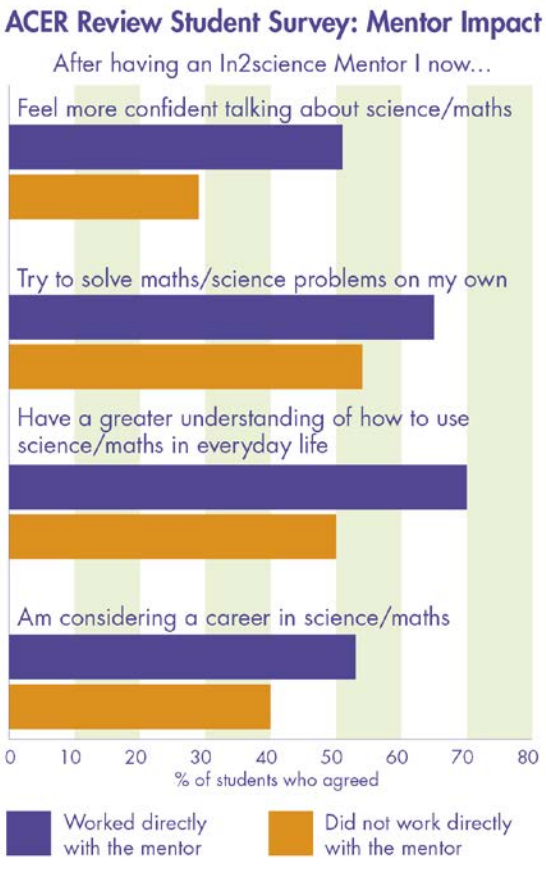
In2science aims to **increase engagement in STEM** by placing volunteer university students as **peer mentors** in maths and science classes to act as **role models** for secondary school students. The program, which started in 2004, creates **collaborative partnerships** between universities and schools that facilitate meaningful relationships between university students, teachers and school students over a 10 week placement and beyond. It is a joint project between La Trobe, Melbourne, RMIT and Swinburne Universities.

In2science currently partners with more than 50 Victorian **low SES and regional and rural schools**.

Impact

The program has been very successful in its mission to increase science engagement of secondary students. Several external evaluations of the In2science program show that:

- In2science improves student confidence and enjoyment of STEM subjects, as well as their appreciation of the relevance and importance of these disciplines
- Mentors enabled teachers to run more interactive lessons with activity based learning
- In2science prepares university students for the work force improving their communication, problem solving and organisational skills



www.in2science.org.au

Responses to questions

1. *Do you think the identified issues affecting women and girls in STEM education and careers are correct? Are there other key issues that have not been identified?*

   Yes, this paper has identified the key issues affecting women and girls in STEM education and careers. It would be interesting to also include data on the representation of women in STEM from low socio-economic areas.

2. *What role can Government best play in addressing the issues of gender inequity in STEM fields?*

   - Coordinate the approach of all stakeholders
   - Implement structural changes e.g. measures of academic success or support for women returning from career breaks
   - Govern mathematics as a compulsory prerequisite for STEM university degrees. At some institutions, many STEM degrees in areas of greatest gender disparity (Maths, IT, Physics and Engineering) don't have advanced mathematics as a prerequisite. However, these courses still require high school advanced mathematics or an equivalent bridging course for successful completion of the degree. Bridging courses combine up to 2 years of advanced high school mathematics into a 12-week course. Partaking in a bridging course is a potential barrier and disincentive for many students entering these areas, especially female students who have lower participation in advanced mathematics. We agree with our Chief Scientists that there should be a phased in reintroduction of mathematics prerequisites for relevant courses. Mathematics is the language of science and mathematics skills need constant development and cannot be acquired effectively in a short bridging course.
   - Fund non-government initiatives that aim to address these issues and include a mandatory evaluation requirement to ensure that the Government is able to make an informed move from funding pilot programs to funding programs that work best.

