# SASTA Annual Conference

# Science
## saving the planet

## 12-13 April 2021
Pulteney Grammar School

# Program

This program may be subject to change.
Version: 25 March

sponsored by credit unionsa

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# Program overview

| Monday 12 April | |
|---|---|
| 7.30am | Registration & light breakfast |
| 8.50am | Welcome & Awards Presentation |
| 9.30 am | Keynote by Prof. Chris Daniels |
| 10.35 am | Morning Tea & Exhibition |
| 11.10 am | Workshop Session 1 |
| 12.15 pm | Workshop Session 2 |
| 1.15 pm | Lunch & Exhibition |
| 2.05 pm | Panel Discussion |
| 3.25 pm | Workshop Session 3 |
| 4.30 pm | Happy Hour |
| 7.00pm | Conference Dinner |

| Tuesday 13 April | |
|---|---|
| 8.15am | Registration |
| 8.45 am | Welcome & Awards Presentation |
| 9.10 am | Keynote by Dr Hannah Brown |
| 10.10 am | SASTA Annual General Meeting |
| 10.40 am | Morning Tea & Exhibition |
| 11.15 am | Cutting Edge Session 1 |
| 12.20 pm | Cutting Edge Session 2 |
| 1.20 pm | Lunch & Exhibition |
| 2.10 pm | Workshop Session 4 |
| 3.15 pm | Workshop Session 5 |
| 4.15 pm | Happy Hour |

## 9.00 am
## Welcome & Awards Presentation

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## 9.30 am
## Keynote 1

### The Role of Experiential Connection with Nature as Educational Tools for Conservation Science: the Cleland Experience

**Professor Chris Daniels, Director of Cleland Wildlife Park and CEO of the International Koala Centre of Excellence**


Jacques Cousteau, (French explorer and conservationist) famously said "You can't save what you don't love, and you can't love what you don't know." Zoos and wildlife parks create opportunities for visitors to get to know and develop an attachment for displayed species. Hence, most zoos and wildlife parks have education as one of their core aims. Cleland's purpose statement reflects this role: "Cleland Wildlife Park provides world class, direct nature experiences which connect guests and communities to South Australian wildlife. By creating and supporting a love of nature we provide the information and knowledge necessary to empower conservation action in our guests, staff, researchers and supporters." Up close and personal experiences with animals are both popular with the public, and are an effective educational tool. However, in a standard visit to a zoo or wildlife park, people spend as little as 10 seconds in front of an individual exhibit. Clearly this is insufficient time to learn or develop any kind of attachment for the species in question. In addition, there is a ground-swell of anti-zoo, anti-handling sentiment directed towards some zoos and wildlife experiences. The challenge to zoos and wildlife parks is to find ways of engaging and educating the public in a meaningful, and lasting manner around the science, necessity and practice of conservation, while being aware of, and responding to the 'anti-zoo' sentiment being expressed more and more fervently. This challenge is leading to many new and exciting methods for delivering educational outcomes in environmental science and conservation.

Prof. Chris Daniels PhD DSc FAICD is currently Director of Cleland Wildlife Park and is adjunct professor of Biology in the School of Pharmacy and Medical Sciences at UniSA. He is focused on conserving wildlife and connecting people with nature. Chris Daniels' was Prof. of Urban Ecology at UniSA, Director of the Barbara Hardy Institute at UniSA and the presiding member of the Adelaide and Mt Lofty Ranges NRM Board.

Chris was a member of the City of Marion Strategic directions committee, is a Governor of the World Wildlife Fund and was Patron of Unley City Council Adopt a Tree Program. He is patron of the Friends of Woorabinda (Stirling Linear Park) and the SA Junior Field Naturalists Soc. He was chair of the Board of Nature Play SA (2016-2018) and is a Fellow of the Australian Institute of Company Directors.

## 10.35 am
## Morning Tea & Exhibition

## 11.10 am
## Workshop Session 1

### 101 Using the Australia Curriculum Science, cross curriculum priority - sustainability to teach climate change solutions

**Katrina Elliott, Department for Education**

*primary, middle*

Explore how to teach climate change solutions using opportunities provided in the Australia Curriculum Science and Cross curriculum priority Sustainability and General Capabilities.

### 102 Introductory Robotics

**Don Eickhoff, Techspace Learning**

*primary, middle*

Learn to program an Arduino microprocessor to make your own gadgets using ArduBlock, a simple 'drag and drop' interface. No experience required.

### 103 To Improve the Representation of Females in STEM Should We be Renewing Our Focus on Soft Skills?

**Catherine Royans, University of Adelaide**

*primary, middle, senior, tertiary*

Current research suggests female secondary students are underrepresented in typically 'masculine' STEM subjects. Without intervention, it is predicted that the underrepresentation of females will continue to impact social equity, future workforce needs and business profitability. A range of initiatives have emerged to address the underrepresentation of females; such as local and national STEM competitions, scholarships and camps. This workshop investigates a rational for the underrepresentation of females in STEM education and proposes a renewed focus on soft skills and using worked examples to encourage females to succeed in STEM at school.

