



FINAL REPORT 2016

For Public Release

Part 1 - Summary Details

Please use your TAB key to complete Parts 1 & 2.

CRDC Project Number: USQ1501

Project Title: Cotton Industry Young Professional Program

Project Commencement Date: 1 Jan 2015 **Project Completion Date:** 29 Feb 2016

CRDC Research Program: 4 People

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23 May 2016

Part 3 – Final Report

(The points below are to be used as a guideline when completing your final report.)

Background

1. Outline the background to the project.

The Primary Industry Centre for Science Education (PICSE) is a proven national collaboration between universities, regional primary industries, national R&D Corporations, national agribusiness, regional research institutes, local community organisations, schools and State Government Departments. PICSE is designed to attract an increased supply of high-quality, young people into science-based primary industries and their supporting businesses through engagement with students during school years and early university. Through its program, PICSE attracts students into tertiary science and increases the number of skilled professionals in science-based primary industries.

The Cotton Industry Young Professionals project was established to create strong interaction with cotton industry personnel and stimulate student interest in studying science at university with a view to a career pathway into the Cotton Industry. The program was reinforced through the promotion of the importance of science, science education pathways, science based-careers, science-based industries and research to students and teachers. More specific Cotton Industry Young Professionals Program objectives included:

- Encouraging students to continue with school science and on to university science,
- Informing students and teachers about the diversity of exciting and rewarding science career futures that are available in the cotton industry,
- Supporting science teachers with the provision of class activities, teaching resources and targeted Professional Development particularly using cotton case studies,
- Linking with other cotton industry initiatives including current tertiary course offerings.

The success of the Cotton Industry Young Professionals Program was achieved through the collaborative partnership between the Cotton RDC, the Institute for Agriculture and the Environment (University of Southern Queensland), CSIRO and the Australian Cotton Research Institute. The project built on the resources previously developed by PICSE with involvement by regional universities, cotton industry agribusinesses and other employers.

Objectives

2. List the project objectives and the extent to which these have been achieved, with reference to the Milestones and Performance indicators.

1. Integrate the cotton industry program planning with the PICSE Framework

1.1 0.5 FTE PICSE Cotton SEO appointed and managed through USQ

Carissa Anderson from Armidale was initially appointed as the Science Education Officer (SEO) 5 – 30 January 2015 as the fulltime FTE PICSE Cotton Activity Centre. Carissa was away on maternity leave and recommenced her SEO role 23 March 2015 at a 0.4 FTE. The centre operated the Institute for Agriculture and the Environment at the University of Southern Queensland. She was managed under the supervision of Kay Lembo, PICSE Program Manager.

1.2 Annual plan co-developed with CRDC

The initial annual plan for the design and implementation of the integrated PICSE activities was developed in consultation with PICSE SEO, the program manager, USQ Academic and support staff, CSIRO/ACRI and CRDC. Modifications to the plan during 2015 were made after consultation and approval between CRDC, USQ and PICSE personnel. In addition to these meeting, participation in the Cotton Workforce development agenda with multiple cotton industry representative was undertaken at USQ and lead by Assoc. Prof Peter McIlveen.

1.3 Steering Committee established to ensure strong cotton industry engagement

No formal steering committee was established however frequent contact was made between CRDC, USQ, and Cotton agribusinesses. Trudy Staines from CSIRO/ACRI provided a pivotal role in the collaboration with the range of stakeholders.

2. Students engaged with the cotton industry and students

2.1 Class visits to address Year 11/12 pre-tertiary science students

Carissa Anderson undertook school visits in Term 3 and 4 to schools in northern New South Wales and Southwest Queensland. During the school visits, 343 students were presented with information regarding the diversity of career opportunities and research undertaken across the agricultural industry with specific highlights within the Cotton industry. Students were also made aware of the PICSE Cotton Industry Placement Scholarship and encouraged to apply.

2.2 Science and Engineering Investigation Awards (SEIAs) for primary and middle schools

Two SEIA's whole-day programs and judging were held in 2015. The first being held at USQ, Clive Berghoffer Recreation Centre, Toowoomba on Thursday 13 August and the second on 27 August at Narrabri Crossing Theatre. Student projects for the Toowoomba SEIA were received from Prep to Year 12 students with 185 students attending the judging and presenting 69 science projects. The Narrabri SEIA's involved students from Foundation to Year 10, with 76 projects received and 498 involved in the project development, with class representatives only attending the judging day for the primary schools.

An online version of the SEIA's, 'Science for Growth Awards' for project submission from Year 9 and 10 students was managed by Julie Crough. Julie provided online support for teachers and students prior to the students submitting their reports electronically. The shortlisted finalists were judged via direct communication using skype (or equivalent) with Cotton Industry personnel.

