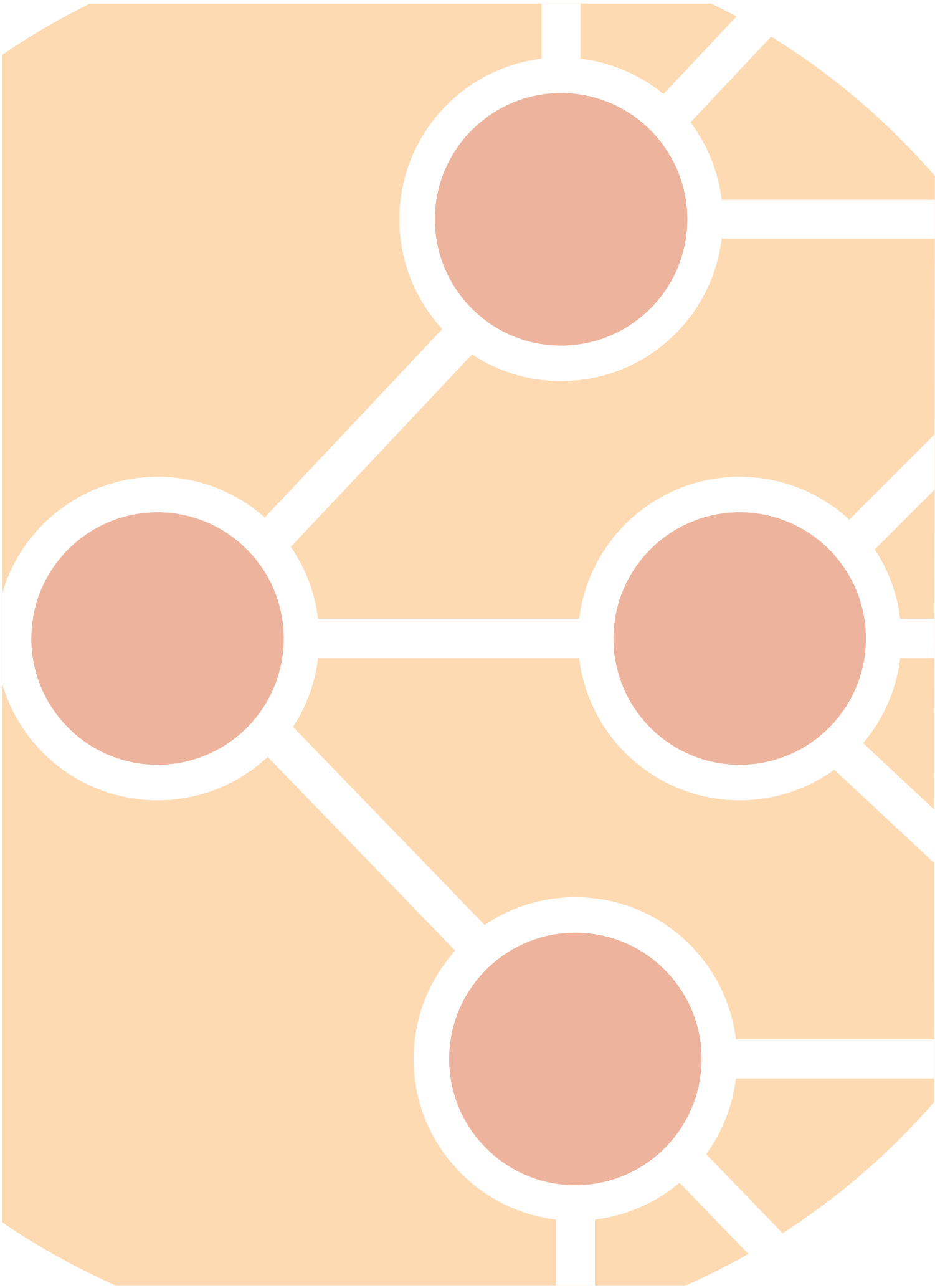
In2.science Reflections

Science and Maths Peer Mentoring in Schools

Megan Mundy and Dr Emily Cook
November 2013



Contents

Executive Summary

This report looks back on the In2science program, its inception, growth, achievements and the challenges faced along the way. Over the last 9 years In2science has been the outstanding peer mentoring program in supporting science education in Australia, and has played a critical role in addressing the decline of secondary school science participation in STEM subjects.

The In2science program has been a genuine partnership, with multiple universities and schools working together to improve enthusiasm and outcomes in the middle years of science and maths education. Over the duration of the program more than 50,000 students have enjoyed a different science experience thanks to the efforts of 1,900 Mentor volunteers. Feedback about the program has been overwhelmingly positive. The full impact of the program in terms of increased uptake of science courses and the secondary or tertiary level cannot be assessed accurately, but is substantial.

The In2science program faced enormous challenges, not least of which was its own spectacular growth. Successive Program Managers, supported by a dedicated Board, demonstrated versatility and resourcefulness to maintain momentum and the quality of the program, while running their diverse activities with the minimum of overheads. Lessons were learned about maintaining key relationships, and planning strategically, with myriad stakeholders.

The program has benefited from the vision and generosity of a variety of supporters. This has allowed it to serve low SES schools and provide its benefits to the groups who most need it.

All participants in In2science can be extraordinarily proud of the impact they have had for Victorian science education, and their participation in one of the most innovative and efficient partnerships of the last decade

From the Board

In2science was formed in August 2014, to bring peer mentoring to Victorian secondary science education. There was growing concern that the importance of science and its centrality to the way we live was being ignored. Science was no longer part of our national discourse and the proportion of students studying science and mathematics at Australian schools and universities was falling, just as countries in our region and to the north were putting far more emphasis on both. The concept of scientific method, and scientific rigour, in examining evidence and making decisions, was being attacked.

The promoters of In2science, dismayed by the decline of participation in science education in Victorian and Australian schools, were motivated to attempt to reverse the trend.

The concept of "peer mentoring" – introducing undergraduate scientists to secondary schools to assist teachers – had been successfully developed in the UK and Israel, and more recently in Western Australia. We believed this approach would work in Victoria, with its committed teachers and outstanding universities. We were optimistic that it could be done better.

In2science was supported in its formative years by four key parties: La Trobe University, through the vision of David Finlay; the University of Melbourne; the William Buckland Foundation; and the George Alexander Foundation. To these visionary sponsors was added the drive and resourcefulness of In2science's first Program Manager, the indefatigable John McDonald. Together we demonstrated and improved the concept, and, with the support of the Victorian Department of Education (now the Department of Education and Early Childhood Development, DEECD) made it into a major program by the end of the decade.

We are proud that In2science, despite changes in its supporter base, its Managers and coordinators, and its Board, never lost sight of its core purpose. It was always aimed at using the skills and inspiration of budding scientists to inspire the next generation of scientists. The mentors and coordinators, and the Program Managers John and Megan, have done a remarkable job in maintaining and growing In2science despite innumerable challenges, with minimal resources. Their dedication inspired us all.

As I write, it appears that the funding future for In2science is uncertain. It would be a profound setback for Victorian and Australian science education if this remarkable program is not sustained.

However, all who have been associated with this great effort can take enormous pride in its accomplishments over the last decade. They have left a valuable legacy for Victoria and Australia, in the skills and ambitions of that generation of students fortunate to have been inspired by In2science.

The Hon. Barry Jones,
AO, FAA, FAHA, FTSE, FASSA, FRSN, FRSV
Chair of In2science 2004-13

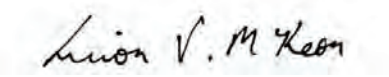
I was honoured to be asked to take over the Chairmanship from Barry Jones in 2013, and to work with the dedicated Board of In2science. Barry was an inspirational Chairman of In2science, and played a critical role in its establishment and success.

In2science has been one of the most important educational initiatives in Victorian secondary science education over the last decade. Bringing dedicated young university science students into the classroom to add enthusiasm and new science has been the key to the program's success.

Over the life of the In2science program we have worked with 50,000 school students through nearly 2000 mentor placements in 145 schools. The benefit of this to Victoria and to Australia, in terms of young people inspired to study science or to teach, has been substantial, and leaves a lasting legacy.

A number of dedicated people can take credit for the sustained success of In2science. In addition to the mentors and teachers, the organisation has been sustained by our University supporters, by the Victorian Government, and the visionary Foundations who provided the initial funding. I would like to pay special tribute to Megan Mundy, the tireless Program Manager for In2science for the last two years, and to her outstanding group of coordinators in the universities.

It has been a great privilege to Chair the In2science Board over the past 12 months.



Simon McKeon, AO
Chair of In2science 2013–Present

There is certainly something magical about seeing young scientists and mathematicians engaging school students in science and maths. I have seen a lot of mentors doing amazing work in classrooms since I started working for In2science as a coordinator three years ago. Students have cheered loudly when a charismatic mentor walks into a room. Students have increased their understanding of maths and science when working with mentors in small groups. Students have been actively engaged by mentors who bring in an experiment or give a presentation about what our mentors are studying at university.

The strength of In2science has been universities working together to address the common problem of declining student enrolment in science subjects. It is a powerful thing when large institutions operate in genuine partnerships, especially when the institutions are usually considered competitors. I would like to thank the seven universities for their involvement and contribution to the In2science program.

I would also like to thank the In2science Board for their wonderful guidance and tireless effort directing the In2science program over the past ten years. Particular thanks goes to Barry Jones for his inaugural Chairmanship and nine years of service, and to Simon McKeon for taking the helm over the last 12 months.

Megan Mundy
In2science Program Manager 2012–Present

Challenges in Australian Science and Maths Education

Reports such as "Sustaining science" (Dobson, 2007), "Participation in Science, Mathematics and Technology in Australian Education" (Ainley, Kos & Nicholas) and the "Health of Australian Science" (Office of the Chief Scientist, 2012) express the fact that there is widespread concern, in Australia and around the world, about the declining proportions of high school aged students opting to study science courses such as biology, chemistry, physics and mathematics. This links to a long-term decline in enrolments in University Science courses despite an overall increase in University enrolments.

