

Inaugural Regional Tertiary Education Conference

Case studies: Collaboration for regional development

Attracting sufficient numbers of young undergraduates into regional institutions to skill regional industries - sciences, agri food/fibre - The PICSE program as a case study

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Overview

The PICSE (Primary Industry Centre for Science Education) program is a national collaborative educational endeavour that focuses on creating awareness, interest and intention amongst bright young people, in their later school years, to participate in professional science based careers in the primary industries sector. The intention is to create a professional skill pool to supply the future needs of regional primary industry and the agri-food and agri-fibre sector of Australia.

Once they are enthused through the PICSE engagement program of activities, students are made aware that science based tertiary courses are a pre-requisite for such participation in these exciting and rewarding careers. Their key influencers, science teachers, are also made aware of this due to structured engagement via the PICSE program with its industry affiliates and collaborator universities. Through this engagement these science teachers experience for themselves these contemporary careers in action.

The basis of the PICSE program is the development of strong partnerships between regional universities, employers, schools, students, science teachers and industry groups. The PICSE program and its science teacher-origin Science Education Officers act as the conduit and enabling entity to create these focussed partnerships. Science Education Officers are based at collaborator universities which form the focus of these local community and industry partnerships. These constitute several of the Key Success Factors of the PICSE program.

Regional universities are well positioned to be the tertiary institution of choice for such students if they offer relevant science based tertiary courses that equip students to enter such careers. There is compelling evidence provided through the PICSE evaluation that the creation of these partnerships facilitates increased student entry into science based tertiary courses.

At the recent National Think Tank “Positions Vacant: Young Scientists wanted for Australia’s future Food Security” organised jointly by PICSE and Agrifood Skills Council, the strong federal government focus on the creation of regional university and industry and community partnerships was re-enforced. The role of PICSE in creating strong and robust partnerships was commended, including at the ministerial level when Senator Kim Carr, Minister for Innovation, Industry, Science and Research presented awards to PICSE program graduates.

1. The Primary Industry Centre for Science Education

The PICSE concept

The Primary Industry Centre for Science Education (PICSE) (www.picse.net) is a national collaborative partnership between the Commonwealth Government, universities, regional primary industries, national R&D Corporations, Cooperative Research Centres (CRCs), national agribusiness, regional research institutes, government authorities, local community organisations, schools and State Government Departments. Its focus is to create an entry point to the supply chain of bright young people entering professional careers in Australia's increasingly vibrant, globally focused and quality conscious food and fibre industries.

PICSE aims to attract an increased supply of high quality young people to these industries through engagement with them during school years and early university. To do so, PICSE provides an established program and strategy which includes science class activities in schools, teacher professional development, student camps, student industry placements and the development of teaching resources. Collectively, these activities build strong and sustainable relationships with employers, science practitioners, educators and students (both primary and secondary with continued engagement at tertiary level).

Key Success Factor

The 'seeing is believing' nature of the program based on strong relationships between partners and collaborators supports direct engagement of all stakeholders and facilitates strong communication and feedback.

'The PICSE goal is to attract the brightest and most creative minds to ongoing science education and primary industry careers' (Russell et al, PICSE Scoping Study, 2006). The PICSE program and strategies deliberately employs an evidence base approach making all aspects of the science underpinning sustainable agricultural production, processing and quality management a key priority through use of current research and industry examples. PICSE's integrated program is well researched, tested and evaluated over a 10-year period. The outcomes of the PICSE program are further supported by research that indicates the significant benefits of building long term relationships in order to affect changing attitudes and perceptions amongst students, teachers, industry and the broader community.

In 2011 PICSE operates from ten Activity Centres (AC) located at universities or in industries in every state of Australia (except Victoria). It is strongly focussed on its government and industry relationships that have been built nationally by long term investment in collaboration by the senior leaders of PICSE. The local industry relationships have been established in each AC by the science education officers located in regional universities or industries. The 14 PICSE Science Education Officers (SEOs) are fundamental to the success and sustainability of the program in the local regions. PICSE has a very strong monitoring and evaluation program that supports internal continuous improvement as well as robust progress reporting to partners and investors. The specialist company, QualDATA Pty Ltd, has managed the monitoring evaluation and reporting program for PICSE since 2008.

Key Success Factor

The strong evidence based origins, plus a strong monitoring, evaluation and reporting program, provides robust data on successes to report to investors and supports internal continuous improvement where it is required to facilitate innovation.

Its origins

The PICSE program had its origins in Tasmania in 1998. It emerged out of a desire by the University of Tasmania to secure a stream of entrants from school into its undergraduate and post-graduate agricultural science courses. To do this the program focussed on direct engagement by students and teachers with handpicked professional local primary industries focussed businesses.