### 104 How can you build authentic student agency in science?

**Lara Lang, Reynella East College**

*middle, senior*

Student voice, student agency, student influence – many words to mean similar things. But how can you build authentic student agency in a subject like science where you're bound to the Australian Curriculum? What difference does it make to student learning and is it worth it? In this session, you'll see real-classroom-tested ways of facilitating student agency around the what, how, who, where and when of learning science.

## 105 CANCELLED: Opportunities for Student Participation in Real Scientific Investigations through SACE Earth and Environmental Science

**Robyn Pillans, SACE Board and Luke McKay, Geoscience Pathways Project**

*middle, senior*

The Stage 2 SACE Earth and Environmental Science (EES) course has more content about Climate Change and Sustainability than any other SACE course. Together these topics make up 50% of the Stage 2 EES course. This session will provide a brief overview of opportunities for field investigations to suit the requirements of the SACE EES curriculum. Kelly Sharrad, a curriculum writer and experienced EES teacher, will present this part of the session. Dr Cesca McInerney (University of Adelaide) will describe a range of opportunities for EES students to work alongside University researchers, in studies related to Climate Change and Sustainability. These suggestions will include an opportunity for students to be directly involved in the collecting and analysing real field data, as part of their externally assessed Stage 2 Earth Systems Study. During the session substantial cash prizes will be announced for student Earth Systems Studies. From 2021, students will be invited to submit 2-minute videos documenting their work, to thereby compete for $2500 in prize money offered by the Geological Society of Australia.

## 106 STEM Unit on Lockheed Martin Australia's Future Submarine Program

**Swati Salvi and Nitika Chauhan, Parafield Gardens High School**

*middle, senior*

We are enthusiastic about developing critical and analytical thinking in students via STEM-based units that integrate classroom-based learning with real-world applications.

Our STEM unit that aligns with the ACARA achievement standards for year 9-10 science and mathematics will be delivered over a period of 8 weeks in blocks of two 90 minute lessons. The unit focuses on students understanding some aspects of designing a submarine, such as the chemical properties of the material used, physics of buoyancy and biology of maintaining life support under seawater conditions.

The unit was developed in collaboration with Lockheed Martin Australia (LMA) whose latest venture with the Department of Defence and Naval Group is to design twelve new submarines. As the submarines are likely to enter the service by early 2030s, students currently in Year 8-12 are prospective employees of the project.

This unit will be run by the presenters at Parafield Gardens High School in 2020 with a select group of students interested in STEM-based learning. We invite you to run the unit with us so that we can provide support and assistance to each other during the year, discuss ideas for future improvement of this plan and brainstorm other potential plans.

## 107 Experience Coding LEGO Education's SPIKE Prime Robotics system in Python and Block-based code (DOUBLE SESSION)

**James Dwyer, Modern Teaching Aids**

*primary, middle, senior*

In this engaging hands-on workshop you will learn to code the SPIKE Prime Robotics system in Python and/or Block-based coding. SPIKE Prime is easy to get started, use and incredibly flexible based on your students' level and curriculum requirements.

Learn how you can teach STEAM following the progression of the SPIKE Prime units aligned to the Australian curriculum and build your students' confidence.

Look at ideas for running and facilitating hands-on lessons as well as discussing classroom management tips with time for questions.

Participants will need to bring a laptop, iPad or other BYO device with the LEGO Education SPIKE Prime App installed.

## 108 SA Water presents The Well (DOUBLE SESSION)

**Daniel Becker, SA Water**

*primary, middle, senior*

The Well, SA Water's new educational program is a series of free activities and resources focussing on all things water. Students can participate in workshops and tours that explain the process of cleaning water from a variety of sources, including wastewater. Our newly developed young innovators and entrepreneurs' program sees students developing solutions to real world issues in this problem-based learning experience. Students become water quality scientists for the day by ordering one of our water education and testing kits that give them the chance to taste a variety of waters from across the state and test some of their properties. There will be also be a chance to discuss utilising Smart Water Meters and moisture/nutrient probes at your school, allowing students to constantly monitor water usage, analyse patterns and gain an understanding of Smart Irrigation. Finally learn about how cooling open green spaces can reduce energy costs and improve the livability of the community.

## 109 Bushfires and Science in Disaster Resilience Education (DOUBLE SESSION)

**Chris Sedunary & Belinda Dunbar, SA Country Fire Service**

*middle, senior, tertiary*

Disaster resilience is an important skill that ensures people can withstand and recover from the impacts of events such as fire, drought, and flood.