2.3 Conducting student industry placements (IPS)

Student Industry placements were undertaken in January 2015 and the students presented their experiences at the Reporting Back Session at USQ Toowoomba on 11 February 2015. Individual student presentations can be accessed via the following link:

<https://drive.google.com/folderview?id=0B2uJA8C75SC8Q1F1bUMwZ2tTX0E&usp=sharing>

Students were also required to provide a written report of their camp and industry placement experience. An electronic copy can be accessed at:

https://drive.google.com/file/d/0B-7mm7y5x_sTOG5EUTVuRFpfdkE/view?usp=sharing

Student Industry placements were undertaken in January 2015 and the students presented their experiences at the Reporting Back Session at USQ Toowoomba on 11 February 2016. Individual student presentations can be accessed via the following link:

<https://drive.google.com/folderview?id=0B2uJA8C75SC8TEdPU2dYaVBDDzA&usp=sharing>

Students were also required to provide a written report of their camp and industry placement experience. An electronic copy can be accessed at:

<https://drive.google.com/file/d/0B2uJA8C75SC8Vm5ZSjN2Yy1ZanJmZTIKN2xNTDdhV3BfZm5v/view?usp=sharing>

3. Teachers engaged with the cotton industry

3.1 A two-day professional development for Year 11/12 science

A PICSE workshop 'Entomology across the Curriculum' was presented at the annual Science teacher conference, CONASTA64 in Perth on Tuesday 7 July 2015. The workshop was presented by Jessica Sautner, Trudy Staines and Kay Lembo, with 23 participants engaging with the entomology activities in the *Cotton across the Curriculum* teacher resource. Kay Lembo presented a PICSE workshop 'Enzymes in Action', to 26 teachers on Tuesday 1 December at the Cutting Edge Science conference held on the Gold Coast.

The presentation and teacher workshop engagement with the finalised teacher resource booklet 'Cotton across the curriculum' will be presented at CONASTA65 conference Brisbane in July 2016 with the workshop 'Contextualising Science Across the Curriculum' and will be presented by Trudy Staines and Kay Lembo

3.2 The production, distribution and application of cotton-specific teaching resources in the cotton industry and nationally

Strong interest is still being received for current PICSE Teacher resource material and is being distributed as requested. The 2014 Resource, *Living Science: Food, Agricultural Science and Natural Resource Careers* poster and career case studies, incorporated Cotton Industry exemplars.

Mrs Jessica Sautner was appointed to coordinate and develop the new PICSE Teacher resource, *Cotton Across the Curriculum*, which provides teachers with cotton based contexts that relate not only to individual year levels but also to specific curriculum learning outcomes. The first chapter of the 2015 Teacher Resources 'Entomology' was presented at the annual Science teacher conference, CONASTA64 in Perth on Tuesday 7 July. The resources incorporate entomology and cotton industry across all secondary science year levels ie Year 7-10 and Biology, Chemistry and Physics. An electronic copy can be accessed at:

<https://drive.google.com/file/d/0BxpfXIAWjFZ2V1dqZEw0R3R0UE0/view?usp=sharing>

4. Annual reporting to cotton investors

4.1 Annual Report

Ongoing communication has occurred throughout the year with the CRDC through face-to-face meetings, emails and telecommunications. Trudy Staines has been actively involved engaged with Carissa Anderson in extended the reach of communication across a variety of forum.

4.2 Attendance at SEO Forums

The first 2015 SEO Forum will be held 6 - 8 July in Perth in conjunction with CONASTA64. This allow for optimisation of travel and accommodation budget. The second SEO forum was held in Sydney on 16-17 December. The forums provided the opportunity for reviewing and evaluating progress towards various aspects for the program development and implementation.

5. Increase the size of engagement from half AC to full AC

5.1 SEO appointed

Mrs Carissa Anderson was appointed as full time PICSE Cotton Science Education Officer (SEO) on 5 January 2015. Carissa's contract has been temporarily reduced to 0.4 FTE due to the birth of daughter. While it was anticipated that Carissa would have returned to fulltime hours in July 2015, she remained at the 0.4 FTE. The PICSE Cotton Activity Centre was provided with additional support and active involvement of Trudy Staines (CSIRO/ACRI) and Kay Lembo (PICSE Manager) and by Ms Trish Russell administrative support, Mrs Jess Saunter, teacher resource development and professional development and Ms Julie Crough, Science for Growth Awards coordinator. The latter three staff all supported through fixed term contracts.

6. Increased employer engagement and buy-in

6.1 Increased buy-in

PICSE is an integral element of the cotton agribusiness pilot project being facilitated with Ms Trudy Staines and Mr Gordon Stone (commenced mid 2014). As the cotton agribusiness links strengthen, the greater buy-in is expected. The PICSE Undergraduate Internships scholarships, based on the IPS program for secondary students, has continued to grow in demand with applicants being received from all the eastern states of Australia. The placement of these students, along with the IPS students, has only been successful due to the increased partnership between various industry and research organisations. The organisations involved are highlighted in the individual student reports in both the 2015 and 2016 PICSE student report booklets.

7. Stronger engagement with Inv in Youth / CRDC

7.1 Liaison jointly with CRDC and RIRDC to ensure cotton students managed

Strong links with RIRDC and the Horizons Scholarship students continue to be forged and maintained, with a number of PICSE students gaining success in receiving scholarships. Students are encouraged to apply for the scholarships and assistance is given in organising

placements. Trudy Staines has continued to provide support of Horizon students and provide a passionate understanding of a broad range of the cotton industry and the PICSE program.

Methods

5. Detail the methodology and justify the methodology used. Include any discoveries in methods that may benefit other related research.

The PICSE Cotton Activity centre has enhanced awareness of many aspects of the broader cotton industry and promoted future career opportunities with teachers, students and undergraduate university students. The Science Education Officer (SEO) interacted with a variety of schools, students and scientific- focused organisations to develop appropriate industry placements for both education levels of PICSE students.

