Australia's National Science Agency

Teacher Researcher in Partnership Program (TRiPP)

CSIRO Education and Outreach offer the Teacher Researcher in Partnership Program (TRiPP), a professional learning experience for Australian secondary school teachers, supported by CSIRO's Active Integrated Matter Future Science Platform.

Ben Rerden

Ben Rerden worked with Data 61 researcher Dr Nick Hockings at the CSIRO Queensland Centre for Advanced Technologies, Pullenvale, QLD.

Ben applied for the Teacher Researcher in Partnership Program to quench his thirst for knowledge and a desire to create authentic learning experiences and engaging lessons for students. He aims to improve science literacy and prepare students for jobs of the future.

Ben Rerden, Secondary Teacher
2018 TRiPP participant

The project: Mechatronic control of a fibre spinning machine

The project aimed to develop an extruder to create conductive wires as thin as 10-20 microns. These fibres would be used to emulate sensory nerves in soft robot applications.

Ben was involved with several aspects of the project. From the design of a syringe driver and spool to 3D printing the fibre. Ben was also involved with the physical assembly of the electrical and mechanical components and extended his knowledge of writing code for the motors, thermistors and heaters of the extruder. Ben also tested various parameters to optimize the fibre production.

The impact

Through the project placement Ben has gained knowledge in programming languages using Arduino, an open-source hardware and software company, that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices. He also developed a better understanding of 3D design and testing procedures.

Back in the classroom Ben used his experience to explore and experiment with properties of materials. He has implemented the design and development of circuits using Arduino and discusses the practical applications of thermodynamics with his students.

Ben has made use of his knowledge of the Arduino sensors, and has worked with students to attach them to high altitude balloons to capture data from students' projects.

Following on from his TRiPP experience Ben developed the resource Modelling the Human Hand, linking his experience developing conductive wires to emulate the nerves of the human hand.

Ben is an advocate for delivering real science to his students and demonstrating the applications of what they are being taught in the classroom. He also has a passion to extend students in areas they have a great interest in.

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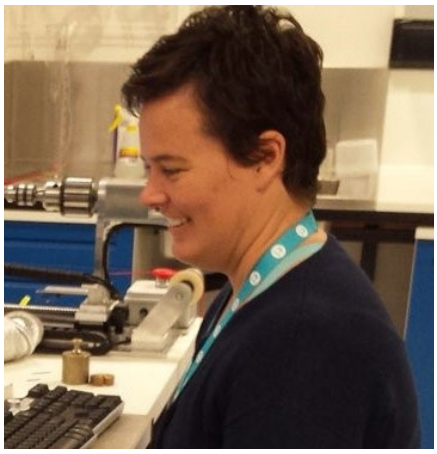
Jacqui Watson

Jacqui Watson participated in an immersive hands-on research experience with researcher Mr Scott Barnes, in the manufacturing laboratories in Waurn Ponds, Victoria.

Jacqui was keen to experience the laboratory environment and working in a scientist's role. After years of being in the classroom she felt distant from the world of research. Being able to bring her experience back into the classroom by developing a unit of work based on current research was appealing.



Jacqui Watson, Secondary Teacher
2017 TRiPP participant

The project: Improving room acoustic performance

Jacqui was placed on a small research project investigating acoustic panels working with CSIRO's Manufacturing team. Jacqui's hands-on experience involved the testing of acoustic panels and understanding the methods used for sound attenuation. Jacqui's experience allowed her to learn about new materials, the acoustic properties of various materials and the testing process they go through.

The impact

Through the experience Jacqui has gained many stories that she can share with her students about what working in research is like, what a lab looks like, some current science, how research is used to help people or develop new products.

The experience has provided confidence in developing a unit of work based on research and Jacqui looks to include career and research opportunities to keep the science that students are learning relevant in all areas of study.

Jacqui's students have investigated sound and sound attenuation. The students conclude their sound investigation with an open inquiry, designing their own research methods. The goal of the student's investigation is to design a quieter classroom, applying the knowledge of sound they have just learnt to a real-life problem, as there were some rooms in the school that had poor acoustics.

The students were able to take a problem-solving approach during the sound investigation, rather than just learning content and completing some practical tasks in the lab. The students used real data from research to help solve the sound acoustic problem.

This was then used to prepare a report for the principal, to suggest ways and propose a budget to transform the classroom to have better acoustics to promote learning.

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Ruth Eyre

Ruth worked alongside microbial ecologist Dr David Midgley at the energy laboratories at North Ryde, NSW.

Ruth was hoping to refresh her skills by spending time working with a scientist in an area that was new to her and hoped to establish links to the classroom.