Disaster resilience education allows young people to understand and deal with the impacts of natural hazards and develop solutions to local challenges. South Australia is one of the most bushfire prone places in the world and the threat of a bushfire to South Australian students is increasing with climate change. This seminar will walk you through how to use an understanding of bushfire risk and disaster resilience education to contribute to young people's survival and resilience in bushfires. You will link bushfire preparedness and awareness with the Australian Science Curriculum with STEM projects that integrate across the curriculum requiring students to solve modern real-world problems.

# 12.15 pm Workshop Session 2

## 201 How much gold is in my smartphone? Why geoscience needs you!

**Dr Richard Lilly, University of Adelaide , NExUS Program Leader and Minerals Industry Embedded Research Fellow**

*middle, senior*

In this workshop we will get hands-on with the rocks and minerals needed to produce the things we use every day. What elements do you need to make a smartphone? What are the most important metals? How much do we need? How do you find them? We will also explore the disconnect between the commonly negative associations with mining and our ever-increasing consumption of metals and minerals for modern and future technologies. Geoscience also plays a critical role in the Australian economy and is suffering a sharp decline in tertiary enrolments, resulting in a growing skills shortage. During 2021, the University of Adelaide, through the National Exploration Undercover School (NExUS), plans to initiate the NExUS-Rock Stars geoscience outreach program to primary and secondary schools. In collaboration with the CoRE learning foundation, we aim to provide training opportunities to science teachers to enable integrated learning of earth science through contextually set project-based learning.

## 202 UniSA Connect STEM Innovation Experience (STEMIE)

### Anita Trenwith, University of South Australia

*senior*

The UniSA STEM Innovation Experience (STEMIE) is designed to increase STEM engagement in schools and increase STEM awareness in the wider community. This is achieved by students participating in a series of STEM-based tasks that are linked to curriculum.

Each year approximately 300 students from across South Australia participate. Qualifying schools present their learning at Regional Showcases. Winners from each showcase continue to the STEMIE State Final, where students compete in unseen STEM challenges to gain the title of "STEMIE State Final Winner" and also receive prize money to spend on equipment for the school.

The program is free to invited schools and UniSA sponsorship also provides starter equipment and ongoing support from UniSA Connect Staff and through the STEMIE online Moodle. Come along and get your school on the list.

## 203 What's Up? CSIRO's Space Initiatives

### Robert Hollow, CSIRO Astronomy and Space Science

*middle, senior*

CSIRO is a major leader in Australian space initiatives. Specific examples including the Space Roadmap, the Centre for Earth Observation, NovaSAR-1, a new radar satellite and the development of CSIROSat-1 due for launch in 2021. CSIRO also provides excellent space tracking and communication through facilities such as the CDSCC operated in conjunction with NASA and the ESA station at New Norcia. We explore these initiatives in detail, highlighting how they can be incorporated into the curriculum. The role of Earth Observation in addressing the UN's Sustainable Development Goals is discussed. Examples of educational resources and activities are presented.

## 204 CANCELLED: Incorporating Science as a Human Endeavour into Your Lessons

### Stile Education

*middle*

It can be hard incorporating SHE activities into a jam-packed curriculum. Stile has done the hard work for you by producing high-quality units that include links to up-to-date, relevant scientific endeavours. Come along to get some examples and resources to take back to your classroom!

Please bring a device along to this session.

## 205 Audacious Middle School Units on Sustainability

### Lara Lang, Reynella East College

*middle*

What if, in teaching science, you could actually make a difference to the world around you? Well, you can, and you do!

In this workshop, be encouraged to THINK BIG, and do the OUTRAGEOUS in your classroom. Connect to the wider world with integrated projects as you explore the theme of sustainability and science.

6 complete (and taught and tested) units of work that align with science will be presented, giving you ideas, curriculum links, and big term long inquiry projects that any teacher and students can tackle, in exploring the interdisciplinary topic of sustainability.

## 206 RSPCA - Our role in animal welfare science

**Alison Wilson, RSPCA South Australia**

*primary, middle*

Animal welfare science uses scientific principles and research to determine the impact of our actions on animals, be they farm, companion or wild.

AWARE by RSPCA is a free Teachers' Portal designed for primary and middle school teachers looking for innovative resources that provide real life, meaningful contexts for teaching and learning with the Australian Curriculum. The free Student's Portal provides accurate resources and students can upload drawings, photographs or questions.

The workshop will provide an overview: of the fifteen Units of Learning and Lesson Plans, printable worksheets for in class inter- disciplinary learning; online, interactive quizzes; downloadable PowerPoint resources; Classroom videos and numerous Research Articles & Readings; glossaries in 4 languages.

The workshop will also provide a discussion with a RSPCA animal rescue officer, an animal shelter volunteer (both may be available to visit your school), and a vet/vet nurse.

## 1.15 pm
## Lunch & Exhibition

## 2.05 pm
## Panel Discussion

Join Professor Martin Westwell (Chief Executive of SACE, neuroscience of learning researcher, strategic leader and boundary pusher) as he takes the audience on a controversial and reflective journey into science education practices. He will be chairing the panel discussion and asking our panellists probing questions to engage the audience and get everyone thinking. The audience is also invited to ask the panellists questions, ensuring a teacher voice is present in the discussion.