The annual program has involved the integrated engagement activities of:

- a) Science-based class presentations by the SEO where students were exposed to cutting-edge scientific research and the exciting opportunities for science and agricultural graduates in their region, with examples of the application of science in regional cotton organisations.
- b) Teacher professional development workshops for secondary teachers, to illustrate the connection between the sciences taught in class and the science used within agribusinesses, universities and Research and Development organisations.
- c) Student scholarships to attend a five-day industry science induction camp for selected Year 11 and 12 students in their vacation time, involving in-depth consideration of career and research opportunities with the science and agriculture , with specific emphasis on Cotton focussed opportunities. Postgraduate students from local research institutions and scientists working in local primary industries provide assistance and input in the camp.
- d) A five-day student industry placement for scholarship (IPS) students with scientists/researchers in specific local industries. The placements were matched as closely as possible to the student's aptitude and inclination. At the end of the placement, the students provided a report to other scholarship students, industry mentors, university personnel and to parents.
- e) A five-day industry internship scholarship for undergraduate university students with scientists/researchers in cotton agribusiness and research facilities. The internships allowed students to apply to theoretical studies to real-life applications as well as establish vital networks and awareness to establish a personal career pathway plan towards entering the cotton industry sector.
- f) Production of science teaching resources that integrate into school science curricula and use practical, cotton focussed exemplars.
- g) Facilitation of the Science and Engineering Investigation Awards for Foundation to Year 12 students at News South Wales and Queensland locations. A centralised judging occurring where students engage with education, scientific and community representatives to discuss their project outcomes and their application of scientific methodology.
- h) Online science investigations awards, Science for Growth Awards, allowed for students in Year 9 and 10 from all Australian states and territory to submit the reports electronically, with shortlisted finalists being interviewed by cotton industry researchers to communicate their projects.

Results

6. Detail and discuss the results for each objective including the statistical analysis of results.

Throughout the all aspect of engagement with schools, university and industries, the PICSE SEO (Carissa Anderson) worked closely with Trudy Staines (CSIRO/ACRI) to develop a thorough understanding of function and requirements the Cotton industry in order to align specific contexts that could be integrated into stimulating school presentations and outreach events.

The initial school engagement aspect of the PICSE program was the delivery of a 20 minute PowerPoint presentation, to year 10, 11 and 12 science students in their chemistry or biology classes with the teacher present. The focus of this presentation is the career opportunities that primary industry and research organisations can provide young people of today. The presentation slides can be viewed at:

https://drive.google.com/file/d/0B-7mm7y5x_sTdEt3Vk5iNVMtV1U/view?usp=sharing

The PICSE IPS camp was held in December 2015 with 23 students being accepted to attend. This consisted of 13 female and 10 males which five students from year 10, 15 students from years 11 and three students from year 12. The IPS students came from diverse geographically locations with 8 students from New South Wales and 15 from Queensland – from Clermont to Gilgandra. Student feedback and camp evaluation provided in Appendix 1. Appendix 2 provides an insight into what the students personally gained as being involved.

As part of the IPS program students also undertake their one week industry placement. These occurred in January 2015 and January 2016. This cumulated with the student presenting verbal presentation at the Reporting Back Sessions on February 11 in both 2015 and 2016. 2015 Student presentation can be viewed at:

<https://drive.google.com/folderview?id=0B2uJA8C75SC8Q1F1bUMwZ2tTX0E&usp=sharing>

and 2016 presentations at:

<https://drive.google.com/folderview?id=0B2uJA8C75SC8TEdPU2dYaVBDdzA&usp=sharing>

Students were also required to provide a written report of their camp and industry placement experience. An electronic copy of the 2015 reports can be accessed at:

https://drive.google.com/file/d/0B-7mm7y5x_sTOG5EUTVuRFpfdkE/view?usp=sharing

An electronic copy of the 2016 reports can be accessed at:

<https://drive.google.com/file/d/0B2uJA8C75SC8Vm5ZSjN2Yy1ZanJmZTlKN2xNTDdhV3BfZm5v/view?usp=sharing> . These reports also contain the written reports from the eleven

Undergraduate Internship scholarships that were organised as part of this program.

The PICSE program has had a strong focus on providing teacher resources that support their classroom teaching and in doing so promote the attributes of science based cotton industry careers. This assists teachers in building their capacity and professional knowledge while benefitting the industry. The 2015 teacher resource '*Cotton Across the Curriculum*' has been produced and made available as hard copy booklet and electronical on DVD. The resource can be accessed at:

<https://drive.google.com/file/d/0BxpfxIAWjFZ2V1dqZEw0R3R0UE0/view?usp=sharing> .

In addition to the teacher professional development workshops and programs developed and held as part of the PICSE program, three secondary science teachers were also provide with vacation scholarships to undertake an intensive week placement with an scientific organisation. Two teachers undertook their placement with Monsanto, Toowoomba and the third in Brisbane at the EcoSciences precinct. A requirement was that the teacher development resources/product that could be used within their classroom and shared with colleagues. These are available at:

<https://drive.google.com/open?id=0Bw3vqCBDOdVSfk9uUkhBd2I5cUhsbjJ1Xzd1UTg2NjQ0LW1xWEN5bjdvcy1JV1gybGNqQ2M>

Throughout the involvement with the Science and Engineering Awards and the Science for Growth Awards, students undertake a scientific investigation on any topic, present findings as a research poster and then communicate their understanding to judges. The online Science for Growth Awards are supported at www.scienceforgrowthawards.com.au with information for students and teachers. In 2015, 72 students and eight teachers from 11 schools registered to access the information website. Registrations were received from 5 states: WA, SA, VIC, NSW and QLD. At competition close, 46 students submitted 33 investigation posters. The submissions were judged to select the finalists and these finalists were then received personal interviews (via

skype or phone) with the judges to discuss their projects. Appendix 3 show the topics and states for shortlisted projects.