It has been shown that the most common reason for not choosing science subjects at high school level is that students can't envisage themselves as scientists (Lyons and Quinn, 2010). Part of this issue is because few school age students will know any scientists and part of it is the portrayal of science and scientists in popular culture. Further evidence suggests that students have made identity-related decisions about their future by the age of fourteen (Tytler, 2007) thus it is important that interventions address these issues before this age. Also occupational plans formed in adolescence are consequential to young adults' attainment, particularly for an early entry into high-status employment (Sikora and Saha, 2011).

The need for science specialist knowledge in the classroom is especially important as only 44% of junior secondary science teachers have two or more years of tertiary education in general science (McKenzie, 2008). There is also a lack of appreciation of the relevance of science in life, with only about 20% of lower secondary students recognising that science is relevant or useful for them, very often or almost always. About one-third of these students indicate that science never deals with things they are concerned about or helps them make decisions about their health (Rennie et al., 2001). Data collected from 13 and 14-year-olds, placed Australia 19th out of 23 countries for having a positive attitude towards science, which was the lowest of all English speaking countries. Almost 40% of secondary students surveyed reported that they never got excited about what they do in science and 22% indicated that they were almost always bored in science (Martin et al., 2001).

Ainley, J., Kos, J., & Nicholas, M. (2008). Participation in Science, Mathematics and Technology in Australian Education. ACER Research Monograph No 63.

Dobson, I. R. (2007). Sustaining Science: University Science in the Twenty-First Century. Report commissioned by the Australian Council of Deans of Science.

Health of Australian Science. (2012). Canberra: Office of the Chief Scientist.

Lyons, T., & Quinn, F. (2010). Choosing science. Understanding the declines in senior high school science enrolments. Armidale, NSW: University of New England.

Martin, Michael O., Ina VS Mullis, Eugenio J. Gonzalez, Kelvin D. Gregory, Teresa A. Smith, Steven J. Chrostowski, Robert A. Garden, and Kathleen M. O'Connor. "TIMSS 1999." International science report. Findings from IEA's Repeat of the third international mathematics and science study at the eighth grade. Boston College: International study center, Lynch School of Education (2000).

McKenzie, P. (2008). Staff in Australia's schools. Research Developments, 19(Article 4).

McKenzie, Philip; Kos, Julie; Walker, Maurice; Hong, Jennifer; and Owen, Susanne, "Staff in Australia's Schools 2007" (2008). http://research.acer.edu.au/tll_misc/3

Rennie, Léonie J., Denis Goodrum, and Mark Hackling. "Science teaching and learning in Australian schools: Results of a national study." Research in Science Education 31, no. 4 (2001): 455-498

Sikora, J., & Saha, L. (2011). Lost talent? The occupational expectations and attainments of young Australians. National Centre for Vocational Education Research.

Tytler, R. (2007). Re-imagining science education: Engaging students in science for Australia's future.

It has been shown that the most common reason for not choosing science subjects at high school level is that students can't envisage themselves as scientists

Background of the In2science Program

In2science is an innovative program that places university students as peer Mentors in science and maths classrooms. They support teachers by working with students, especially in practical and small group work. The aim of the program is to work with school students to generate enthusiasm for science and maths and to encourage them to continue their studies in science to year 12 and beyond.

The In2science program started in 2004 as a collaborative project between The University of Melbourne and La Trobe University in response to declining numbers of science students in school and at university. In2science was initially funded by the William Buckland Foundation. It was based on the STAR peer-tutoring program developed by Murdoch University in Western Australia.

Monash University joined in 2008 with funding from the George Alexander Foundation and the Department of Education and Early Childhood Development (DEECD). In 2010 a new funding agreement with the DEECD saw the inclusion of an additional four Universities bringing RMIT University, Deakin University, University of Ballarat and Swinburne University of Technology into the partnership. La Trobe University remained the managing agent of the program.

Who are the Peer Mentors?

In2science Peer Mentors are young science, maths and engineering students, who volunteer for the program. They are not trainee teachers and there are no specific requirements in terms of grades.

They are keen to share their enthusiasm for science, help students achieve in class, and encourage them to consider further study in science. Peer Mentors are placed in government schools for 2 to 3 hours per week. They work with the same classes for up to 11 weeks, getting to know students and supporting them in their learning. Mentors work closely with the class teacher to provide support for the lesson, especially practical classes.

Mentors are recruited through a variety of means:

- Posters
- Coordinators talking in lectures
- Promotional slides given to lecturers
- Learning management systems
- Mass emailing (not allowed at all Universities)
- Volunteering databases

The Aims of the In2science Program

1. Generate enthusiasm for science (especially chemistry, mathematics and physics) in young students (grades 5-10).
2. Place university students in school classrooms so they can be positive role models for young science and mathematics students.
3. Promote the value and rewards of science and mathematics as positive career choices.
4. Foster links between schools and universities.

The first and second aims of the program have been consistently met, with over 1900 science and mathematics students being placed into grade 5-10 classrooms. The focus on chemistry, mathematics and physics however has not always been emphasised. Geographical and timetabling constraints limit coordinators options in arranging placements and the targets set meant the emphasis was on number of placements rather than selecting, for example, a chemistry class over a biology class.

The third aim of the program has been met implicitly, with Mentors encouraged to talk to students about their career choices and options. However, there has never been a strict requirement that Mentors do this and their training does not provide them with information about careers; any information they impart is from their own experiences.

There has been some confusion over whether the aim is to promote science/maths as a career or to show the relevance of science/maths in many careers. For example, is placing an accounting student in a maths class appropriate? Is it more important to enthuse young students by showing them the relevance of science and mathematics in many fields or to only promote jobs that are STEM focussed?

The fourth aim was again met implicitly, with school students meeting university students and providing a point of contact for link and classroom teachers, breaking down the barriers between the institutions. In some cases Mentors even arranged trips onto campuses, however this was exceptional rather than a common occurrence. The regular In2science newsletters also aimed to keep Mentors and teachers informed both about the program itself and other events taking place at partner institutions. The impact of newsletters has not to date been evaluated.

Unwritten Aims of the In2science program

In addition to the four explicit aims there have been unwritten aims and benefits of the program:

1. Encourage quality students to consider teaching as a career
2. Support low SES schools

Encouraging students to consider teaching as a career is an unintended benefit of the program, even though it is not a central aim. There are many Mentors who, prior to their involvement with In2science, had never considered teaching as an option. After enjoying their interactions with students they consider the possibility. Other Mentors applying to participate are already considering teaching as a career option and use In2science to test the waters. It had been shown that the program both encouraged some Mentors to consider teaching as a career whilst simultaneously guiding others away from the classroom (Harris and Calma (2009), Cook et al. (2012)).

The focus on low SES schools came from particular funding requirement of the DEECD but it is not a stated as a central aim of the program. This has led to confusion about whether it was more important to enthuse as many students as possible, regardless of socio-economic background, or whether Mentors should be preferentially placed in low SES schools. This is a particular problem as it is usually easier to place large numbers of Mentors in high SES schools rather than low. A suggestion for the future would be to cement the aims of the program independent of funding options.

Growths and statistics

The In2science program has grown in terms of number of universities, schools and placements since its inception. A full list of schools can be found in Appendix B.

		Number of Universities	Number of Schools	Number of Mentors	Number of students*
2004	Semester 2	2	10	14	616
2005	Semester 1	2	13	25	924
	Semester 2	2	17	38	1518
2006	Semester 1	2	21	53	1870
	Semester 2	2	22	55	1540
2007	Semester 1	2	28	70	2420
	Semester 2	2	28	64	2288
2008	Semester 1	2	33	85	2926
	Semester 2	3	36	87	2794
2009	Semester 1	3	40	92	3300
	Semester 2	3	38	85	2838
2010	Semester 1	3	50	126	3806
	Semester 2	4	57	120	2706
2011	Semester 1	7	86	197	5258
	Semester 2	7	101	259	6798
2012	Semester 1	7	101	247	5680
	Semester 2	6	75	158	3982
2013	Semester 1	6	76	157	3850
	Semester 2	2	7	12	374
	Total	7	144	1932	55488

Table 1.
Numbers of universities, schools, Mentors and school students participating in In2science 2004-2013. *Numbers of students approximated based on an average class size of 22.

Figure 1.
In2science participation numbers 2004-2013

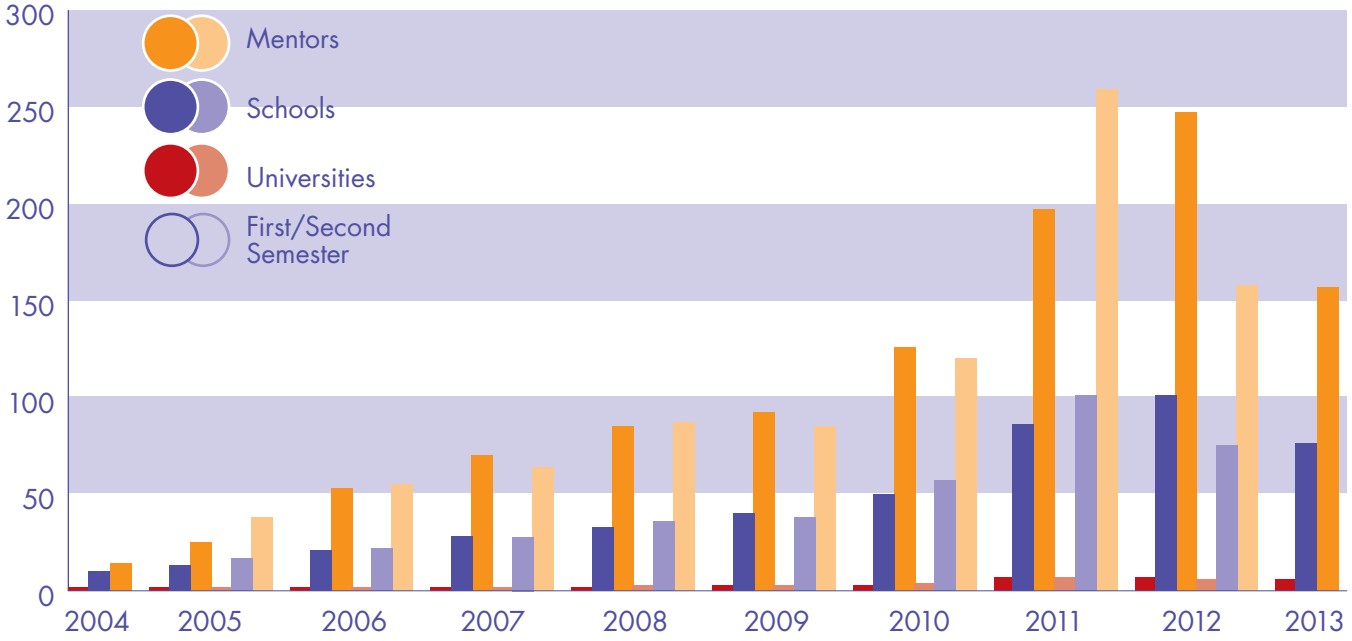


Figure 2.
Socio-economic status of partner schools and placements

Partner schools and placements by socio-economic status

SES	Schools	Placements
Low	37	483
Low-Mid	33	389
Mid	20	205
Mid-High	17	314
High	35	507