Our panellists are not just experts in their field, but great thinkers who each bring a different perspective to the discussion. They are: Keynote speaker Prof Chris Daniels who is passionate about finding effective ways of delivering science education outcomes. Professor Sandra Orgeig from UniSA. Head of School: research and professor in Pulmonary Biology. Associate Professor Kathryn Page in Education for Sustainability from UniSAs Education Futures.

# 3.25 pm
# Workshop Session 3

## 301 How to get Industry Experts in your classroom

**Hilary Schubert-Jones, DST**

*middle, senior*

Defence Science Technology Group undertake cutting edge STEM research for both military and civilian life applications. In this workshop we take you through the work that DST undertake to assist Australia wide in various situations such as the bushfires and COVID-19 response. We talk about how you can utilise these real life examples of STEM in your classroom and how to connect our scientists and engineers with your students in a personalised manner.

## 302 Get Real! Using Authentic Astronomy Data in the Classroom

**Robert Hollow, CSIRO Astronomy and Space Science**

*middle, senior*

Astronomy is a discipline in which real scientific data is freely and easily accessible. This makes it an ideal area for both first hand and second hand student investigations with the potential to undertake engaging and exciting projects. This workshop discusses a variety of data sources and programs, how to access them and what tools are available. Examples of possible student investigations are outlined.

## 303 Still Flipping Excited!

**Tobias Ward, Department for Education**

*middle, senior*

Flipped learning is a teaching methodology that gives teacher time to students by covering theory in their students' personal time, and spending their class time working with their learning. In this presentation I'll go through why I flip, how I flip, the technology I use, and how to flip assessment and feedback (which saves paper, in line with saving the planet, our conference's theme). We will also get started on your first flip if you bring your laptop/device.

## 304 Science for Special Options Classes

**Dina Phan, Woodville High School and Kerensa Greenfield, Kapunda High School**

*primary, middle*

Ideal for educators working with students with additional needs, or in special options classes. Together, we'll explore three ways you can differentiate in Science, for both theory and practical lessons: outcome, personal support, and resources. We'll look at strategies you can use to support a range of students, including those who may be non-verbal, have mobility limitations, are working at low literacy and numeracy levels, have sensory or processing disorders, or are heavily dependent on their SSOs.

## 305 Continuing the Conversation

Have you ever left a panel session, your interest piqued, but wishing there had been more time to explore issues, questions and ideas more deeply with the panellists, moderator and each other? This workshop builds on from the panel discussion, and is a more informal chance for panellists and interested workshop attendees to 'continue the conversation'.

## 306 Fibre, Yarn and Fabric

### Sheryl Hoffmann, Concordia College

*lab officers, primary, middle, senior, tertiary*

In an age where people are thinking about recycling and words like fast fashion, sustainable wardrobe and microplastic pollution are bandied about, isn't it time to look at what our clothes are made of, and what we can do to reduce our footprint on the planet?

This workshop will be a hands-on opportunity to look at fibres, yarns and fabrics both visually and under a microscope and perform a simple burns test to determine what fabrics are made from and if they are made of natural or man-made fibres.

Suggestions will be made for suitable practicals on this topic, for various year levels, including making rayon & nylon. We will also discuss ways to reduce, recycle and reuse clothing and accessories.

## 307 Quantifying Engagement with Lesson Formats

### Sam Moyle, Brighton Secondary School

*middle, senior*

Student engagement is considered 'the cornerstone of high school reform efforts' with students connecting across cognitive, behavioural, emotional and agentic domains. However, while multiple engagement measures are available, they offer little Australian audience focus, do not evaluate discrete domains of engagement, and data is rarely actioned to develop best pedagogical practice.

This study developed a secondary school, domain-level engagement survey, the SDES to map learner engagement domains with four common pedagogical models (Chalk and Talk (CT), Digital Platform (DP), Practical-Based (PB), and Inquiry-based (IB) lessons.

Results revealed that overall, IB lesson styles generated the highest levels of engagement across the four domains for Year 10 students and across cognitive and emotional domains for Year 9 students. This presentation considers the findings of the SDES as an engagement measure that enables educators to design pedagogy for maximal engagement.

## 308 Merge: Bring Science to life in every classroom, using just 3 simple tools

### Rosemary Arnott, Modern Teaching Aids

*primary, middle*

Students learn best when they can hold and inspect physical objects, but is this always available in the classroom when it comes to Science?

With Merge, students can feel the vibrations of a human heart, dissect a frog and rotate around the planets of the solar system, all just with a digital device, an app and a physical cube. The patterns on the cube act as a super QR code, which communicates with the device's camera to launch simulations from the app right onto the screen. Students interact with the simulation on the screen in a 3D, hands-on learning experience, using the simulation to "feel" the object rather than just see it.  Learning experiences are equipped with student follow-up tasks and are aligned to the Australian Science Curriculum.