This had the effect of showing the contemporary, global and professional operations of these businesses in a 'show and tell' setting where these potential employers demonstrated the breadth of exciting careers on offer. This direct engagement with students and science teachers remains a key factor in PICSE's strategic approach today.

Key Success Factor

Direct engagement of teachers and students with handpicked employers demystifies the breadth of primary industries careers on offer.

The Grains Research and Development Corporation (GRDC) supported the expansion of the program to Western Australia in 2003 to determine whether the Tasmanian experience could be replicated in a different context. The program continues to flourish and expand in its third phase in WA. The GRDC remains a significant funding partner as does the University of Western Australia. Other national partners have engaged over time.

In 2005 the Federal Government commissioned a Scoping Study to determine the feasibility of national expansion of the program. A key focus of this study was to create a suitable vision and operations for the program through to 2014 and to determine how to establish key partnerships with industry investors, state governments and businesses. Engagement with governments, RDCs and business investors during the study revealed the need for a Business Case which the federal government subsequently funded.

A key outcome of the Business Case was consideration of how to adequately report suitable measures of return on investment and measures of success to convince investors that outcomes were being achieved and money spent effectively. The creation of the business case was instrumental in a number of the RDCs being prepared to invest in PICSE and gave confidence to other investors, including universities, that a rigorous market research and business development process had been undertaken.

Key Success Factor

Preparation of the Scoping Study and Business Case provided confidence to investors by demonstrating a clear vision for the future and an articulation of expected key measures of success.

Engagement

While both the Business Case and Scoping Study provided an evidence based approach to engaging investors and stakeholders, personal engagement from the PICSE senior management team over time, since these studies, provided the opportunity for potential investors to understand fully the vision and objectives of the program plus the operations.

The development of a Network newsletter that is regularly forwarded to all current and potential investors and interested parties provides a further engagement mechanism. This supports regular 'drop-in' meetings and formal update briefings with investors.

The whole process provides the opportunity for partner and investor input and for them to 'have a say' that also influences planning and continuous improvement. The provision of data regarding outcomes via the Reporting process also gives them confidence in the program. This further supports their understanding of the 'what's in it for me'. It provides the PICSE team with an understanding of the key drivers of individual investors and an understanding of the motivations of certain investor segments such as RDCs and global and national agribusiness.

When investors agree to support the program an MOU is created, based on PICSE committing to deliver key outcomes based on Performance Indicators against which success can be judged. These translate into personalised touch points for the program with investors that have operational and strategic ramifications.

Key Success Factor

A defined personal engagement strategy between PICSE senior management and investors, partners and interested parties has facilitated the development of strong relationships and an understanding of, and ability to report against, key performance indicators.

Accordingly the Key Success Factors of PICSE can be regarded as:

- The experiential nature of the program is a core strength of its engagement of students, teachers and industry
- The robust monitoring and evaluation gives all parties a true and clear picture of progress being made and capacity to make evidence based changes. This underpins the PICSE Innovation Program
- Many science careers are 'a mystery' to both students and teachers. The PICSE program explicitly de-mystifies these careers through allowing student and teachers to experience the breadth of activities being undertaken via industry exemplars
- PICSE takes a businesslike approach to realising its Vision which gives investors and partners confidence that their engagement has strategic implications in attracting more and higher quality personnel to identified industry careers
- PICSE is based strongly on developing relationships, partnerships and collaborative programs that are a win:win for all parties.

2. Evidence of success – Impact of the PICSE program – a snapshot

Since its inception, a feature of PICSE has been its robust monitoring and evaluation program. It deals with both Process and Impact evaluation. The Process evaluation is used internally within

PICSE to support internal continuous improvement. The Impact evaluation is used to inform partners and investors about progress against milestones, KPIs and agreed objectives.

Between 1998 and 2010, the PICSE program has:

- Presented to 44,540 students in 2,272 year 11/12 science classes;
- Selected 778 year 11/12 students for science investigation camps and industry placements;
- Conducted practical professional development programs to 850 secondary science teachers using select primary industries to demonstrate the science;
- Supported 3,336 secondary school students in the participation of Science Investigation Awards;
- Partnered with the Commonwealth Government, universities and industry to secure in excess of \$12 M (2000 to 2010) to grow the program from a single Activity Centre (AC) to a national program with nine AC's and 25 professional staff.

Independent evaluator, QualDATA's 2011 Impact Evaluation Report reports these key findings:

Participation

Participation in the PICSE program is growing. It has significantly increased between 2009 and 2010 in all areas within its seven Activity Centres (now 9 in 2011) across Australia: Data includes:

- 154 teachers were involved in the **teachers professional development program** in 2010/11 (up from 102 in 2009/10).
- 1082 students (primary and secondary schools) were engaged in the **Science Investigation Awards** (up from 331 in 2009/10). The numbers of judges and teachers involved in the program has also increased.
- 152 students were involved in **Year 11 and 12 Student Camps** (up from 120 in 2009/10).
- 136 students were involved in the **Industry Placement Scholarships** (up from 90 in 2009/2010).