Table 2.
Partner schools and placements by geographic region

Partner schools and placements by location

	Schools	Placements
Regional	28	1667
Metro	115	239

Successes

- Expansions to reach increasing numbers of students
- Multiple Universities with multiple campuses extend the reach of the program
- High proportion of low and low-mid SES schools and placements

Challenges

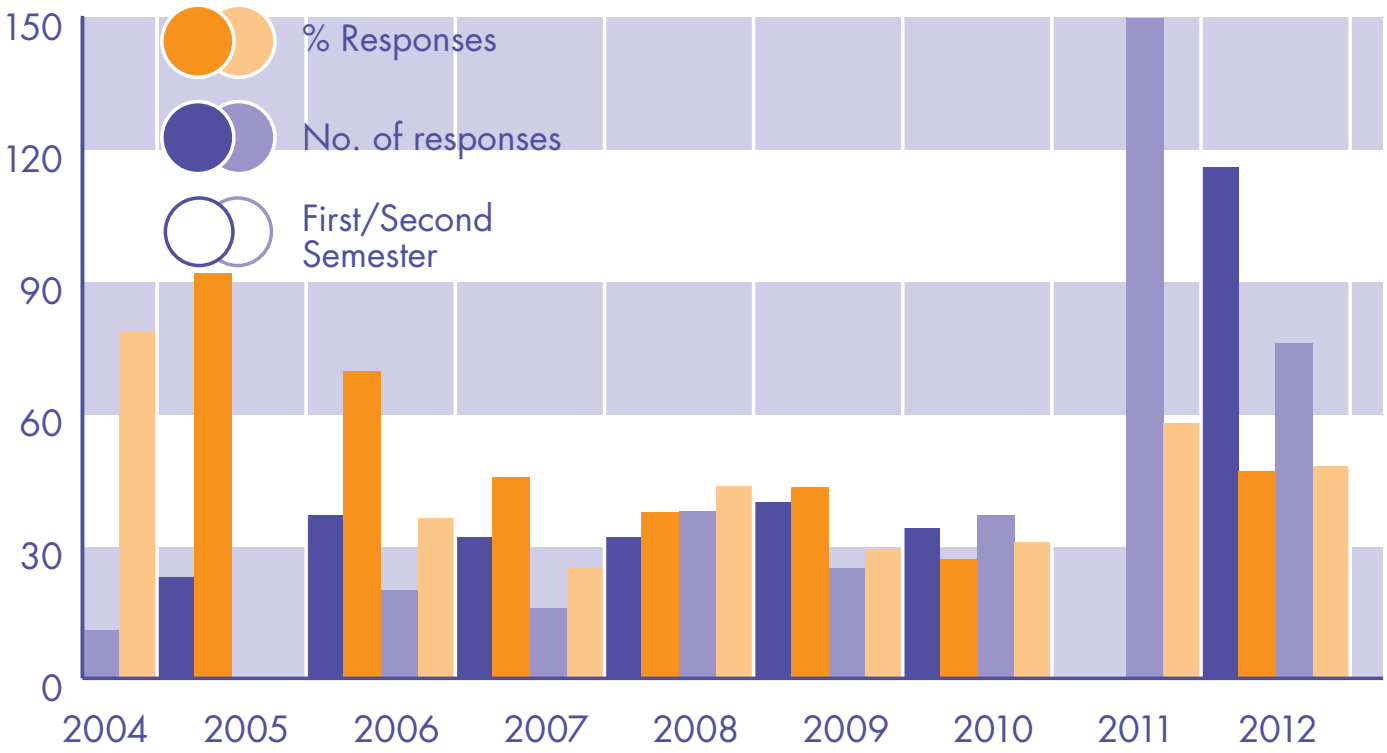
- Numerical targets for growth disguised a drop in quality of relationships
- Numerical targets not based on actual situations (number of local schools not already involved, interest in the program, time fraction of coordinator)
- Different institutions have different levels of buy-in, different processes and procedures and employed staff in different capacities
- Regional placements require more time and resources than metro placements
- Universities dropping out

The buy-in from Universities refers to investment in terms of finance, management and support. Some Universities were more willing or able to contribute financially to the running of the program. Universities asked to contribute financially to the running of the program in 2012.

In terms of program management, only La Trobe, Melbourne and Monash Universities had board members and contributed to the direction of the program.

Stakeholder Perspectives

Figure 3.
Response rates to end-of-placement surveys by Mentors.



As a genuine partnership program, In2science works with and benefits a range of stakeholders. These include:

- Teachers
- School students
- Mentors
- Universities

From the feedback survey data collected from 2004-2013 it is possible to assess the program from the point of view of some of these stakeholders.

Feedback Survey Results

Feedback Surveys were sent out to all Mentors and teachers and a sub-set of school students at the end of every placement. Initially these were all paper copies, with a move to online surveys for Mentors and teachers in 2011 and for all surveys in 2013.

Over the nine years of In2science, responses have been collected from 687 Mentors, 657 classroom teachers and 5364 school students. Response rates were high at the start of In2science when the program only worked with small numbers of schools and Mentors. They dropped off as numbers involved became larger. There was a jump in the Mentor response rate when the switch to online surveys was made (30% to 58%).

Data collected was intended for use in reporting to funding bodies and to inform the future running of the program. It was not made publically available or the information fed back to participants.

Successes

- Useful mechanism for collecting information on the running of the program
- Useful for getting sound bites about the program

Challenges

- Surveys not designed to measure impact on students beyond program participation
- Difficult to collect data, poor response rates

Teacher

There have been 2045 Mentor placements and 657 of the teachers who had a Mentor placed in their classroom completed evaluation forms.

The majority used Mentors in their general science classes, but there were many occasions when Mentors were placed in more specialised science classes. Overall the teachers found that having a Mentor in their class did not require more planning on their part and did not disrupt the class.

On reflection at the end of placement, 53% teachers felt they could have made better use of having a Mentor in their classroom. This was consistent over the nine year In2science timeframe, thus no interventions intended to assist teachers in planning how to use a Mentor were successful.

When asked about the benefits of having a Mentor in the classroom, teachers stated they were able to help answer questions, especially during practical work, to help struggling students, extend able students, provide additional technical knowledge and act as a role model to the students.

Of the 657 teacher responses, 635 (97%) stated they would like a Mentor again in the future. This is an overwhelmingly positive response indicating the value of the program to classroom teachers.

Figure 4.
Subject area Mentor assisted with according to classroom teacher feedback surveys.

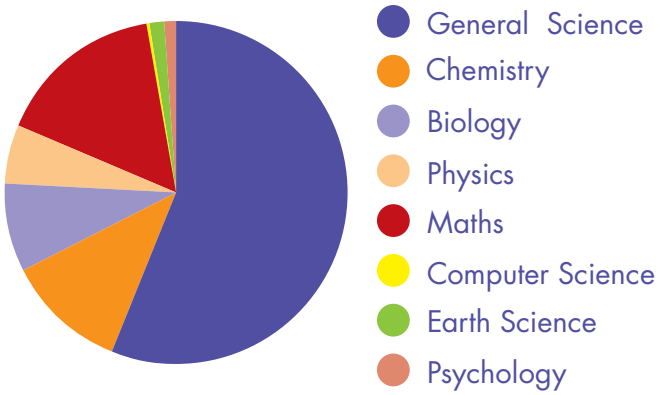


Figure 5. Selection of teacher responses to feedback surveys.

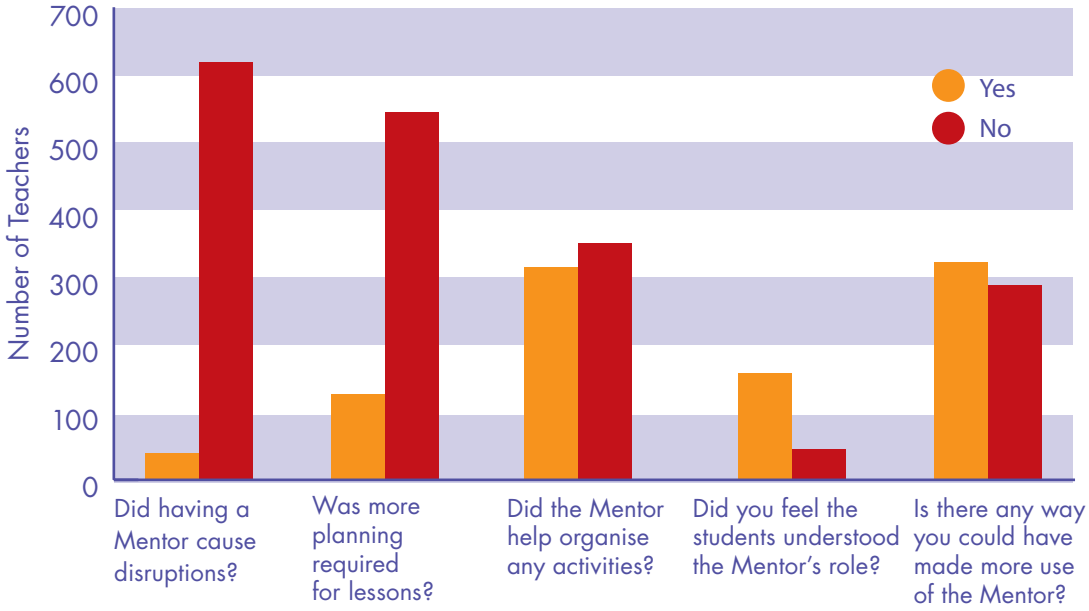


Figure 6.
Word cloud showing word frequency for teacher answers to the question 'what were the benefits of having a Mentor in your classroom?'