### 309 Teaching the Science of a Bionic Fish

**Thomas Man, Neuplex**

*lab officers, primary, middle, senior, tertiary*

Teaching science in an engaging and interesting way can be challenging at times and rather dependent on the responses as well as the state of mind of students. This seminar proposes how to use a bionic fish to make the teaching of science (physics/biology) as well as digital technology tangibly, impressively and productively. The pleasant surprise of seeing a bionic fish turning its tail in air and swimming in water (if a tub is available) will wake up and wow the sleepiest in class. The bionic fish is a STEM product from Festo Didactic and has been taught in classes of students with learning challenges, with amazing results.

## 4.30 pm
## Happy Hour

## 7.00 pm
## Conference Dinner

Join us at the Highway Hotel to celebrate SASTA's 70th Anniversary! The cost is $54.00 for a 3 course meal including a complimentary drink on arrival. Registration for the dinner is available through the online registration process.

## 8.45 am
## Welcome & Awards Presentation

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## 9.10 am
## Keynote 2

### Communicating for Change!

**Dr Hannah Brown, Science Strategy and Operations at the Victorian Heart Institute**

In a world where it's increasingly difficult to identify #fakenews, communicating and telling stories with impact is key! But is it possible to use the science of communication and marketing to share science messages and tell science stories that make people want to save the planet?

Dr Hannah Brown will share her strategies on how to be more influence than influenza, how to communicate with impact, and most importantly, how to tell stories that change behaviour.

Hannah is an Adelaide born and educated, internationally trained, researcher-turned-leader and communicator who leads Science Strategy and Operations at the Victorian Heart Institute. Having trained and worked as an academic, she now sits at the interface between science and the public, helping to turn ideas into impact through storytelling. She believes that creating clear and consistent narrative, engaging broadly with consumers, authenticity, integrity and humour are the keys to effective communication.

## 10.10 am
## SASTA Annual General Meeting

## 10.40 am
## Morning Tea & Exhibition

# 11.15 am
# Cutting Edge Session 1

## 1A How Can We Use Biomedical Engineering to Improve Pregnancy Outcomes?

### Dr Marnie Winter, University of South Australia

Pregnancy is an extremely exciting, yet also stressful time for expectant parents as they often worry that something might go wrong. These fears are not completely unfounded as for every 100 pregnancies around 3 will have a pathogenic genetic abnormality (such as Down Syndrome or a genetic heart condition). In addition, more than 10 of these pregnancies will be affected by placental dysfunctions that can lead to several serious complications including growth restriction, preeclampsia and sadly even stillbirth. Prenatal testing for these conditions and complications is crucial to ensure the best management of pregnancy and therefore, birth outcomes as well as to reassure the majority of expectant parents with a healthy pregnancy.

Marnie will speak about her ongoing interdisciplinary research aiming to improve prenatal screening for genetic abnormalities and diagnosis of pregnancy complications such as preeclampsia.

Dr Winter's research has focused on developing technology that can separate these rare fetal cells from the mother's cells. This technology in currently in the process of being further developed, and commercialised for future clinical implementation. Marnie is passionate about science outreach and communication, spanning from national radio and television interviews and newspaper articles, organised events for National Science Week, hosted laboratory tours, and visited numerous high schools to talk about maths and science. Dr Winter received her PhD from University of South Australia, and is currently a research associate at the Future Industries Institute, University of South Australia.

## 1B Sharks: Where Are They Going? How Do We Know?

### Associate Professor Charlie Huveneers, Flinders University

A/Prof Charlie Huveneers leads the Southern Shark Ecology Group (SSEG) at Flinders University and is the Director of Flinders Marine & Coastal Research Consortium. The SSEG has a national and international profile based on its innovative use of electronic tagging. The SSEG works on highly migratory species of pelagic sharks including white sharks and tigers sharks, and has recently tested the efficacy of a range of personal shark deterrents on several potentially dangerous species.

Charlie started his PhD at Macquarie University in 2003 on the biology and ecology of wobbegong sharks in relation to the commercial fishery in NSW. In 2007, he started running the Australian Acoustic Tagging and Monitoring System (AATAMS) part of the Integrated Marine Observing System program (IMOS) during which he deployed acoustic receivers around Australia and created a national network of acoustic telemetry users. He joined MISA through a joint position between SARDI - Aquatic Sciences and Flinders University where he acted as shark ecologist and Lecturer between 2009 and 2014. Since 2014, he has been at Flinders University full-time.

Over the years, A/Prof Huveners has worked on a wide range of species including wobbegongs, Port Jackson sharks, grey reef sharks, bronze whalers, dusky sharks, blacktip reef sharks, nervous sharks, smooth rays, fiddler rays, manta rays, and white sharks.