A total of 145 projects were presented at the Science and Engineering Investigation Awards which involved 683 students from NSW and QLD students from early years to Year 12 involved in the projects development. While a range of feedback received from the student, the greatest was 93% of secondary students reporting that they liked choosing their own topic, with undertaking the practical part of experiment also a positive experience: *“Looking and observing the experiments”*; *“Getting to do the experiment in or out of school”* and *“Doing the experiment and recording the results”*.. Students had a mixed response regarding the ‘writing up’ of the investigation as the least liked experience: *“The introduction and the conclusion”*; *“Calculating results and the tables / graphs”* and *“Doing the proper work”*.

Outcomes

7. Describe how the project’s outputs will contribute to the planned outcomes identified in the project application. Describe the planned outcomes achieved to date.

This project has made many positive influences and impacts on students, schools and wider community members. Through the active engagement and application of the range of science and technology topics, students from early years are encouraged to develop a passion and curiosity towards science. The project provides the opportunity for students to develop high level of scientific literacy, knowledge and skills that they can continue to engage with across their working careers. It has also made valuable contribution to cotton industry through providing practical knowledge, engagement and career pathway awareness to potential future employees and researchers.

The PICSE program has implemented an integrated approach that allows opportunities for students and schools to engage with a variety of science based activities that all incorporate specific cotton industry contexts and individuals. The repeated engagement strengthens and reinforces the knowledge and relevance of the industry requirements. Through engagement with students with the Science and Engineering investigation awards, 89% of teachers considered that the SEIA’s engaged students who were not previously interested in Science. With additional teacher comments on student engagement *“The students were enthusiastic about investigating the hypothesis”*; *“They (the students) enjoyed the concepts of setting up and conducting the experiment. Most of them were able to carry out these tasks independently”*; and that the face-to-face judging: *“Gave students a chance to explain their projects, public speaking practice”* and *“Enables students to explore projects increasing their science communication skills”*. 67%of teachers indicated that they would definitely like their classes to participate next year, while 33% were unsure due to a range of external factors.

The positive influence and engagement with judges from both awards day reinforce not just the projects worth but also the value in engaging students, with the broader scientific and community organisations. This is supported with comments such as: *“It encourages all levels of science interest and communication”*; *It teaches children to think critically and breakdown a problem’*; *It's really good to be able to interact with the kids and chat about their projects, especially as they may not get feedback”* and; *“It’s a great program, I have been a part of it for 4 years now and I think it's fantastic”*. The impact of teachers who work with students prior to the presentation day is also strongly acknowledged: *“While the SEIA program has impact, the actual impact is very much influenced by teacher enthusiasm and drive”* and *“I think the teachers probably have a bigger effect before the awards”*. With 91% of judges indicating that they want to be involved next year ... *“So pleased to get the opportunity to be involved. Loved every bit of it. It is a fantastic program and is doing so much for science and also agriculture”*.

The Industry Placement Scholarships and camp and Undergraduate Internships continue to provide strong evidence of the positive impact on participants and their family. 100 % of family members at the Reporting Back Session stated that their own understanding of the importance and role of science within primary industries had been improved, and 87% saw an increase in the

student enthusiasm and commitment towards science and their future careers. With positive aspects seen as: *“The range of industries students were exposed to was great as is the variety of follow up placements”*; *“Many different experiences that they probably wouldn't have had otherwise”*; *“The program has given students from all backgrounds exposure to a very cross section of opportunities within the agricultural industry”*; *“A great way for students to experience firsthand work and what it entails”* and *“The passion and enquiry of students should be encouraged”*.

The practical experience and direct engagement with Cotton industry researchers and Agribusiness section has made significant impact on student career understanding and influenced their pathway choices. Specific examples include:

“One of the main skills which I have improved during my placement at the ACRI is the design and of management of a research project.....I thoroughly enjoyed my experience and it helped me to realign my career aspirations according to opportunities I didn't realise existed.” Emily Pattison, University of Queensland

“After the PICSE camp, I began to realise how fascinating and vital to our world agronomy and plant pathology really is... I feel that I gained so much knowledge of both the cotton industry and the agricultural industry as a whole. I was able to make some great industry contacts that I hope I will have the chance to work with again sometime in the future. I feel confident after my placement that I do want to go into the marketing side of agriculture” Sophie Wilson, St Ursula's College

“Through university I gained an education but the industry placement gave me real world experience. I knew that agriculture was a broad industry but knew little about cotton. However, through my placement I learned about practical skills such as identification of pests, weeds, plant issues, cotton production and interacting with growers..... Learning from industry professionals enables you to an understanding of skills and knowledge required for that job but also advice on how to pursue that career if you desired to.” Justin Salter, University of New England

“I feel that I gained so much knowledge of both the cotton industry and the agricultural industry as a whole. I was able to make some great industry contacts that I hope I will have the chance to work with again sometime in the future. I feel confident after my placement that I do want to go into the marketing side of agriculture...” Ashleigh James, University of Sydney

8. Please describe any:-

- a) technical advances achieved (eg commercially significant developments, patents applied for or granted licenses, etc.);**

No technical advances achieved

- b) other information developed from research (eg discoveries in methodology, equipment design, etc.); and**

Not applicable

- c) required changes to the Intellectual Property register.**

No changes

Conclusion

9. Provide an assessment of the likely impact of the results and conclusions of the research project for the cotton industry. What are the take home messages?