The project: Which microbes eat what?

Ruth participated on a project investigating microbes and what they eat. The project involved microbes from the deep subsurface that interact with fuels to understand how they alter fuel properties (e.g. making more methane from coal, or reducing H2S production).

The impact

Ruth has a renewed appreciation for science and the many facets of laboratory tasks and the need to remain life-long learners. The experience has provided meaningful content currently being researched by scientists, enabling a fresh approach to her delivery of science content to high school students. Ruth has refreshed her teaching practice in being more of an instrument of information awakening in students to inspire and help direct their interests rather than just delivering syllabus content all the time.

Ruth has taken the experience and developed resources and an inquiry where students will research microbes (fungi) and generate their own questions, they will culture and identify fungi. Students will learn about micro-organisms and the role they can play in solving real world problems, such as enhancing coal seam methane.

Ruth Eyre, Secondary Teacher
2019 TRiPP participant

From the experience Ruth furthered her skills in the laboratory and has been able to put real context in what the students are learning. With a refreshed knowledge of laboratory practices, Ruth has been able to develop the skills of her students in the scientific process conducting their own investigations.

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Sandra Woodward

Sandra Woodward participated in an immersive hands-on research experience with Dr Zhaojun Han in the manufacturing laboratories at Lindfield, NSW.

Sandra is always looking for ways to make science relevant for her students. She is frequently asked "when am I ever going to need to know this?" Sandra is a firm believer that the learning needs to be real.

Sandra Woodward, Secondary Teacher
2018 TRiPP participant

The project: solid-state energy storage devices

Sandra was placed on a small research project "solid-state energy storage devices" working with CSIRO's Manufacturing team. Solid-state energy storage differs to conventional lead-acid battery storage systems, by the electrolyte being solid rather than liquid such as lithium-ion batteries. They are rechargeable and charge quickly, lithium-ion batteries however have an increased flammability. Sandra's hands-on experience involved the production of vertical graphene and the integration of this material into super capacitors, for use in high performance batteries that are safer than lithium-ion. These batteries were then evaluated for their performance. Sandra's experience allowed her to learn about new materials and the rigorous testing process they go through.

The impact

Learning something new can sometimes be a little daunting. By stepping out of her comfort zone, Sandra was able to walk away with fresh ideas to inspire her students. Sandra learned about the storage devices of the future and gained new insights to take back into the classroom.

Her students investigated energy and technology innovations through an independent inquiry process, this encouraged students to build their interest and knowledge on the topic, which inspired the students to generate their own questions.

Sandra has been able to develop lessons that have more relevance for her students, enabling her to demonstrate the applications outside of the classroom for what they have learnt. Seeing how their study can be applied inspired the students to think about what is possible.

Throughout the project placement Sandra used the same scientific process techniques she teaches at school; this has provided a reason for the routine and scientific rigour practiced in class. Sandra aims to increase her students STEM literacy skills, interpreting graphs and data. The students can then make meaning from the data they have gathered.

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Shane McMaster

Shane McMaster participated in an immersive hands-on research experience with Dr Simone Osborne in the agriculture and food laboratories at St Lucia, QLD.

Shane has a passion for science and loves to pass that onto his students. He has often found it is easier for students to connect with the content when it has a real-life context. Shane found the experience fun and a good way to reinvigorate himself and further his lab experience that he could then use with his classes.

Shane McMaster, Secondary Teacher
2018 TRiPP participant

The project: Digestibility of milk from different species

Shane was placed on a small research project "Digestibility of milk from different species" working with CSIRO's Agriculture and Food team. Shane's hands-on experience involved the digestibility of milk with respect to release of peptides in the gastric and intestinal phase of digestion. Shane's experience allowed him to see a functional research lab at work and extend his laboratory skills.

The impact

Having been a little while since study and working in a laboratory Shane hoped to gain a peek into the work of a current-day scientist.

He felt that many of his past experiences in the laboratory were dated. Wanting to gain knowledge to help answer the questions his students often asked him like; what exactly does a scientist do all day? Do they use the scientific method in the same way we do, or is it more inherent?

Shane has taken the experience back to the classroom, with students conducting a weeklong investigation into the digestibility of milk. The experience has had a huge impact on how Shane runs investigations with his classes and his own laboratory techniques and skills. It has made him a more thoughtful in-class scientist.

It has given him more to think about when he plans experiments, and help his students extend their investigations. It has enabled him to be more thoughtful about making the time in the lab more of an investigation and less of an experiment for the students. Shane has more confidence in guiding his students through their investigations and adding a real-world context to his lessons.

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