# 12.20 pm
# Cutting Edge Session 2

## 2A The Nurture of Nature: How Environmental Factors Can Influence Our Genetic Risk

### Associate Professor Sarah Cohen-Woods, Flinders University

Sarah's research centres around how genetic factors influence cognitive and mental health outcomes, and how these are impacted by environmental exposures such as early-life stress, exercise, and diet. She leads the Behavioural GEMs laboratory at Flinders University, with a focus on genomic and epigenomic variation that contributes to depression, eating disorders, psychosis, and cognitive change. In this talk Sarah will address some questions relevant to the learning and experiences of children in our care. What is it that shapes behaviour and mental health outcomes? Both genetic and the environmental factors are important in shaping our futures, but if there is a genetic control do we as educationalists have any control really, or the children themselves? And given the significance of trauma exposure ingrained in Australian history and also recent catastrophes, can we pass our experiences of trauma to our children through our genetic material? The aim of this talk is to give you a brief overview and provide opportunity to ask questions and raise discussions.

While we know that behaviours, including psychological disorders, are heritable, we know this is also not deterministic. Just because we have a genetic risk for depression does not mean we will become depressed.

Associate Professor Cohen-Woods' research works on understanding how nurture influences our nature by studying how environments can influence genetic predisposition and gene expression, influencing psychological outcomes. Sarah's research investigates immunogenetic risks for depression moderated by childhood maltreatment, and epigenetic variation associated with chronic early-life adversity, and whether this mediates a relationship of poor mental health.

Sarah's extensive public engagement has spanned public talks across a range of groups, radio and television interviews, advocating for science at the Australian Parliament, and numerous visits to primary and secondary schools. Associate Professor Cohen-Woods was awarded her PhD from King's College London in 2008, and is currently an Associate Professor at Flinders University.

## 2B Understanding Parasite Biology to Make Better Therapeutics

### Dr Danny Wilson, The University of Adelaide

Mosquito borne malaria parasites cause repeated bouts of debilitating illness and the death of 450,000 children younger than 5 every year. Spreading resistance to our best antimalarials in SE Asia is of great concern and new drug treatments are urgently needed. Furthermore, long-term control of the disease is only likely to happen with the successful development of effective vaccines. However, even our best control measures are under constant risk due to parasite and mosquito adaptations, as well as political and environmental challenges. Disease causing malaria parasites live inside human red blood cells (RBCs) that carry oxygen to where needed in the body. Dr. Wilson and his team are uncovering the function of proteins unique to the parasites that could be targeted by drugs and vaccines.

Dr Danny Wilson completed his PhD at the Walter & Eliza Hall Institute (Melbourne) with a focus on vaccine and drug development targeting the human malaria parasites. Dr. Wilson development specialised assays to study parasite invasion of human red blood cells, identified a secondary mechanism of action for antibiotics that kill parasites with short exposure and has applied quantitative super-resolution fluorescence microscopy techniques to study protein function during parasite invasion of human red blood cells.

Dr Wilson is a 2019 South Australian Young Tall Poppy awardee and Hospital Research Foundation Fellow, which is supporting his research into vaccine targets and novel drug treatment strategies to control malaria.

### 2C Determining embryo health with a light touch

**Dr Kylie Dunning, The University of Adelaide**

The inability to conceive one's own child places a tremendous burden on the parental unit and society as a whole. Affecting 15% of Australians, this stigmatised condition can lead to reduced productivity, financial hardship, relationship breakdown and mental illness. In vitro fertilisation (IVF) is the leading method to address infertility, yet it still has a remarkably low success rate: only 18% of initiated cycles deliver a live birth.

One of the greatest challenges for IVF clinics is identifying which embryos are suitable for transfer back into the patient's uterus. Overcoming this challenge would increase the number of patients taking home a baby. The current gold standard technologies include taking a biopsy, and then sequencing the DNA to confirm that the embryo has the predicted number of chromosomes. As well as being invasive, this procedure shows no improvement in live-birth rate.

Kylie's team are developing new technologies that overcome the need for a cell biopsy, these instead use light to take a non-invasive 'molecular photo' to assess the health of the embryo. They hope these discoveries will change the way fertility specialists and embryologists select the best embryos and ultimately reducing costs and heartache for hopeful parents.

Kylie graduated with a PhD from the University of Adelaide and currently holds a fellowship from The Hospital Research Foundation. Kylie leads the Reproductive Success team within the Robinson Research Institute, where they use light-based technologies to better understand the biology that underpins successful development of the oocyte and early embryo. In 2020, in recognition of research excellence and community outreach, she was awarded The South Australian Tall Poppy of the Year Award, the HDA Women's Excellence in Research Award and the Robinson Research Institute Director's Award.