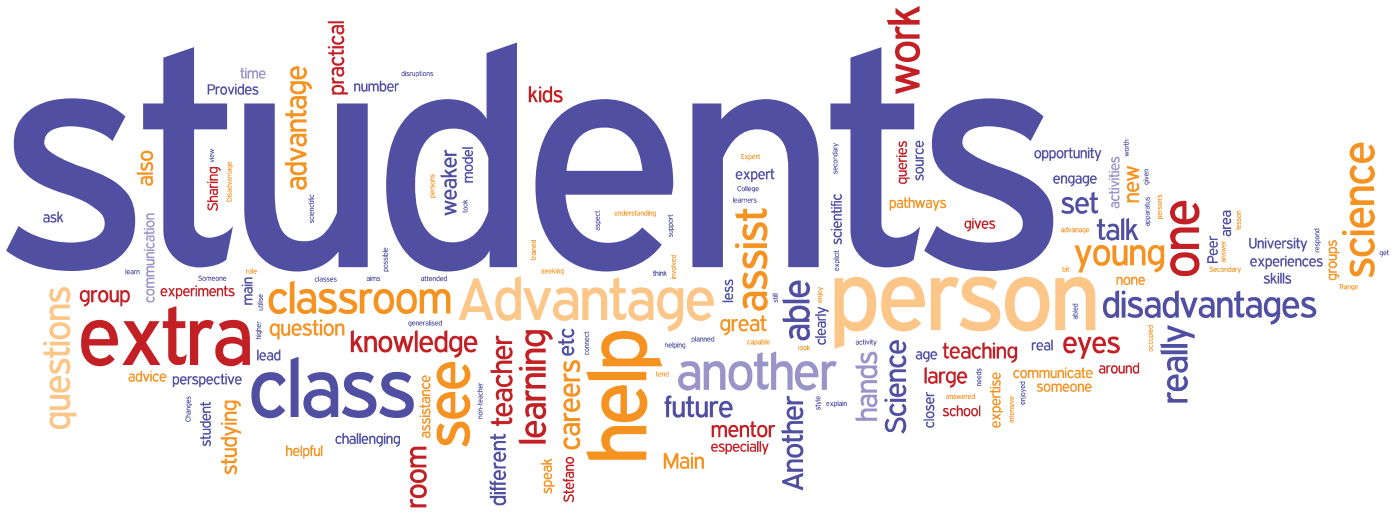


Figure 7.
Teacher responses to the question 'would you like another Mentor in the future?'

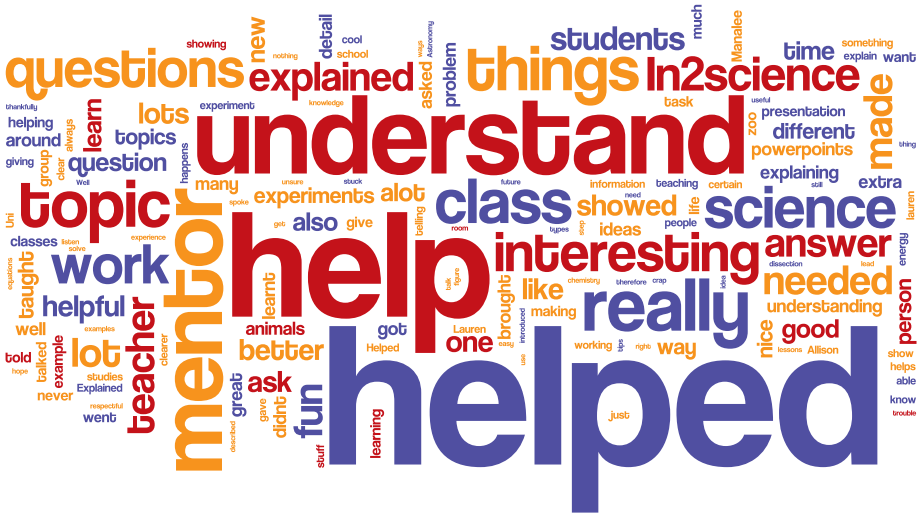


Figure 8. Word cloud showing word frequency for school student answers to the question 'what did your Mentor help you with?'

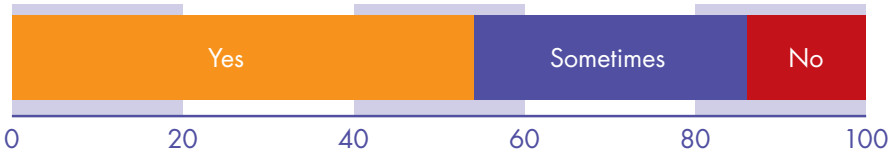


Figure 9. School student responses to the question 'Did having a Mentor make your maths/science lessons more interesting?'

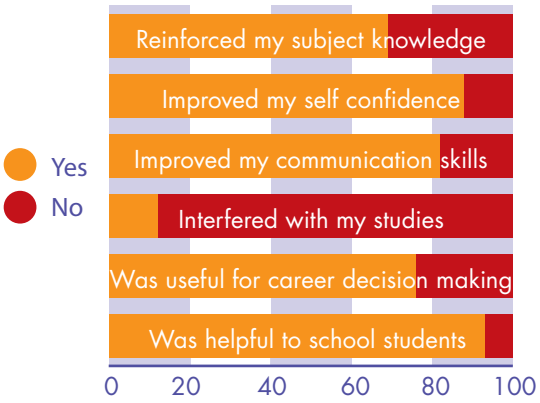


Figure 10.
Mentor responses to selected end-of-placement survey questions.

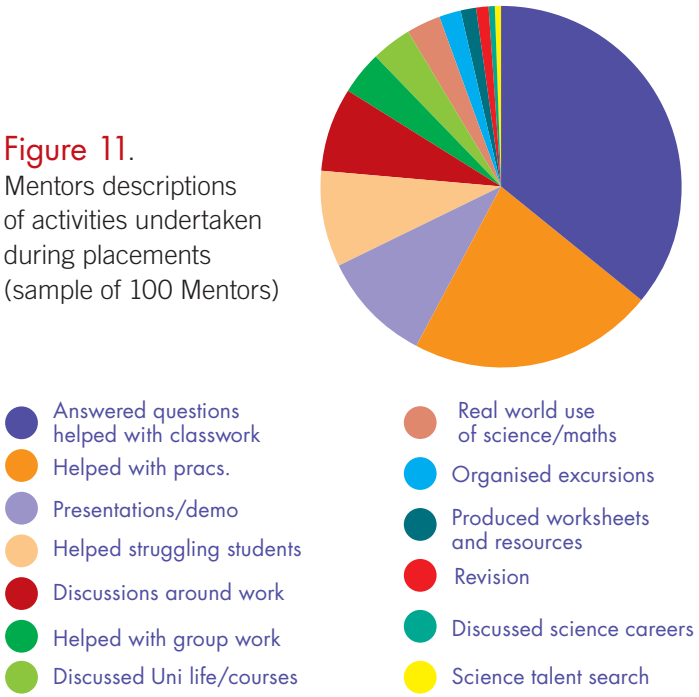


Figure 11.
Mentors descriptions of activities undertaken during placements (sample of 100 Mentors)

Student

School students also had an overwhelmingly positive response to the presence of In2science Mentors in their classes. Of the 5433 responses from students over the nine year period, 88% said they would like to have an In2science Mentor in the future.

It is notable that they two key words school students used to describe what the Mentor did were 'helped' and 'understand'. They found Mentors helped them by answering their questions when the teacher wasn't available, by explaining the topics in language that was easy to understand, and by providing more in depth knowledge of the subject and its applications at university and beyond.

Figure 12.
Word cloud showing word frequency for Mentors' answers to the question 'what were the benefits to you of taking part in In2science?'

Mentor

Overall, Mentors enjoyed volunteering for the In2science program and found it increased their self-confidence and communication skills without interfering with their own University studies.

Many Mentors undertook more than one placement, sometimes returning to the same school but often to different schools to experience a diverse range of ages, subjects and environments.

Mentor placements were very varied, with unique combinations of Mentor, school, class and teachers each providing a distinctive experience. Mentors were asked about their role in the classroom during their placements. All responses were analysed, results are shown in Figure 11.

Mostly Mentors assisted teachers by answering students' questions and helping with practical work. They also organised their own activities and presentations, extended student thinking on the topics being studied and talked about life at University and careers in science and maths.

The Mentors, when asked the benefits of participating, focussed on their ability to help school students and also cited developing communication skills, self-confidence and experience of a classroom environment as key benefits of their placements.

In depth research on Mentors has been also been conducted at Swinburne University and RMIT. Swinburne conducted focus groups to find out why students volunteered and what benefits they gained from participation in In2science. It was found that students volunteers for reasons of altruism, career, and learning, a passion for science and for fun. While the Mentors could explain the benefits the school students gained form the interaction, they struggled to identify the benefits they themselves received and the skills they had gained and demonstrated.