Extension Opportunities

10. Detail a plan for the activities or other steps that may be taken:

- (a) to further develop or to exploit the project technology.**
- (b) for the future presentation and dissemination of the project outcomes.**
- (c) for future research.**

The presentation and distribution of the secondary science teachers' resource 'Cotton across the Curriculum' will occur at CONASTA65, the Australian Science Teacher's national conference being held in July 2016.

While the direct influence of individual students underpins the program outcomes, equally benefit is a key gained for the tertiary sector for student participation and opportunity existing for early identification and mentoring opportunities for industry/workforce sector. The PICSE program and its capacity to continue to provide practical, real-life' engagement for secondary and tertiary students and school teachers with scientific researches and industry organisations, is reliant on on-going funding from government, industry and tertiary sectors.

The enhanced PICSE integrated activity model represents good value for investors and partners as participants continue to provide solid evidence of its impact on their perception of the breadth and depth of career pathways available within agriculture and science.

9. A. List the publications arising from the research project and/or a publication plan.

(NB: Where possible, please provide a copy of any publication/s)

Cotton Across the Curriculum: Entomology, Botany and Hydrology – Cover shown Appendix 5

<https://drive.google.com/file/d/0Bw3vqCBDOdVSR0dLUVF3R1VSMkE/view?usp=sharing>

Spotlight magazine: 'Science turns spotlight on Science' – refer Appendix 4

B. Have you developed any online resources and what is the website address?

Science for Growth Awards: www.scienceforgrowthawards.com.au

Part 4 – Final Report Executive Summary

The Cotton RDC has actively supported the PICSE program for over four years and despite the changing circumstances impacting on the PICSE program leadership and funding arrangements, their funding and active partnership has remained the strong. The value and impact remained the same - students, teachers and judges enjoy being involved in the program and believe it has positively impacted their broader awareness and understanding of science, primary industries and associated career paths.

Students indicate that involvement, particularly the Industry Placements and camp, has influenced their future study plans and career choices. Undergraduate students are also reporting their participation in the Industry Internship program provides them the links for the studies to 'real-life' applications along with the irreplaceable value of developed networks and connections with future employers. School teachers (primary and secondary) said that it has been valuable and helped them teach science better (through the PD program and resources) and allows for real examples that are occurring at their local regional level as well as nationally. Teachers and community and industry judges (SEIA's and SGA's) believe that students are more positively engaged with science and inspired to pursue their area of interest.

The PICSE program has strengthened networks within and between schools, universities and scientific organisations, and has ensured contemporary and relevant information underpinning the Australian Cotton Industry has been distributed across the networks. Enhancing the awareness of, and through direct participation with, all aspects of the cotton industry, has allowed students a greater understanding of career pathways and opportunities. Through the

defining and clarification of career pathways has provided a major contribution to Cotton industry. The PICSE program, in collaboration with the Cotton Industry partners, has provided the opportunity for the early identification and supply of highly skilled, educated and motivated individuals who will continue to strengthen the Australian Cotton Industries reputation for quality research and production, both nationally and internationally.

For any further information contact:

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APPENDIX 1 - IPS Camp Feedback



2015 Cotton Industry Placement camp

23 Students attended, 23 respondents (100%)

Please note: respondents indicates the number of students who completed an evaluation form

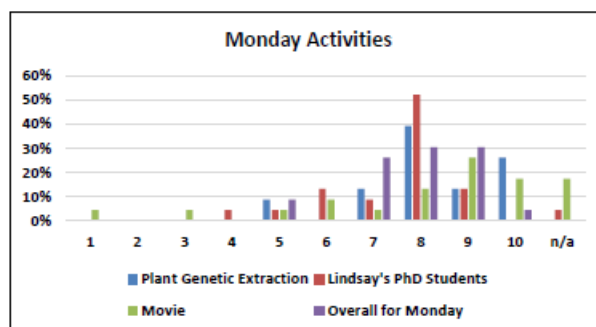


Q3. Monday

(10 = excellent)

Plant Genetic Extraction
Lindsay's PhD Students
Movie
Overall for Monday

	1	2	3	4	5	6	7	8	9	10	n/a
Plant Genetic Extraction	0%	0%	0%	0%	9%	0%	13%	39%	13%	26%	0%
Lindsay's PhD Students	0%	0%	0%	4%	4%	13%	9%	52%	13%	0%	4%
Movie	4%	0%	4%	0%	4%	9%	4%	13%	26%	17%	17%
Overall for Monday	0%	0%	0%	0%	9%	0%	26%	30%	30%	4%	0%



Best activity for the day:

Lindsay PhD students X 4 respondents

Talking to the PhD students and watching the rat being dissected

Plant Genetic Extraction X 9 respondents

Tour of labs and movie

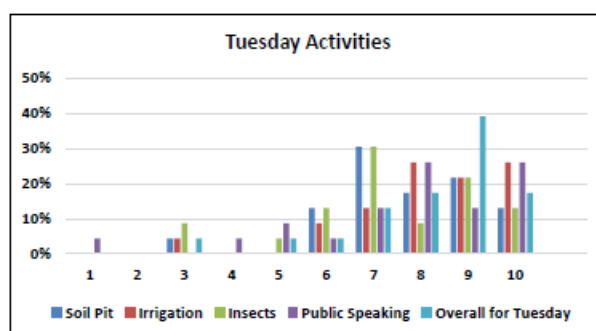
Seeing rats being dissected X 3 respondents

Q4. Tuesday

(10 = excellent)

