Empowering regional and rural school students through science and maths

The proportion of Australian school students studying maths and science subjects is at a 20 year low while the proportion of jobs relying on science, technology, engineering and maths (STEM) is projected to increase (Deloitte Access Economics, commissioned by Office of the Chief Scientist, 2014). By **increasing engagement in science and maths**, In2science aims to improve student outcomes and boost student participation in STEM, particularly for **underrepresented groups** of students.

The program, which started in 2004, is a joint project between La Trobe, RMIT, Swinburne, Melbourne and Monash Universities. It creates **collaborative partnerships** between universities and schools that present ongoing opportunities for community engagement. Our **Advisory Board** works closely with government, industry and philanthropic groups to contribute to shared commitments in improving STEM outcomes for Victorian high school students.

During 2018, In2science recruited and trained mentors for **291 placements** in **53 low and low-to-mid SES Victorian schools**, and reached **4470 students.**

Challenges for regional and rural students

In2science recognises the numerous challenges and barriers facing students from regional and rural backgrounds; this submission will focus on these issues and potential solutions with a focus on STEM. Compared to their metropolitan counterparts, challenges facing regional and rural students may include:

- Limited access to STEM resources and current STEM knowledge;
- Limited access to STEM enrichment programs;
- Reduced subject choice;
- Lack of role models;
- Negative perceptions of STEM professionals;
- Limited understanding of the university experience; and/or
- Social barriers associated with leaving home to attend university

As highlighted by the Expert Advisory Panel, these barriers translate to poorer academic performance, leading to an equivalent achievement gap of one year of schooling in science and maths literacy [Thomson et al., ACER, 2017]. The National Centre for Student Equity in Higher Education also report that regional students are significantly less likely to pursue tertiary

studies [2017]. In this submission we focus on a proven program to engage regional, rural and remote students in STEM, **In2science eMentoring**.

How does eMentoring work?

In2science empowers high school students to navigate the opportunities and demands of their STEM-based future. The **In2science eMentoring** program, offered to schools at no cost, harnesses the power of relationships by pairing volunteer STEM university students as peer mentors and role models for rural and regional secondary school students. Mentors meet with a small group (one to three students) online, once a week for ten weeks, via a secure platform. Mentors undergo rigorous training to equip them with the knowledge and tools to facilitate conversations in a safe and effective manner. Mentors are provided with an eMentoring guide, which outlines topics that they may wish to discuss with the eMentees.

In2science eMentors empower students to:

- become **independent learners**
- have an appreciation for how science and maths are at the core of **problem solving** in everyday life applications
- have an increased awareness of the **impact** science and maths have on their own **future career aspirations**
- **improve their own outcomes** in science and maths
- develop a greater appreciation and consideration of **studying** science and maths at **VCE and beyond**.

> "Without exception, the eMentors we had the privilege of getting to know over the duration of the program were exceptional young scientists. They were passionate, they were enthusiastic, and they were entirely dedicated to the program. They really showed our students that to be young and enthusiastic and passionate about science is acceptable and encouraged."
>
> *Andrew McKenzie-McHarg, Catholic College Wodonga*

Why In2science eMentoring is so effective

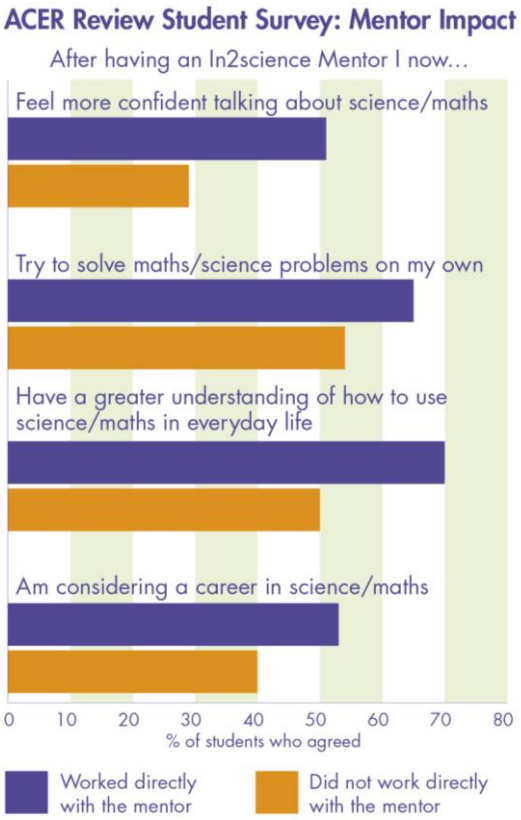
In2science has demonstrated its **effectiveness in increasing STEM engagement** for secondary students through several external evaluations, the most recent by the Australian Council for Educational Research [Kos et al., 2017], which demonstrated that In2science:

- Increases student enjoyment, confidence and self-efficacy in STEM.
- Increases student awareness of STEM's real-world relevance and STEM careers.
- Prepares university students for the work force improving their communication, problem solving and organisational skills
- Enables teachers to run more interactive lessons with activity-based learning

Importantly, when students' attitude towards science learning remains positive, their levels of achievement continue to increase (Ainley et al., 2008). This results in an increased interest in

career opportunities and further education in STEM; and improved self-confidence and attitudes towards science and maths.