RMIT gave Mentors pre and post placement surveys relating to the University graduate attributes, to see whether participation in In2science helped students to achieve and demonstrate these. The study found that participation in In2science improved all graduate attributes, with the exception of engaging internationally, and the greatest gains were found in the areas of communication with non-specialist audiences and in cultural and social awareness.

Table 3. Summary of University involvement

University	Location	Year joined	Board member	Strength of support
La Trobe University	Bundoora Bendigo Albury/Wodonga	2004	Yes	Very strong support across all levels in the university, offered as elective
The University of Melbourne	Parkville	2004	Yes	Strong support from Dean and within faculty, separate 'competitor' elective run from Education
Monash University	Clayton Gippsland	2008–2013	Yes	Moderate support from faculty
RMIT University	City Bundoora	2010	No	Strong support from line manager (Marketing Manager), previously offered as elective
Swinburne University	Hawthorn	2011	No	Strong support from line manager (Academic) and Deans
University of Ballarat	Ballarat	2011	No	Weak support from Faculty
Deakin University	Burwood Geelong Warrnambool	2011–2012	No	Weak support from line manager (Associate Dean)

University

The In2science program has been embedded differently at each of the Universities with various levels of support as shown in the table above. In general, it has been well received and the Deans of Science have been proud of their faculty's involvement in local schools.

In particular the universities benefit from:

- Positive presence and connection in schools – Mentors become a face for their university
- Improved graduate outcomes for Mentors
- Increase in students choosing to study science at university

The strongest indicator of success was the support of the line manager at the university, although Dean level support and central university support is also important. It would have been beneficial to invest in deeper relationships at all universities, particularly those that joined more recently.

Successes

- Strong multi-university program
- Financial support from six university partners in 2013
- Good benefits for the universities involved

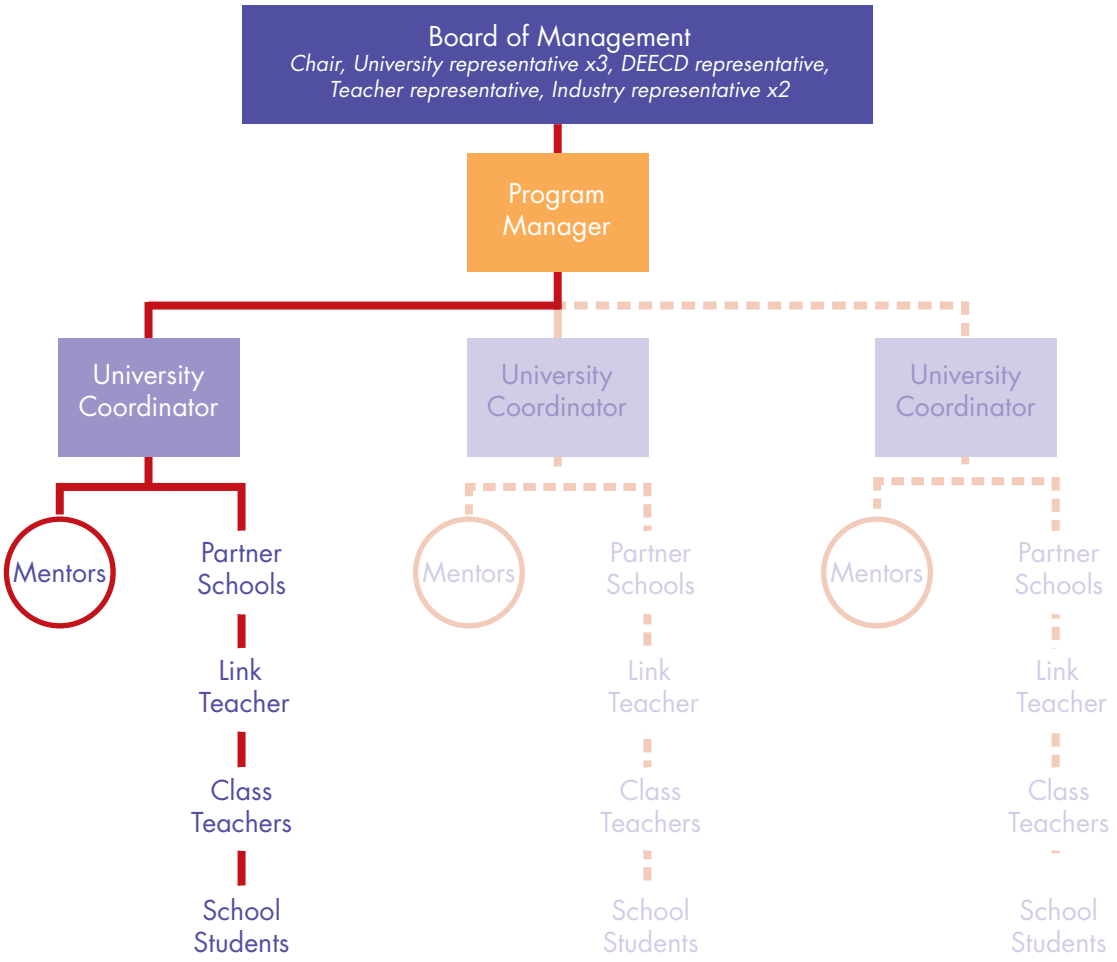
Challenges

- Same time allowance for coordinators working across multiple regional campuses
- Perceived sole ownership of La Trobe by some other universities
- Nurturing relationships and ownership at universities that joined more recently
- Creating a visible profile for the program in all universities
- Lack of strategic allocation of schools
- Large number of stakeholders when planning for changes to funding model

Management Structure

Below is a diagram representing the management structure of the In2science program.

A full list of In2science Board Members can be found in Appendix A



Successes

- Coordinators build good personal relationships with schools
- Coordinators work together – they are able to place Mentors from other institutions into their own school
- Embedding the program in partner universities has kept overheads very low

Challenges

- Limited teacher input to running of the program
- University coordinators have different systems/ pressures from their own institutions
- Nurturing 'team spirit' when all In2science team members are geographically separate
- Turnover of coordinators
- Lack of input from In2science when hiring new coordinators – this is the responsibility of the university

Funding

The In2science program was managed from La Trobe University with central funding provided to other partner institutions for coordinator employment, program running costs and Mentor travel expenses. The main cost of running the In2science program is staffing, with coordinators at each partner university and a central program manager.

In2science is jointly 'owned' by the universities. This has been a great strength of the program in that it is 'for science' rather than for direct recruitment. It has also meant that the program is quite heavy and slow in terms of decision making and fundraising. If it was a program run in just one university then it would be easier for the university to support fundraising and individual partnerships with industry.

For example, when looking for potential industry partnerships there was a conversation with a partnership person from RMIT University. The University had existing partnerships with Boeing and BAE, both of which have a strong interest in science outreach. There was a reluctance to broker a relationship between In2science and these industry partners because of the multi university approach. If there had been stronger support nurtured for In2science from the RMIT Vice-Chancellor then this might not have been such an issue. This also wouldn't have been such an issue if it had been at La Trobe, which is seen by some of the other universities as the 'owner' of the program.

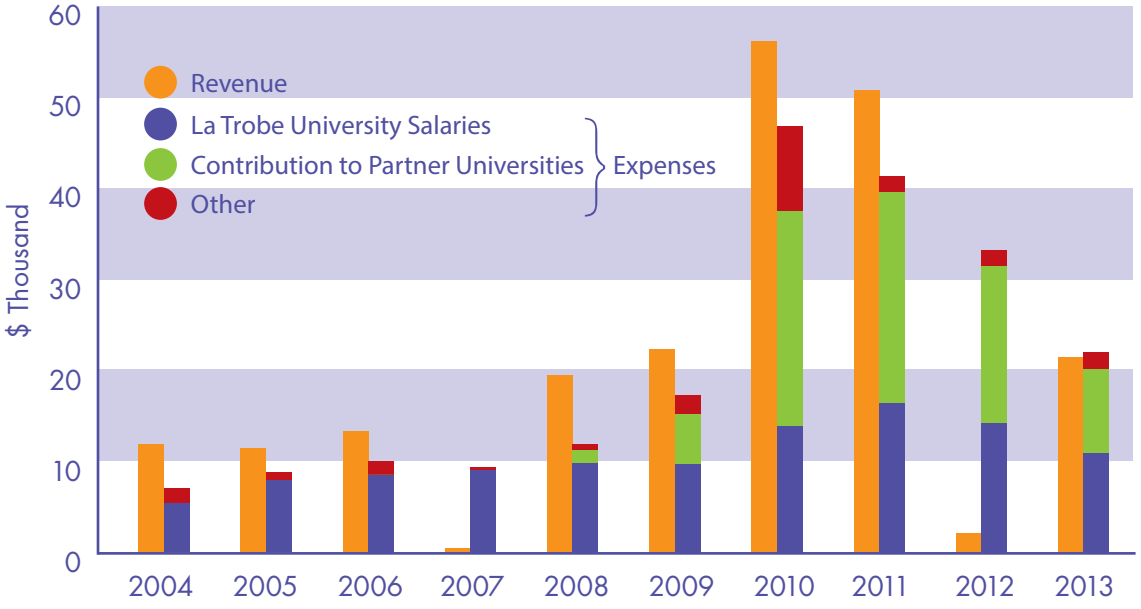
Successes

- Embedding the program in partner universities has kept overheads very low
- Continuous funding for nine years from various sources

Challenges

- Uncertainty of funding impacting ability to plan
- Length of time taken by government to assess funding applications
- Identifying the right time to approach industry partners
- Variation of financial systems across universities
- Lack of clarity of what will happen to left over funding
- Pockets of unknown amounts of money building up in various university's accounts

Expenditure Table



Funding Body	Amount	Duration	Dates
William Buckland Foundation	$363,500	3 years	Jul 2004 to Jun 2007
ASISTIM	$101,500	1.5 years	Jan 2006 to Jun 2007
Nanotechnology Victoria (for Roadshows)	$18,000	3 years	Jun 2006 to Dec 2008
George Alexander Foundation	$100,000	2 years	Jan 2008 to Dec 2009
DEECD	$260,000	2 years	Jan 2008 to Dec 2009
La Trobe, Melbourne and Monash Universities	$66,000	2 years	Jan 2008 to Dec 2009
DEECD	$1,770,000	2 years	Jul 2010 to Jun 2012
DEECD	$150,000	1 year	Nov 2012 – Jun 2013
Six partner universities (for coordinator salaries)	$75,000	6 months	Jan 2013 – Jun 2013

Table 5.
Summary of Funding Received

Table 6.
Summary of other funding applications

Organisation	Amount	Duration	Date applied	Status
AMSPP Nationwide priority projects	$1,281,500	2 years	Feb 2013	Unsuccessful
AMSPP Competitive Grants	$1,143,000	3 years	Jul 2013	Awaiting Confirmation
William Buckland Foundation	$100,000	1 year	Jul 2013	Unsuccessful
Glaxo Smith Kline	$165,00	3 years	Jul 2006	Unsuccessful
Orica	Initial conversation with General Manager, Community		Nov 2012	
Origin Energy	Initial conversation		Aug 2012	

Discussion

The In2science program has had a significant and very positive impact on science education in Victoria. More than 50,000 students have been exposed to an enriching science experience, thanks to the efforts of 1,900 mentor volunteers.