Soil Pit
Irrigation
Insects
Public Speaking
Overall for Tuesday

	1	2	3	4	5	6	7	8	9	10
Soil Pit	0%	0%	4%	0%	0%	13%	30%	17%	22%	13%
Irrigation	0%	0%	4%	0%	0%	9%	13%	26%	22%	26%
Insects	0%	0%	9%	0%	4%	13%	30%	9%	22%	13%
Public Speaking	4%	0%	0%	4%	9%	4%	13%	26%	13%	26%
Overall for Tuesday	0%	0%	4%	0%	4%	4%	13%	17%	39%	17%



Best activity for the day:

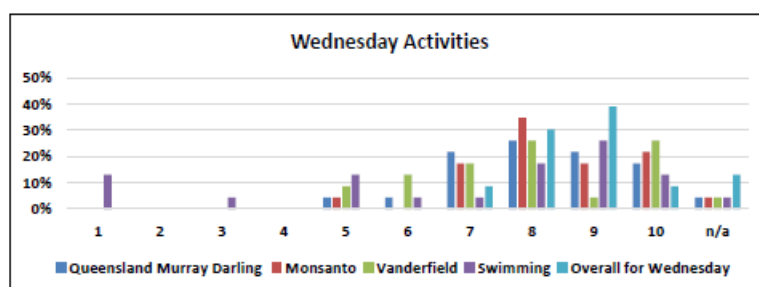
Public Speaking
Insects and chill time at the lake dam
Irrigation X 3 respondents
Soil Pit X2 respondents
Irrigation and the weir, but irrigation was great
The farm
Toast masters, irrigation and swimming
Did not have one

Q5. Wednesday

Queensland Murray Darling
Monsanto
Vanderfield
Swimming
Overall for Wednesday

(10 = excellent)

	1	2	3	4	5	6	7	8	9	10	n/a
Queensland Murray Darling	0%	0%	0%	0%	4%	4%	22%	26%	22%	17%	4%
Monsanto	0%	0%	0%	0%	4%	0%	17%	35%	17%	22%	4%
Vanderfield	0%	0%	0%	0%	9%	13%	17%	26%	4%	26%	4%
Swimming	13%	0%	4%	0%	13%	4%	4%	17%	26%	13%	4%
Overall for Wednesday	0%	0%	0%	0%	0%	0%	9%	30%	39%	9%	13%



Best activity for the day:

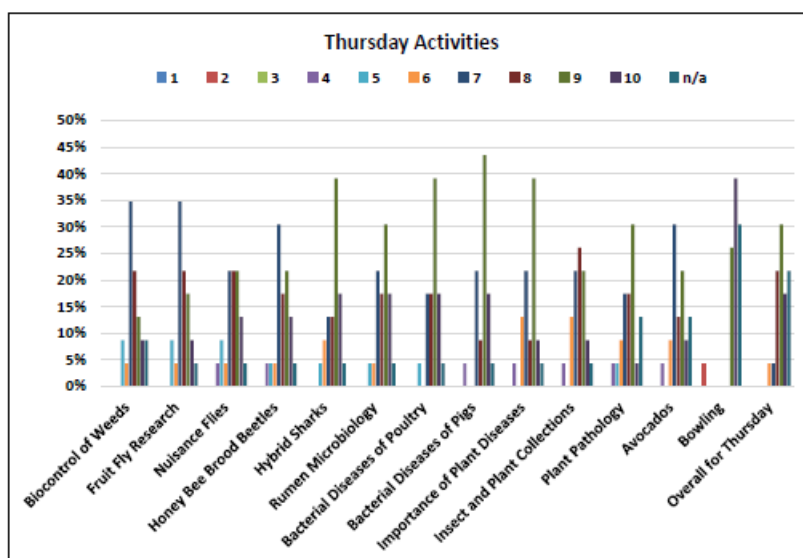
Monsanto X 6 respondents
Queensland Murray Darling Committee
Vanderfield X 6 respondents
Monsanto was best.
Sophie the dog
Queensland Murray Darling Committee / Swimming
Monsanto was good and swimming
Sophie and her trainer
Swimming at the pool

Q6. Thursday

Biocontrol of Weeds
Fruit Fly Research
Nuisance Flies
Honey Bee Brood Beetles
Hybrid Sharks
Rumen Microbiology
Bacterial Diseases of Poultry
Bacterial Diseases of Pigs
Importance of Plant Diseases
Insect and Plant Collections
Plant Pathology
Avocados
Bowling
Overall for Thursday

(10 = excellent)

	1	2	3	4	5	6	7	8	9	10	n/a
Biocontrol of Weeds	0%	0%	0%	0%	9%	4%	35%	22%	13%	9%	9%
Fruit Fly Research	0%	0%	0%	0%	9%	4%	35%	22%	17%	9%	4%
Nuisance Flies	0%	0%	0%	4%	9%	4%	22%	22%	22%	13%	4%
Honey Bee Brood Beetles	0%	0%	0%	4%	4%	4%	30%	17%	22%	13%	4%
Hybrid Sharks	0%	0%	0%	0%	4%	9%	13%	13%	39%	17%	4%
Rumen Microbiology	0%	0%	0%	0%	4%	4%	22%	17%	30%	17%	4%
Bacterial Diseases of Poultry	0%	0%	0%	0%	4%	0%	17%	17%	39%	17%	4%
Bacterial Diseases of Pigs	0%	0%	0%	4%	0%	0%	22%	9%	43%	17%	4%
Importance of Plant Diseases	0%	0%	0%	4%	0%	13%	22%	9%	39%	9%	4%
Insect and Plant Collections	0%	0%	0%	4%	0%	13%	22%	26%	22%	9%	4%
Plant Pathology	0%	0%	0%	4%	4%	9%	17%	17%	30%	4%	13%
Avocados	0%	0%	0%	4%	0%	9%	30%	13%	22%	9%	13%
Bowling	0%	4%	0%	0%	0%	0%	0%	0%	26%	39%	30%
Overall for Thursday	0%	0%	0%	0%	0%	4%	4%	22%	30%	17%	22%