3. *What role should the science and research community, along with industry, play in addressing these issues?*

   As university representatives working with In2science, an innovative and award-winning Peer Mentoring Program, we have firsthand knowledge as to how universities can bridge the gap between schools, the research community and industry.

   At a STEM Industry Summit in Sydney in September 2017, a number of industry representatives said that they felt uncomfortable directly approaching schools to 'improve' STEM education because they were not education experts. They said that they needed 'relationship brokers' to facilitate interactions between industry and schools. Given universities' expertise in working with and administering programs for both school and industry partners, we firmly believe that a university-based initiative like In2science is very well placed to act as a conduit between industries and schools. We are a well-established partnership program working with underrepresented students to increase engagement in STEM.

4. *Are current initiatives focusing on the right areas? What existing initiatives do you think are particularly effective at encouraging greater participation of women and girls STEM education and careers (including those managed or funded by government, and those led by the science, education and industry sectors)?*

   Since 2004, In2science has successfully built collaborative partnerships with multiple universities and schools working together to improve enthusiasm, aspirations and outcomes in science and maths secondary

education. Over the duration of the program more than 2,000 volunteer mentors have worked with over 59,000 students. In2science currently has active partnerships with 56 low SES and regional schools where we have placed 580 mentors in the last three years. The program is overseen by an independent Advisory Board, Chaired by Professor John Brumby AO; comprised of university, industry, government and school representatives.

The program has undergone several external evaluations. The latest evaluation of In2science shows that having a mentor in the classroom increases student confidence, relevance, enjoyment and awareness of STEM subjects (see page. 1). When students' attitude towards science learning remains positive, their levels of achievement continue to increase (Ainley, Kos and Nicholas 2008, Australian Council for Educational Research, https://research.acer.edu.au/cgi/viewcontent.cgi?article=1003&context=acer_monographs). This results in an increased interest in career opportunities and further education in STEM; and improved self-confidence and attitudes towards science and maths.

The toolkit for school-aged girls is an excellent initiative and In2science would be keen to help distribute it through our mentors who work in over 250 classrooms each year. We also recognise that, there are similar knowledge gaps of the diversity of STEM careers for university students from undergraduate, right up to PhD level, and would support initiatives to address this void.

Importantly, In2science does not solely focus on direct STEM careers, but also talks of questions or societal problems that one can answer with STEM. We emphasise the creativity, analytical skills and collaboration necessary for STEM industries where diverse backgrounds, viewpoints and skills lead to progress and success in STEM.

5. *What gaps exist in current efforts that the Government could address?*

We have keenly followed the progress of the Superstars in STEM program and believe that their excellent female leaders are outstanding role models, revealing myriad career pathways for young girls to aspire to. However, it is important to note that highly relatable role models and mentors, with respect to age and study/career pathways, are key for high school students to envisage themselves in STEM. Peer mentoring of female students is proven to increase confidence, aspirations, retention and a sense of belonging (Dennehy & Dasgupta, 2017). Not everyone aspires to be a "superstar" and such approaches may even be counterproductive by making STEM careers seem out of reach for some female students.

Also, current funding is geared towards pilot programs (1-2 years), but little federal funding is available to keep effective programs going past this point. Given the range of programs now in operation, this may be a good time to shift the focus to identifying which are the most effective, ultimately and providing sustainable funding for these existing, proven initiatives.

Dennehy, T & Dasgupta N (2017) Female peer mentors early in college increase women's positive academic experiences and retention in engineering. PNAS 114(23) 5964-5969

6. *Is there anything else the department should consider in developing the Strategy?*

In2science recognises the importance of targeting each stage involved in embarking on, building and then achieving success in STEM and STEM-related careers. However, in considering the critical shortage of people with STEM skills and the significant underrepresentation of women in STEM careers, we would argue that the Australian Government would have the largest impact by targeting students at a time when they are making decisions about study and career pathways: in years 7-10. This approach will not only increase the number of women pursuing STEM careers but has the additional advantage of addressing the broader STEM skills shortage. One of the best way to achieve this is through established programs, like In2science, that are proven to improve attitudes towards STEM and related careers.