Outcomes also include support to teachers, exposure of school students to innovative new ideas and approaches, and a rewarding experience in the classroom for mentors.

Feedback about the program has been overwhelmingly positive. If it is sustained, however, mechanisms need to be put in place to measure the broader impact of the program in increased uptake of science courses at the secondary or tertiary level. The ability to attract funding to a future program depends upon compelling evidence on its achievements against its objectives.

In2science always faced the challenge of short-term funding cycles. Each funding period was followed by uncertainty about the future of the program, which inhibited the ability to plan for forthcoming placements. A permanent program needs to recruit student volunteers a semester in advance.

The growth of the program through the last decade, while demonstrating the real demand for science peer mentoring, also made maintenance of the quality of relationships – with schools, teachers, and universities – a major challenge. It demonstrates the skills of the In2science Program Managers and Coordinators, and the goodwill of the schools and universities, that the collaboration and cooperation between all parties was so successfully maintained through the life of In2science.

In2science has been an outstanding demonstration of peer mentoring, and has provided great insights into how the process can be successfully managed in future incarnations

The Future of In2science

At the time of writing, In2science is waiting on the outcome of the AMSPP Competitive Grants. If the application is successful, the program will continue for the next three years, providing time for In2science to embed itself at each participating university, and to form industry partnerships to ensure the longevity of the program.

If the funding application is unsuccessful then the program in its current form will close. It is likely that two or three individual universities will continue with science student peer mentoring, drawing upon the successes and insights of In2science. This will allow universities to adapt the program to suit their individual needs.

Under either scenario – or other options the partners or Board may pursue – In2science has left a lasting legacy in Victorian science education. Peer mentoring will continue, for the benefit of Victorian students and Australia.

– March 2014

Appendices

Appendix A | In2science Board Members

Patron

Dr Alan Finkel AM	Chancellor, Monash Univerisity	Nov '11	to Present

Chair of the Board

Mr Simon McKeon AO	Chairman of the Board, CSIRO and Executive Director Macquarie Bank	Mar '13	to Present
The Hon. Dr Barry Jones AO		Aug '04	to Mar '13

Board Members

Ms Soula Bennet	Quantum Victoria	Aug '04	to Present
Dr Les Trudzik	Executive Director, Acil Allen Consulting	Aug '04	to Present
Professor Bob Williamson AO	Australian Academy of Science	Feb '12	to Present
Dr Peter Binks	The General Sir John Monash Foundation	Mar '12	to Present
Ms Kate Parker	DEECD	Oct '13	to Present
Dr Liz Johnson	La Trobe University	Oct '13	to Present
Professor Karen Day	The University of Melbourne	Feb '14	to Present
Professor Janet Hergt	The University of Melbourne	Jun '13	to Feb '14
Professor Brian McGraw	La Trobe University	Sep '10	to Oct '13
Ms Cathy Beesey	Student learning outcomes division, DEECD	May '12	to Oct '13
Professor Robert Saint	The University of Melbourne	May '09	to Jun '13
Ass. Prof. Crisitina Varsavsky	Monash University	Feb '12	to Jun '13
Prof. Emeritus David Finlay	La Trobe University	Aug '04	to Sep '12
Mr Ian Burrage	Office of Policy, Research and Innovation, DEECD	Apr '08	to May '12
Prof Scott O'Neill	Monash University	Jul '11	to Feb '12
Prof Rob Norris	Monash University	Jan '06	to Jul '11
Dr Alan Finkel	Monash University	Feb '09	to Oct '09
Prof Liz Sonenberg	The University of Melbourne	Nov '08	to May '09
Prof Bob Officer	The William Buckland Foundation	Aug '04	to Feb '09
Prof Peter Rathjen	The University of Melbourne	Mar '06	to Nov '08
Mr Tony Cook	Office of Learning and Teaching, Department of Education and Training	Aug '04	to Apr '08
Prof John McKenzie	The University of Melbourne	Aug '04	to Mar '06

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In Profession of Engineering Education: Advancing Teaching, Research and Careers, The: 23rd Annual Conference of the Australasian Association for Engineering Education 2012, p. 556. Engineers Australia, 2012.

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"Evaluating university-to-school peer mentoring in science: the influence of the In2science program in Victorian schools." (2009) http://www.cshe.unimelb.edu.au/research/disciplines/docs/In2science_CSHE_Report_Aug09.pdf

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Teacher: The National Education Magazine Nov 2004 (2004): 49.

Appendix C | List of participating schools

A complete list of all schools who have undertaken an In2science placement can be found below.

School name	Regional / Metro	SES	Date joined	Partner University	Total placements
Abbotsford PS	Metro	Low-Mid	2012 Sem 1	Melbourne	5
Albert Park College	Metro	High	2011 Sem 2	Melbourne	3
Ashwood College	Metro	Mid	2011 Sem 1	RMIT	8
Auburn south PS	Metro	High	2011 Sem 2	Swinburne	7
Baden Powell College P-9	Regional	Mid-High	2011 Sem 1	Melbourne	4
Ballarat HS	Regional	Mid	2011 Sem 1	Ballarat	9
Ballarat Learning Precinct Sebastopol Campus	Regional	Low	2011 Sem 1	Ballarat	7
Ballarat SC	Regional	Low	2011 Sem 1	Ballarat	16
Balwyn HS	Metro	High	2008 Sem 2	La Trobe	31
Balwyn Primary School	Metro	High	2013 Sem 1	Swinburne	2
Bayside P-12 College	Metro	Low	2011 Sem 1	RMIT	4
Bayswater SC	Metro	Low	2012 Sem 1	Swinburne	11
Beechworth SC	Regional	High	2010 Sem 1	La Trobe	3
Bendigo South East SC	Regional	Mid-High	2005 Sem 1	La Trobe	34
Bendigo Violet Street PS	Regional	Low	2011 Sem 1	La Trobe	7
Bentleigh SC	Metro	Mid-High	2012 Sem 1	Swinburne	3
Boronia K-12 College	Metro	Low	2012 Sem 2	Swinburne	2
Brauer College	Regional	Mid	2011 Sem 2	Deakin	3
Brentwood College	Metro	High	2012 Sem 1	Swinburne	2
Brighton SC	Metro	High	2012 Sem 1	Monash	5
Brunswick SC	Metro	Low-Mid	2010 Sem 2	RMIT	45
Buckley Park SC	Metro	Low	2011 Sem 2	Melbourne	6
Bundoora SC	Metro	Low-Mid	2007 Sem 2	La Trobe	22
Camberwell HS	Metro	High	2012 Sem 1	Swinburne	2
Canterbury Girls SC	Metro	High	2009 Sem 2	Melbourne	20
Caroline Springs College	Metro	Low	2011 Sem 1	La Trobe	13
Carwatha College P-12	Metro	Low	2013 Sem 1	Monash	1
Charles La Trobe College	Metro	Low	2010 Sem 2	La Trobe	16
Chatham PS	Metro	High	2011 Sem 2	RMIT	1
Clayton North PS	Metro	Low-Mid	2011 Sem 1	Monash	8
Clifton Hill PS	Metro	High	2011 Sem 2	Melbourne	4
Coburg Senior SC	Metro	Low-Mid	2007 Sem 1	La Trobe	28
Collingwood College	Metro	Low	2008 Sem 1	Melbourne	9
Craigieburn SC	Metro	Low-Mid	2012 Sem 1	RMIT	12