Best activity for the day:

Hybrid Sharks X 2 respondents

Rumen Microbiology

Bowling X 3 respondents

DAFF X 2 respondents

Glasshouse man with cotton seeds

Rumen Microbiology / Bacterial Diseases, both poultry and pigs X 2 respondents

Nuisance Flies X 2 respondents

All day was best

Fruit Flies

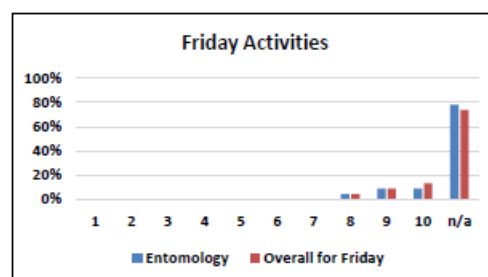
Whittcott seeds

Q7. Friday

Entomology

Overall for Friday

(10 = excellent)										
1	2	3	4	5	6	7	8	9	10	n/a
0%	0%	0%	0%	0%	0%	0%	4%	9%	9%	78%
0%	0%	0%	0%	0%	0%	0%	4%	9%	13%	74%



Best activity for the day:

Entomology X 2 respondents

The only one

Driving home X 2 respondents

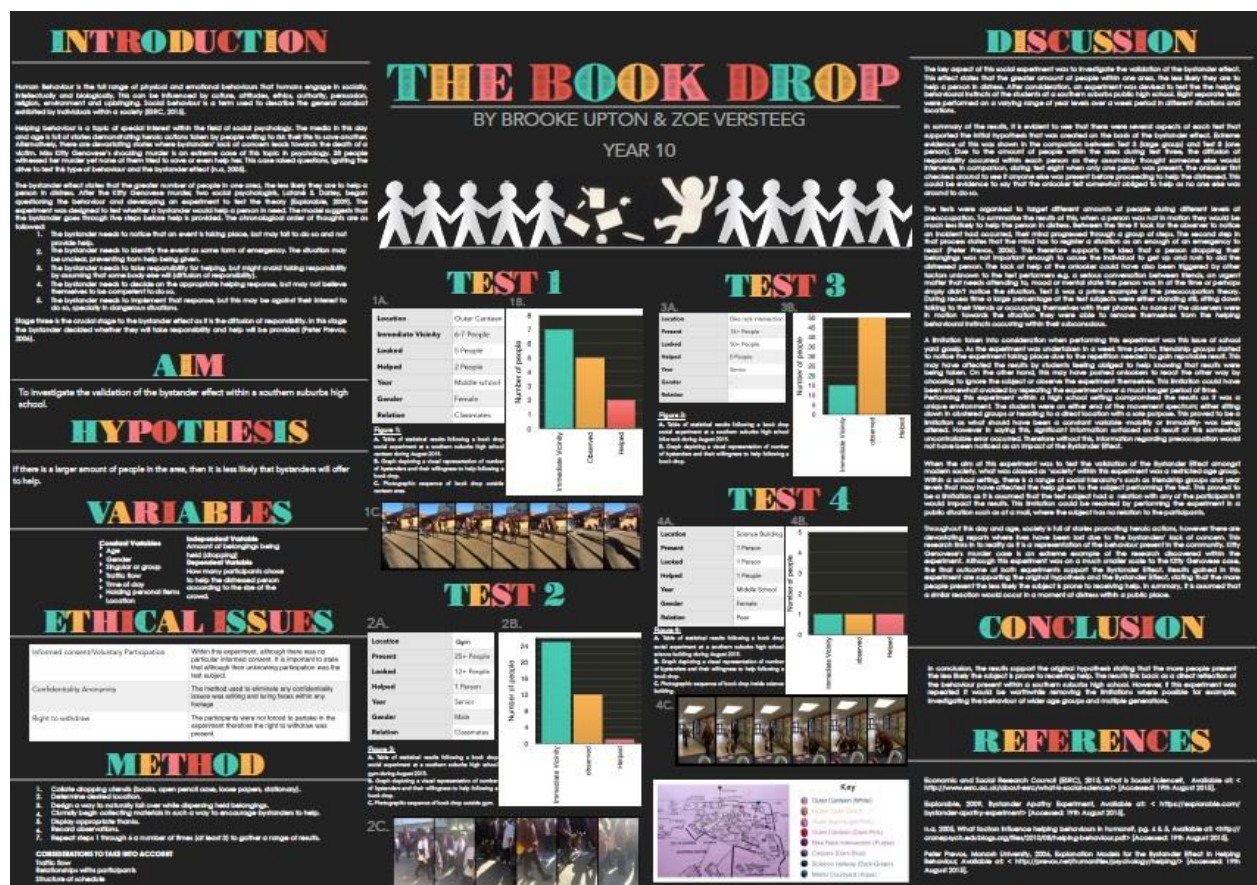
APPENDIX 2 - Student perceived gains of IPS camp involvement