## 1.20 pm
## Lunch & Exhibition

## 2.10 pm
## Workshop Session 4

### 401 Global citizen science in your classroom

**Bill Flynn, CSIRO Education and Outreach**

*primary, middle*

Imagine a worldwide community of students, teachers, scientists, and citizens working together to better understand, sustain, and improve Earth's environment at local, regional, and global scales. In this session you will learn about and experience The Global Learning and Observations to Benefit the Environment (GLOBE) Program. An international science and education program that provides students and the public worldwide with the opportunity to participate in data collection and the scientific process, and contribute meaningfully to our understanding of the Earth system and global environment. Bring a laptop or tablet able to access the internet to this session.

## 402 Navigating the Oliphant Science Awards in your School

**Peter Turnbull, SASTA OSA Committee**

Come along to this session to learn more about how the Oliphant Science Awards can be incorporated into your school!

The session will cover general information about the competition, how to get involved, tips on supporting students with projects and judging.

## 403 Exploring online assessment with EP

**Kelly Hollis, Education Perfect**

*middle, senior*

Education Perfect provides a quick and intuitive solution for secure, online Assessment that is able to automate the process, significantly reducing the burden on teachers and driving marked improvements in student learning outcomes. The EP platform includes an EP Assessment cycle including pre-testing to diagnose current knowledge of each student, automated and individualised next steps for each learner, post-testing to gain an updated measure of student knowledge and analysis and insights into student learning growth.

Come along and find out how the EP platform can help prepare all of your Science students for online assessment.

## 404 The Impact of Gesture on Student Learning Outcomes in STEM Education: An Investigation using Cognitive Load Theory and Self-Efficacy Measures

**Kylie Walters, Brighton Secondary School**

*middle, senior*

Student perceptions of subject difficulty and confidence in ability are compounded by the complex and abstract nature of concepts in STEM disciplines. Furthermore, the intricacies involved in making connections for learning, may exhaust student working memory, due to immense cognitive load. The incorporation of human movement effect within cognitive load theory, the linking of Geary's evolutionary psychology with cognitive architecture and the emergence of embodied cognition theory, have the potential to improve student learning outcomes and perceptions in education. This study used cognitive load as a theoretical framework to investigate the impact of gestures on student learning outcomes in a secondary school chemistry classroom.

## 405 Not Such an Alien Subject

**Alexandra Fowler, Woomera Area School**

*primary, middle*

Earth and Space Science is can be a struggle to teach; but what if there was a way to explore the curiosity of Aliens while also teaching the Australian Curriculum? This session focusses on teaching students both Earth and Space concepts while exploring it from an Alien Perspective. What if you discovered a new planet and had to record the science of the planet, its solar system, and its ecosystems? Students invent and explain their Alien Species and the planet in terms of scientific concepts such as resources, lunar cycle, solar systems, rock cycles, tectonic plates, and carbon cycle (year level appropriate tasks). Student explore the concepts using earth as the example and then apply those understandings to their planets. This unit has been run for a year's 2-10 and covers required standards for each level.

This session explores implantation of the unit in the classroom and how to identify which tasks and develop appropriate additional learning in these concepts.

### 406 Putting a Face to the Science

**Alex Carr, Nature Education Centre**

*primary, middle, senior*

How the Nature Education Centre's educational animal talks tie in with the curriculum and inspire students to care about the conservation of the natural world. In this workshop you will meet some of our animal ambassadors and one of our education officers will discuss how they can be used to demonstrate real world examples to suit the curriculum across different year levels. We will also explore the variety of different talk topics we can deliver using our wide range of both live and preserved specimens.

### 407 Formative Favourites (DOUBLE SESSION)

**Anthea Ponte, Department for Education**

*primary*

This workshop will engage teachers in 10 examples of Formative Assessment opportunities that can be used to elicit student's prior knowledge and misconceptions related to Primary Science. Each example is aligned to content from the Australian Curriculum: Science, with at least one example from each year level, R-7. Participants will be provided with digital copies of all resources presented during the workshop.

### 408 SHE: The Task and Writing Questions (DOUBLE SESSION)

**Jason Greenslade, Westminster School**

*senior*

This workshop will look at the SHE links and break them down in a way that might be easier for the students in your class to understand; we will then look at the task itself and the ways that it can be structured for students.

We will finish with a look at exam/test SHE questions - how to write them from articles and how to instruct students on how to answer them and some strategies for teaching this.

## 3.15 pm
## Workshop Session 5

### 501 Integrated Sustainable STEAM Units

**Kathleen Best, Clarendon Primary School**

*primary, middle*

Participants will explore how to create STEAM units which focus on sustainability, plant health, the natural environment and integrate Aboriginal and Torres Strait Islander perspectives. We will also look at how to assess these units in a practical way, with examples, and how to support staff involvement across multiple subject areas to create authentic learning experiences.

## 502 Designing a solution to save the planet

### Jennifer Chalmers, RiAus

*middle, senior*

Experience how STEM subjects can be taught together to provide students with real-life applications and context for learning.

In this session, you will learn how to structure design challenges to meet the curriculum, engage students and provide meaningful motivation for learning. Design challenges should be designed to solve a real problem, that students are concerned about, and which a solution can make an impact on society.