Cranbourne SC	Metro	Low-Mid	2010 Sem 1	Monash	15
Crusoe College	Regional	Mid	2007 Sem 1	La Trobe	17
Dandenong SC	Metro	Low	2011 Sem 2	Monash	5
Eaglehawk SC, Bendigo	Regional	Low-Mid	2009 Sem 1	La Trobe	11
East Doncaster SC	Metro	Mid-High	2004 Sem 2	La Trobe	34
Eltham HS	Metro	High	2004 Sem 2	La Trobe	50
Epping SC	Metro	Low-Mid	2009 Sem 1	La Trobe	11
Essendon Keilor District College	Metro	Low-Mid	2012 Sem 1	RMIT	3
Fitzroy HS	Metro	High	2007 Sem 1	Melbourne	40
Fitzroy PS	Metro	Low	2010 Sem 2	RMIT	12
Flemington PS	Metro	High	2011 Sem 2	Melbourne	11
Footscray City College	Metro	Low-Mid	2005 Sem 1	Melbourne	60
Forest Hill SC	Metro	Mid	2010 Sem 2	Deakin	5
Fountain Gate SC	Metro	Low-Mid	2011 Sem 2	Swinburne	6
Geelong HS	Regional	Low-Mid	2011 Sem 2	Deakin	4
Gilmore Girls College	Metro	Low	2008 Sem 1	La Trobe	6
Gisborne SC	Regional	Mid-High	2011 Sem 2	Swinburne	2
Glen Eira SC	Metro	Mid-High	2011 Sem 2	RMIT	16
Glen Waverley SC	Metro	High	2005 Sem 1	Monash	27
Glendal PS	Metro	High	2012 Sem 1	Swinburne	1
Gleneagles SC	Metro	Low-Mid	2007 Sem 2	Monash	14
Glenferrie PS	Metro	High	2010 Sem 2	Melbourne	1
Golden Square SC	Regional	N/A	2005 Sem 1	La Trobe	8
Greensborough SC	Metro	Mid-High	2009 Sem 1	La Trobe	17
Grovedale College	Regional	Low-Mid	2011 Sem 1	Deakin	7
Grovedale West PS	Regional	Low-Mid	2011 Sem 1	Deakin	5
Hawthorn SC	Metro	Low-Mid	2011 Sem 2	Swinburne	19
Heathmont SC	Metro	Low-Mid	2009 Sem 2	Monash	8
John Monash SC	Metro	High	2010 Sem 2	Monash	11
Kambrya College	Metro	Low-Mid	2013 Sem 1	Monash	1
Kew HS	Metro	Mid-High	2007 Sem 1	La Trobe	27
Keysborough College	Metro	Low	2011 Sem 1	Monash	14
Kingsbury PS	Metro	Low-Mid	2010 Sem 2	La Trobe	2
Kurnai College	Regional	Low-Mid	2010 Sem 1	Monash	4
Lalor North SC	Metro	Low	2006 Sem 2	La Trobe	21
Lalor SC	Metro	Low	2010 Sem 2	RMIT	3
Lilydale Heights College	Metro	Mid	2010 Sem 2	La Trobe	11
Lyndhurst SC	Metro	Low-Mid	2011 Sem 2	Deakin	3

School name	Regional / Metro	SES	Date joined	Partner University	Total placements
Mac Robertson Girls' HS	Metro	High	2005 Sem 1	La Trobe	30
Macleod College	Metro	Mid	2004 Sem 2	La Trobe	31
Malvern Central School	Metro	High	2011 Sem 1	Melbourne	9
Manor Lakes P-12	Regional	Mid	2011 Sem 1	RMIT	9
Maribyrnong SC	Metro	Low-Mid	2012 Sem 1	RMIT	2
McClelland College	Metro	Low	2010 Sem 1	Monash	10
McKinnon SC	Metro	High	2006 Sem 1	Monash	28
Melbourne Girls College	Metro	High	2004 Sem 2	Melbourne	37
Melbourne HS	Metro	High	2010 Sem 1	Melbourne	14
Melton SC	Metro	Low	2012 Sem 2	La Trobe	2
Mentone Girls SC	Metro	High	2011 Sem 2	Monash	3
Mill Park Heights PS	Metro	Mid	2013 Sem 1	La Trobe	1
Mill Park SC	Metro	Low-Mid	2004 Sem 2	La Trobe	41
Montmorency SC	Metro	High	2008 Sem 1	La Trobe	21
Moonee Ponds Central School	Metro	High	2012 Sem 1	Melbourne	3
Mordialloc College	Metro	Mid	2011 Sem 2	Deakin	2
Moreland PS	Metro	Low	2010 Sem 2	RMIT	12
Mount Clear College	Regional	Mid	2011 Sem 1	Ballarat	2
Mount Clear PS	Regional	Mid	2012 Sem 1	Ballarat	8
Mount Erin SC	Metro	Low-Mid	2011 Sem 1	Monash	3
Mt Alexander SC (Debney Park SC)	Metro	Low	2011 Sem 1	Melbourne	2
Mt Waverley SC	Metro	High	2006 Sem 1	Monash	27
Mullauna College	Metro	Low-Mid	2010 Sem 1	La Trobe	2
Newcomb SC	Regional	Low	2011 Sem 1	Deakin	6
Norris Bank PS	Metro	Low-Mid	2012 Sem 1	La Trobe	3
North Geelong HS	Regional	Low	2011 Sem 2	Deakin	2
Northcote HS	Metro	Mid-High	2004 Sem 2	Melbourne	87
Northcote PS	Metro	High	2012 Sem 2	Melbourne	6
Norwood SC	Metro	High	2012 Sem 1	Swinburne	5
Pakenham SC	Metro	Low-Mid	2010 Sem 1	Monash	6
Parkdale SC	Metro	Low-Mid	2012 Sem 1	Monash	2
Parkhill PS	Metro	Mid	2011 Sem 1	Deakin	6
Pascoe Vale Girls SC	Metro	Low	2004 Sem 2	La Trobe	35
Patterson River SC	Metro	Mid	2012 Sem 1	Monash	7
Pentland PS	Regional	Mid	2011 Sem 1	RMIT	0

Phoenix P-12 Community College	Regional	Low-Mid	2011 Sem 1	Ballarat	9
Preston Girls SC	Metro	Low	2006 Sem 2	La Trobe	36
Princes Hill SC	Metro	High	2004 Sem 2	La Trobe	16
Reservoir HS	Metro	Low	2005 Sem 1	La Trobe	82
Richmond West PS	Metro	Low	2010 Sem 2	RMIT	19
Ringwood SC	Metro	Mid-High	2009 Sem 1	Monash	9
Rosehill Secondary College	Metro	Mid	2010 Sem 2	La Trobe	16
Roxburgh College	Metro	Low	2011 Sem 1	La Trobe	3
Sandringham College	Metro	High	2008 Sem 1	Monash	14
South Oakleigh SC	Metro	Low-Mid	2011 Sem 1	Deakin	8
Spencely Street PS	Metro	High	2011 Sem 2	Melbourne	8
St Albans SC	Metro	Low	2011 Sem 2	Deakin	3
St Helena SC	Metro	Mid-High	2004 Sem 2	La Trobe	34
Stonnington PS	Metro	Low	2011 Sem 1	RMIT	5
Strathmore SC	Metro	Low	2005 Sem 1	La Trobe	35
Sunshine SC	Metro	Low	2010 Sem 2	RMIT	10
Sydney Road Community School	Metro	Mid-High	2011 Sem 1	RMIT	10
Tecoma PS	Regional	Mid-High	2013 Sem 1	Monash	1
Templestowe College	Metro	Mid-High	2008 Sem 2	La Trobe	15
The Lakes School	Metro	Low-Mid	2008 Sem 2	La Trobe	2
Thomastown East PS	Metro	Low	2010 Sem 2	RMIT	6
Thomastown SC	Metro	Low	2011 Sem 2	RMIT	10
Thornbury HS	Metro	Low-Mid	2006 Sem 1	La Trobe	18
University HS	Metro	High	2008 Sem 1	Melbourne	37
Upwey HS	Metro	Mid-High	2011 Sem 2	Deakin	2
Vermont SC	Metro	High	2011 Sem 1	Monash	10
Viewbank College	Metro	High	2006 Sem 1	La Trobe	18
Wantirna SC	Metro	Mid-High	2009 Sem 1	Monash	14
Warrnambool College	Regional	Mid	2011 Sem 1	Deakin	6
Wellington SC	Metro	Low	2011 Sem 1	Monash	14
Werribee SC	Regional	Mid	2011 Sem 1	RMIT	17
Westall SC	Metro	Low	2008 Sem 2	Monash	18
Wheelers Hill SC	Metro	Mid	2008 Sem 2	Monash	14
William Ruthven SC	Metro	Low	2008 Sem 1	La Trobe	20
Wodonga Middle Years SC	Regional	Mid	2004 Sem 2	La Trobe	33
Wodonga PS	Regional	Mid-High	2011 Sem 1	La Trobe	5
TOTAL					1906

The In2science weekly placement program was not able to support schools that were not easily accessible from the campuses of the partner universities or from the homes of Mentors. Regional Roadshows were necessary to connect university and school students in regional and rural locations. These ran once a year around the end of November. In2science Roadshows have the following format:

- Introductory talk given by the coordinator
- Four hands-on workstations each manned by a Mentor. School students rotate through these in groups
- Plenary session (if time)

All students, teachers and Mentors complete a feedback form. Feedback to Roadshows has been overwhelmingly positive. Three different In2science Roadshows have been run over the duration of the program.

In2biotech

This biotechnology Roadshow was run conjunction with 'Get into Genes' and is aimed at years 9/10. It considers reasons for selective breeding and genetic modification in terms of climate change and looks at biofuels. School students try techniques such as gel electrophoresis and DNA extraction.

In2nanotech

Introduces the nanoscale and has hands on activities looking at nanoparticles in sunscreens, nanocoatings on fabric, memory metals and ferrofluids. In2nanotech is aimed at years 8, 9 and 10.

In2ecotech

This Roadshow was developed by University of Ballarat in conjunction with the Earth Ed Earth Sciences Centre. It was aimed at year 7 and 8 students. The theme was using environmental monitoring to understand the impact of climate change and human activity.

Figure 14. Word cloud showing student feedback from the In2nanotech Roadshow (2012)

Successes

- Very positive feedback from students, teachers and Mentors.
- Introduced topics to students which are not covered explicitly in the curriculum
- Provided school students opportunity to access equipment not available in schools
- Gave teachers more confidence in topics
- Fun science experience

Challenges

- No ongoing relationships developed – one off event only
- Content driven rather than relationship focussed mentoring
- Scheduling Roadshows is difficult as there are limited times when Mentors are free for a week and schools are not on holidays
- All schools have different timetables thus content needs to be adapted for each school
- Cost (travel, accommodation and living expenses) ~$3000 per Roadshow.