Q9. List three things that you gained from the camp

The science behind cotton
Possible university options
Knowledge of jobs in agriculture
Knowledge of agriculture professions and jobs
Ideas for agricultural research for the future
The importance of networking (friends)
Social skills
A greater knowledge of agriculture
Gained experience
Worked out what I would like to do in life
Insight into the agricultural industry
Cool friends
A sweet nickname
Agronomy knowledge
Contacts
A new network
Pest control
A wider understanding
Networking
More insight into the cotton industry
I don't want to work in a lab
Friends from Warwick
Importance of networking and new friends
More open mind and opportunities to choose from in a future career
Interest in new areas I hadn't previously considered
More job opportunities
Learnt about my interests
Learnt about irrigation pipes
Learnt how science is important to society
The science involved in agriculture
The complexities of science in agriculture
All the research involved
Friends X 6 respondents
Knowledge
Found out what jobs are available in science and agriculture
Networks
Insight into new pathways
Confidence
Friends / networks
Information that I can use in agricultural industries that I am interested in
A glimpse at the range of industries / jobs available
Further insight into technologies
How agriculture had developed over the years
Further insight on university courses

Qld:	Proving Potential Energy The Pendulum Intervals that Produce the Strongest Sympathetic Vibrations between Two Guitar Strings
NSW:	What Colour Clothing can Prevent Skin Cancer? Does Composting Work? The Green Machine
Vic:	Water & Hydrogels How much Vitamin C? How does Acid Content Influence Fruit Deterioration
SA:	Which rink Hydrates Better? Book Drop Diet V's Normal Food
WA:	Flaming Fabrics Black & White V's Colour Submarine Fins

1st Prize National winner



APPENDIX 4 - Spotlight Magazine ‘Science awards turn spotlight on students’

The Primary Industry Centre for Science Education is seeking curious school students as part of its awards program. PICSE Program Manager Kay Lembo says the awards are designed to improve understanding amongst school students and science teachers of the career opportunities available in science-based primary industries and to increase the number of students enrolling in related tertiary science courses. “The PICSE awards are part of a larger PICSE strategy to improve the supply chain that provides the next generation of research and industry scientists,” Kay says.

The PICSE-Cotton Namoi Valley Awards are open to primary and secondary school students. PICSE-Cotton Namoi Awards coordinator Trudy Staines says, “the Science and Engineering Investigations Awards are a great way for students to do real-life science, learn and gain valuable skills, solve problems and maybe even win a prize”.

Each student or team has to pose a research question, then plan and complete a scientific investigation to help answer their hypothesis. Each project needs to be written up as a scientific report but students have the added fun of creating their display and showcase them on Thursday 27th August at the Narrabri Crossing Theatre, Trudy explains.

The PICSE-Cotton University of Southern Queensland Science and Engineering Awards are open to primary and secondary school students. PICSE Science Education Officer, Carissa Anderson says the awards are a great opportunity for students to create projects that explain and apply elements of sustainability to our everyday lives. Students can choose a topic that interests them from one of three categories: communicating science, models and inventions, and scientific investigations.

“Judging of entries takes place on Thursday 13 August at the USQ Toowoomba campus where students can showcase their projects, talk with the judges and explore other students’ projects,” Carissa explains. “It’s a great day and students whose entries win are not only eligible for prizes but their projects are showcased at the USQ Open Day on Saturday 16 August.”

Students who enter either of these competitions are also eligible to enter the PICSE Science for Growth Awards which are sponsored by the Cotton RDC.

The PICSE Science for Growth Awards (SGAs) are open to all students across Australia and are similar in design to the PICSE Science and Engineering Awards but their online format enables students from anywhere in Australia to enter, irrespective of where they live.

Science for Growth Awards Coordinator, Julie Crough says “these awards have just opened so Year 9-10 students still have nearly four months to register, conduct their investigations and upload their projects by Friday 13th November”.

While students are encouraged to investigate an area of science that is related to primary industries, such as food, fibre production and natural resources management, they can broaden their scope and choose an area that is interesting and relevant to their lives, Julie explains.

“I’m amazed with students’ curiosity and ideas,” Julie says. “Last year, the national winner, Alana Mastroianni (from Our Lady of Mercy College, Parramatta) conducted an experiment to determine whether natural or chemical antiseptics kill bacteria most effectively and found that the humble lemon was the best bacteria killer.”

Last year’s winner of the Best Primary Industry Related Science for Growth Award Rebecca Castor said she had seen first-hand how vital the agriculture industry is for Australia.

“My uncle is an agronomist and manages a large cotton farm in Queensland. I’ve been to the property a couple of times and I know water plays an enormous role in farming. So I wanted to look at some of the local water issues in my community,” Rebecca said.

The Year 10 student, also from Our Lady of Mercy College in Parramatta, spent almost two months investigating the water quality of the Nepean River in the Penrith area in New South Wales.

“I collected water samples at three different locations on the Nepean River and measured the pH levels,” she said.

Rebecca hypothesised that Penrith would have a large effect on the Nepean River’s pH making it more acidic due to increased pollution.

“I was surprised by the results. The river water actually became more alkaline downstream even after the contribution of various pollutants. The Nepean River seems well looked after and well treated,” she said.

Rebecca said there were a lot of variables such as frequent rainfall that may have changed the outcome of her investigation, but was still pleased with the outcome.

All three competitions are closely aligned with the Australian Science Curriculum focusing on science inquiry skills. They also complement the State/Territory Teachers’ Associations Awards and the BHP Billiton Awards, so students can enter these competitions too.

For more information contact:

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PICSE-Cotton USQ Awards

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Or visit: <http://www.usq.edu.au/research/research-at-usq/institutes-centres/iage/Science-Engineering-Investigation-Awards>

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APPENDIX 5 - Teacher PD Booklet Cover