Generating Awareness and Interest

There is strong data to show that involvement by students and teachers in PICSE activities is increasing the profile of science and primary industry opportunities and careers amongst the school community:

- Teachers who undertake **professional development activities** rated these as highly valuable, providing useful resources for their courses and increasing their interest and ability to encourage students to study science and seek careers in this area, including the primary industries sector as the focus of 'science in action'.
- Students overall enjoyed their involvement in the **Science Investigation Awards** and rated their involvement as having a reasonable impact on their view of science and science studies – including having a clearer direction for the future.
- Most of the students who attended **Year 11 and 12 Camps** indicated that they had positively changed their attitudes towards studying science at university as a result of better understanding study options and career pathways. This was also mirrored in students who participated in Year 10 camps.
- Ninety percent of students who participated in the **Industry Placement Scholarships** indicated that they had changed their view on the importance of science in Primary Industries and one third who had not previously been interested, changed their career thinking towards science and primary industries.

Impacting on study and career options

The consistent message coming through the impact evaluation data is that the PICSE program is impacting positively on the choices that students are making – either by reaffirming their direction, providing clearer pathways, or moving them towards study and careers in science and primary industries where otherwise they would not have considered it:

- 22% of students attending **Year 11 and 12 Camps** had submitted a university application for Agricultural Science and 54% for a general science degree. 32% of students indicated that their involvement had increased their interest in undertaking post-graduate research.
- 46% of students involved in the **IPS scholarships** said they had enrolled or intended to enrol in a science/primary industry university course.

The expansion of the **Science Investigation Awards** from a pilot program in 2009 to a Nation-wide program during 2010 illustrates the ability of PICSE to undertake innovations that meet particular target audience needs.

Overall Message

The overall message from the results is that participation in PICSE is growing and the program is having a measurable positive impact on those teachers and students who have participated. The program is increasing interest in science within the schools in which it is operating and impacting positively on choices made by student participants in terms of post-secondary study, post-graduate study and careers in science.

3. Strategic positioning

On 21st June 2011 PICSE and its partner Agrifood Skills Council convened a National Think Tank entitled “Positions Vacant: Young Scientists wanted for Australia’s Future Food Security”. A range of people including federal government senior personnel, university partners, employer partners, industry personnel, PICSE students, PICSE graduates now employed in industry and senior PICSE personnel convened to consider the way forward.

The key findings of the Think Tank can be summarised as:

- PICSE is a strong and robust initiative with clear evidence based outcomes and a strong future vision that is based on collaboration and partnerships
- Science and primary industry related careers can be regarded as robust and resilient occupations with expected strong growth
- A partnering of industry, government and universities is a key component for the next stage of PICSE
- Universities need to address their low use courses vs. opportunities to engage in high use courses
- There are tremendous opportunities for young people in science careers that focus on innovation. However very positive signals are required – to both city and country young people alike.
- A supply of the right young people throughout the agri-food and fibre supply chain is crucial to those industries
- There are a range of global mega trends that recognise food and fibre as growth industries

- The need for a supply of science and agriculture related graduates is 4,000 per annum however approximately 700 are available currently (Pratley, J 2011)
- Science teachers have an opportunity to bringing the food and fibre related stories to life – and PICSE achieves this by supporting students and teachers who can engage with real life employers and employees that showcase these occupations as being real to passionate young people
- It is important to show young people real jobs and a core element of this is about more sensible engagement with employers to get the right story out
- The federal government has a range of initiatives underway, including creating a strategic 10-year framework to secure the research workforce.

What this means for the PICSE program

The following summarise key strategic outcomes for PICSE:

- The current model is working well and has been overwhelming supported by those attending the Think Tank.
- The linkages between universities, industry and schools are unique and in combination, make the PICSE program unique.
- An expansion of the program into more remote and regional areas is warranted. This development would provide a significant benefit to teachers in remote and regional schools and stimulate and network students with their peers across the state and in some cases interstate.
- An expansion of the program into lower socioeconomic areas is also warranted. This development would have the advantage to develop new interest in science and its application to primary industry related careers and potentially attract a new student audience.
- PICSE could be more active in the ‘post secondary’ student environment. There exists an opportunity to involve PICSE students in a formal program of activities whilst undergoing their tertiary studies.

4. What this means for regional universities

Key federal perspectives

The current federal government focus on key issues for universities was reported at the Think Tank.

Relevant points include the value in:

- Strong community engagement – by developing robust community links
- The creation of partnerships to provide skills for the future
- Promoting science and innovation
- Promoting engagement with young people
- Developing strong collaborative arrangements.