Year	Location	Schools	Topic
2012	Gippsland	Neerim District, Kurnai College, Traralgon College, Sale College, Leongatha College, Newhaven College	In2nanotech
	South West	Beaufort SC, Ararat Community College, Stawell SC, Horsham College	In2ecotech
2011	North West	Chaffey SC, Red Cliffs SC, Irymple SC	In2biotech
	South West	Cobden Technical School, Warrnambool College, Portland SC, Mortlake P-12 College, Heywood District SC	In2nanotech
2010	North West	Chaffey SC, Red Cliffs SC, Irymple SC, Charlton Coll., Ouyen P-12 Coll.	In2nanotech
	North East	Alexandra SC, Myrtleford P-12 College, Bright P-12 College, Beechworth SC, Wangaratta High School, Euroa SC	In2biotech
2009	North East	Beechworth SC, Bright P-12 College, Euroa SC , Mansfield SC, Myrtleford P-12 College, Wangaratta High School	In2nanotech
	North West	Stawell SC, Murtoa P-12 College, Horsham SC, Dimboola Memorial SC, Warracknabeal SC	In2biotech
2008	North	Rochester SC, Shepparton HS, McGuire College, Numurkah SC, Echuca College, Kerang Tech HS, Cohuna SC	In2nanotech
2007	Gippsland	Bairnsdale SC, Kurnai College, Morewell, Lakes Entrance SC, Traralgon College, Warragul Regional College	In2nanotech

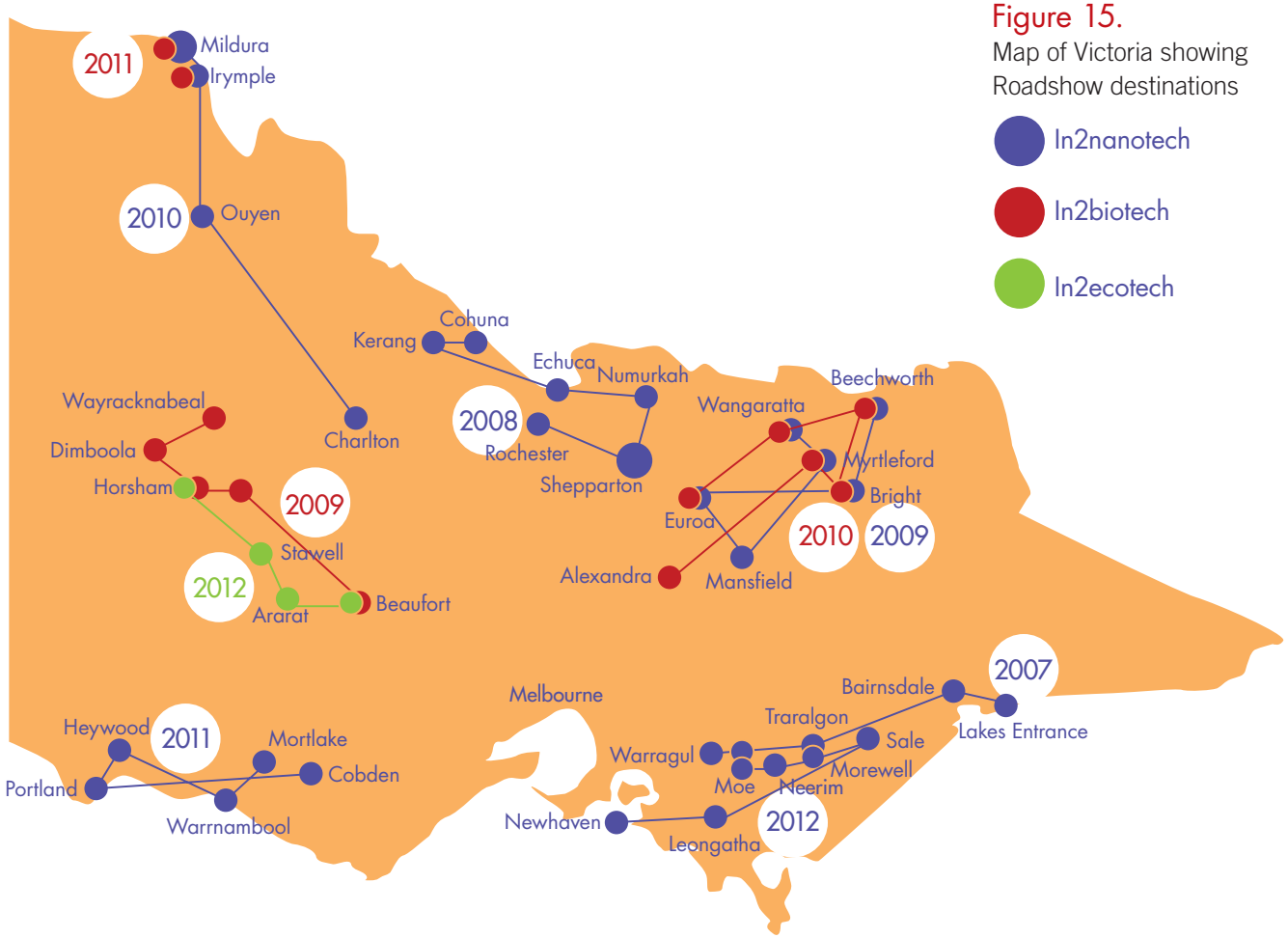
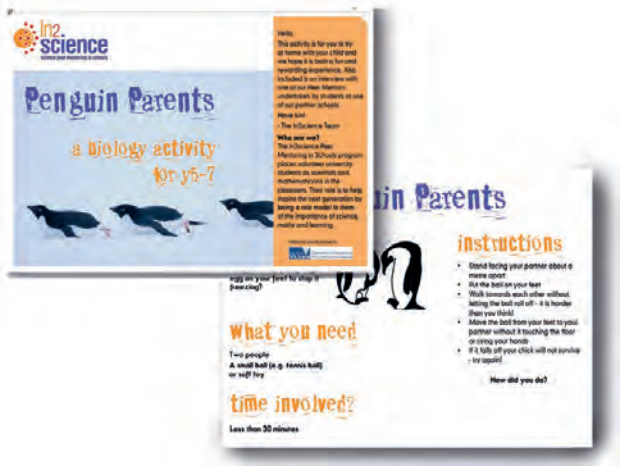


Figure 15.
Map of Victoria showing Roadshow destinations

In2science does not have a central set of physical resources for students to take into schools, though some Universities were able to provide science kits to their Mentors.

In2science has also produced two sets of resources cards, one aimed at school students, the other at teachers. Cards were distributed to students and teachers and PDF versions were made available through the In2science website. They contained activity suggestions and interviews with In2science Mentors.

Figure 16. Student activity card



Student Activity cards

Content by Emily Cook, designed by Fallon Mody

These activity cards were designed for Mentors to give to students to take home. They contain 'Kitchen Science' activities that could be carried out using materials bought from a supermarket.

Subject	Year 5-7	Year 8-10
Biology	Penguin Parents	Mummified Heads
Chemistry	Criminal Ink	Cabbage Chemistry
Physics	Rocket Science	Build a Hovercraft
Maths	Cracking Codes	Finding Pi with Darts

Teacher Resource Cards

Content by Emily Cook, designed by 'Kyla the Designer'

Theses resource cards aimed to support teachers with the new Australian Curriculum, especially the 'Science as a Human Endeavour' and 'Science Inquiry Skills' aspects. They provide example ideas and experiments and suggestions of how to use Mentors in the classroom.

Title	Year	Topic
Buckle-up!	7	Forces (seatbelts)
Bone Wars	8	Earth Science (fossils and dinosaurs)
Product Testing	8/9	Science Inquiry Skills
Atomic People	9	Science as a Human Endeavour (atoms)
Genethics	10	Genetics (ethics)
Stop in time!	10	Forces (stopping distances)

Figure 17. Teacher Resource Cards

Successes

- Useful resources produced, general feedback to coordinators good

Challenges

- No evaluation conducted, do not know what how the cards were used or what could be improved
- Aims of resources not always linked to aims of program

Schools have also won awards outside of the program thanks to the contribution of Mentors.

"In2science Mentors have been an integral part of the Environmental Research Project that has been developing since 2010, and we are proud to state that in 2011 we won the Victorian Mathematics and Science Excellence Award to the value of $10,000."

– Bundoora Secondary College

bundoorasc.vic.edu.au/index.php/enrolment-information/specialist-programs/In2science/

In2science Awards Winners 2012

Mentors

Michael Chami	La Trobe University	1st place
Joshua McLeod	Swinburne University	2nd place
James Taylor	Monash University	3rd place

Teachers

Tabetha Spiteri	Pascoe Vale Girls College	1st place
Daniel Dew	Patterson River Secondary College	2nd place
Joan Vague	Wodonga Primary School	3rd place

Senior Students

Zaakira Husein	Reservoir High School	1st place
Brendan Tang	Balwyn High School	2nd place
Layal Obeid	Pacoe Vale Girls College	3rd place

Junior Students

Vicknan Arjuna	Glen Eira College	1st place
Zoe Waight	Mt Clear Primary School	2nd place
Grace Wilkes	Spensley St reet Primary School	3rd place

In2science Awards Winners 2013

Mentors

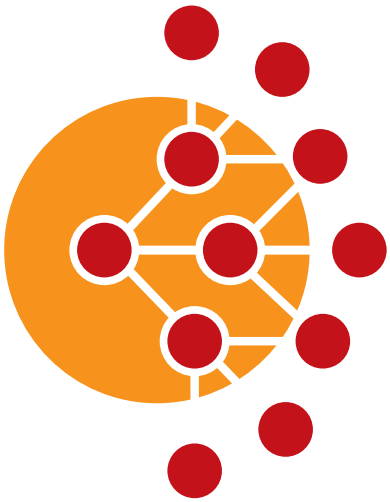
Giulia Portelli	La Trobe University	Commendation
Lee-Kiong (Lee) Au	University of Melbourne	Commendation
Timothy Lucas	University of Ballarat	Commendation

Teachers

Alice Andreu	Buckley Park College	Commendation
Steven Bruce	Northcote Primary School	Commendation

Students

Stephanie McDonald	Heathmont SC	Commendation
Moo Paw	Heathmont SC	Commendation



In2science

science peer mentoring in schools

Contact Us

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