In2science eMentoring's success may be attributed to several factors, including:



- Mentors are relatable, demonstrating a clear and often previously unexplored STEM pathway;
- Regular meetings over a ten-week period sees mentors and mentees build genuine rapport, leading to the development of a genuine mentor-mentee relationship;
- Mentors receive rigorous training and are provided with numerous resources and support to facilitate conversations with their mentees
- Mentoring utilises existing school infrastructure, requiring minimal intervention from the teacher/school once placement is arranged
- Mentors and mentees communicate over a secure platform, password protected, no contact info exchanged
- Small group discussions (one to three mentees are assigned to each mentor) ensure optimal interaction and participation
- Matching is prioritised by student interests (mentor is studying similar courses and/or has similar interests)
- eMentoring is scalable, there are no boundaries to the amount of schools we can reach due to the nature of being online and the fact there is no travelling required for mentors or students
- High levels of engagement with the program when the correct students (students who have demonstrated at least some engagement with STEM) are selected by the schools
- eMentors are able to tailor their 10-week program to suit the specific needs of their students
- eMentors can expose students to the latest STEM research and can offer knowledge in specialist areas that their science teacher may not have
- eMentors act as a 'gateway' and bridge the gap to university education, and STEM careers they may not have considered before
- Using casual conversation as a vehicle, students are engaged in their own career development alongside a like-minded and friendly peer. Students leave the program with an action plan to keep them moving along their STEM journey.

Our Impact

Since 2004, In2science has placed more than **2,500 mentors** in **163 partner schools** to reach more than **65,000 students**. Peer mentoring provides a powerful means of changing attitudes towards studying STEM and pursuing STEM careers. Indeed, sustained mentoring relationships based on consistent and frequent contact over a longer time period have the most impact (Grossman and Rhodes, 2002; Karcher, 2005).

Our internal evaluation of the semester 1, 2019 placement period confirm the impact and efficacy of In2science eMentoring*. After having an In2science mentor:

- 90% of eMentees have **more confidence** doing STEM
- 90% of eMentees have a **better understanding of the pathways and options** available in STEM
- 90% of eMentees feel that **studying science in VCE is achievable** for me
- 90% of eMentees would **like to go to university**

*20 eMentees responding to a post-placement survey

Students participating in In2science eMentoring, enjoy discussing a range of topics with their mentor:

- 100% of eMentees enjoyed hearing about future studies after school, e.g. university
- 100% of eMentees enjoyed hearing about university life

In addition to weekly online interactions, eMentees receive access to opportunities at five of Victoria's leading universities: La Trobe University, The University of Melbourne, RMIT University, Swinburne University and Monash University. In2science eMentoring schools have accessed funding to enable students to attend events such as the Swinburne Science Experience as well as the opportunity to meet their eMentor on their university campus.

> "I gained something out of every session I had with Sabrina. She enabled me to gain confidence in not just my STEM studies, but for all of my classes. She achieved this by helping me set goals and objectives to achieve everyday both during classes and outside of school, which meant that I had to step out of my comfort zone and communicate with my teachers and my class mates which is something I would usually avoid.
>
> The biggest influence Sabrina had on my learning is that she has inspired me to not only continue my STEM journey by meeting new In2science mentors, but to become a mentor myself in the future."
>
> *Madelaine, Year 11 student, Sacred Heart College, Yarrawonga*

Concluding remarks

Regional and rural students face a range of challenges that may impact negatively on their educational outcomes and capacity to pursue higher education. In2science eMentoring directly addresses many of these challenges with a proven, low-cost, scalable and impactful model. In2science recommends funding proven and established programs to increase their sustainability and support expansion of their reach, particularly into regional and rural schools.

References

Ainley, J., Kos, J., & Nicholas, M. (2008). Participation in science, mathematics and technology in Australian education. *ACER Research Monographs*, 4. Access: https://research.acer.edu.au/cgi/viewcontent.cgi?article=1003&context=acer_monographs

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Karcher, M. J. (2005). The effects of school-based developmental mentoring and mentors' attendance on mentees' self-esteem, behavior, and connectedness. Psychology in the Schools, 42, 65–77.

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Videos

In2science Regional eMentoring Program (Case Study) https://vimeo.com/283368875

In2science Regional eMentoring Program (A Student's Journey) https://vimeo.com/28520422