Free resources, hands-on activities and ideas to take back to your classroom will all be part of this workshop.

## 503 Aboriginal and Torres Strait Islander Histories and Cultures: Science

### Katrina Elliott & Caroline Dean, Department for Education

*primary, middle*

ACARA's new science elaborations support teachers to incorporate the Aboriginal and Torres Strait Islander Histories and Cultures. They are scientifically rigorous, demonstrating how Indigenous history, culture, knowledge and understanding can be incorporated into teaching core scientific concepts. They provide a more culturally responsive curriculum experience for Aboriginal students resulting in increased engagement and an opportunity for teachers to engage all students in the awareness and recognition of Aboriginal knowledge and ways of knowing. South Australia Department for Education is contextualising the elaborations for South Australia in collaboration and consultation with our Aboriginal Communities. In this workshop we will share how the science elaborations will be contextualised and some processes and resources to support teachers to implement them.

## 504 The Models of Engaged Learning and Teaching for Interdisciplinary STEM

### John Willison, University of Adelaide

*middle, senior*

One problem for teachers facilitating interdisciplinary STEM projects is how to lift student rigour and sophistication in each subject as well as the interdisciplinary whole. This problem is compounded by differences in terminology within STEM subjects, which make it appear to students like they are being required to do very different forms of thinking and makes it hard for them to make connections between subjects.

This seminar will introduce the Models of Engaged learning and Teaching, or MELT for short, to capture the sophisticated thinking within each subject in terminology used by that subject, and to show the connections between subjects. Participants will make their own modifications to MELT to capture the different ways of, for example, commencing project work in each subject. MELT then can be used to maintain the differences between subjects but amplify the connections between the sophisticated thinking in STEM, and lift student rigour in approach towards projects.

## 505 Strategies for improving students Scientific Literacy

**Jenny Woodcock, Department for Education**

*primary, middle, senior*

In this workshop I will share the results of my year long research study into improving my students' scientific literacy. This study was completed as part of my Masters of Education – STEM course.

In this workshop we will discuss;

1. Why scientific literacy is so important to enable students to understand, synthesise and communicate science conceptual understandings.
2. How using English curriculum strategies for reading, viewing and writing practices can show improvement in students' scientific literacy.
3. How writing models; such as Claim, Evidence, Reasoning can help support students to write better quality scientific summaries
4. How the data collection and analyses from the study confirmed the positive impact the Reciprocal Reading program had on improving my student's scientific literacy results.

## 4.15 pm
## Happy Hour

Stick around for your last chance to network with colleagues and new friends you may have met at the Conference. And don't forget you have the chance to win prizes donated by our sponsors if you are present at Happy Hour!

Please register your attendance at this event when you register online.

# Environmental Impact

**At SASTA we are working to reduce our impact on the environment both in the office and at our events.**

## Catering

- **Each attendee will receive a stainless steel water bottle** in their satchel to be used throughout the two days at the Conference to reduce single use products. So don't forget to bring these back for day 2! **And don't forget to bring along a Keep Cup for coffee / tea!**
- The caterers will provide bamboo compostable plates and cutlery for the event to reduce the amount of waste being sent to landfill.

## Printing

- All conference information will be available online, including the program and the running sheets for each day. Delegates will have wifi access at the conference so please bring along a device to access these details.
- We will also be encouraging presenters to provide electronic copies of their resources to reduce the amount of printing and paper used at the conference.
- The conference evaluation will be sent electronically after the conference and a PDF copy of your certificate will be sent via email the week following the conference.

## Venue - Middle School Building, Pulteney Grammar School

- The Middle School Building is equipped with smart technology :
- It closes windows when it is too hot, or too cold and when it rains
- The airconditioning does not work when a window in the room is open
- Lights turn off automatically after a period of time
- Solar panels on the roof
- Recycling bins in every class and shared area

## Transport

Unfortunately there is no onsite parking at Pulteney Grammar School for the conference, however this provides an opportunity to reduce our carbon footprint by using public transport or car pooling with a colleague!

- **Public Transport**

  Pulteney Grammar School is easily accessible via public transport with the South Terrace tram stop located a 3 min walk from the school along with bus stops on King William Street (3 min walk) and Pulteney Street (6 min walk). For more details and to plan your journey visit Adelaide Metro.

  - Adelaide Entertainment Centre - Park 'N' Ride - $5 per day
  - Adelaide Convention Centre - $16 Early Bird Parking (Catch the tram from the Railway Station)

- **Public Car Parking**
  - Auto Park on Gillies Street - $17 Early Bird Parking (3 min walk)
  - Auto Park on Mills Street - $1 Early Bird Parking (11 min walk)

  There are also a number of other car parks available throughout the city with close access to the tram line.

- Some **street parking** is available, however please ensure you pay attention to the parking signs as it is generally 1 or 2 hour parking on South Terrace and surrounding streets and you will need to move your car throughout the conference.

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