The PICSE is an excellent case study of regional engagement where universities are working effectively with local and national industry and linking successfully with local schools to increase higher education participation in science courses, leading to the provision of graduates for primary industry.

What young people have to say

A number of the PICSE students who reported their experiences at the Think Tank made comments such as:

- 'I wanted to travel the world and do something I was passionate about. PICSE provides me with that opportunity – it has allowed me to connect with passionate fellow students and see practical application of the sciences and It has provided me with direction and clarity that I lacked' ...
- 'I wanted to be an actor before I got involved in PICSE. While there are lots of exciting careers in primary industries, I had no idea what they were until PICSE showed me. So I have entirely changed my career aspirations and want to do ag science at UWA which has now become a clear future path for me' ...
- 'I had no idea what I wanted to do. PICSE gave me a range of options and showed the diversity of opportunities available. It also removed a lot of stereotypes – such as what happens in the labs. It is good to know that there is such a viable future in terms of career options now that I have seen those real careers in action' ...
- 'I was uncertain about my future career. PICSE helped me demystify the opportunities in agriculture. It demonstrated real careers and the contribution we as young people can make to food security – and There appears to be plenty of jobs available' ...
- 'I originally thought farming and fishing and manual labour were synonymous. I have completely changed my views and see that I could be completely engrossed in a career in primary industries, that it would give me personal fulfilment and that it could lead to an incredible adventure. I am happy to go along with this adventure' ... and
- 'I planned to be an engineer like my father as I saw it had a safe and secure future. I saw sciences as something elite – now I want to be a 'nutty professor' to solve real world problems. The reason is that PICSE showed my now this works in the real world'.

Comments from students now in university after having gone through the PICSE program included:

- 'I just love 1st year science – I am fascinated by bacteria and I love the idea of being a problem solver and making a contribution. I am interested in the areas of risk in the supply chain, seafood, meat and food spoilage. My brother got me interested in PICSE because it has a similar impact on him.'

This was supported by former students who are now in the workforce after having gone through the PICSE program:

- 'I entered the PICSE program in 2001. It made the industry real to me so I decided to focus on ag science for my degree and I am now an agronomist and find this has been a very rewarding career for me. I now mentor students going through the PICSE program to share my enthusiasm and experience with younger people looking for similar fulfilment that I get' ... and
- 'I didn't initially see the links between science and primary industries so it is important that the pathways are clear. It is important to understand where young people are coming from with their goals and aspirations and it is crucial to promote the values of science and industry research work in terms they can relate to. This is what worked for me and I have been happily working in the seafood industry for some years now'.

The PICSE strategy has been implemented over a 10 year period and is now a proven model for increasing participation in science courses and connecting all stakeholders cohesively and comprehensively to achieve an ongoing pool of skilled science graduates for our nation's future environmental and food security. Students' stories demonstrate the effectiveness of the PICSE activities. However, the organisational model and the investment plan are just as critical to the success of the PICSE approach.

Elements of the model relevant to regional universities:

The PICSE organisational model comprises:

- Activity centres – which act as regional operations points for the Science Education Officers who are largely based at universities
- Linkages and quality assurance – provided through a National Office and a Senior Management Team who supports the regional personnel and manages investor relationships and strategic business development
- The operations of PICSE are conducted by Science Education Officers – who are mostly science teachers and can talk the language of their science teacher peers
- Industry stakeholders are locally involved through steering committees
- A National Advisory Board is in place – to keep the big picture and strategic vision top of mind and are high level advocates
- Strong links with government through education departments at state and federal levels are created and managed – as are investor relationships with industry and agribusiness partners.
- The critical importance of relationship building in all aspects of PICSE is paramount
- Evaluation of all activities and a critical response process to the evaluation results – at an operational process level as well as an Impact level. This supports internal continuous improvement as well as providing investors and partners with data on value for money.

The bottom line for regional universities

The core issues of the value and benefit to regional universities of an engagement with PICSE includes:

- Creating strong industry and community partnerships
- Developing stronger community engagement
- Being seen to do so
- Increasing numbers of students – moving from school to university
- Engaging with lower socio-economic target audiences
- Engaging with lead organisations, such as UTAS, as a focus for collaborative HEPPP funding – based on a successful case study that has been in operation over time.

This engagement is based on access to a successful model – with data that validates its success.

The question for regional universities is – could engagement with the PICSE program provide value added benefits and leverage? Could it support an expansion of the university program into regional areas? To what extent is there an opportunity to use the knowledge and resources of PICSE to benefit each university and its region?

References:

Pratley, J – Professional agriculture; A matter of supply and demand, Australian Council of Deans of Agriculture, proceedings of Think Tank, 21 June 2011, Canberra