

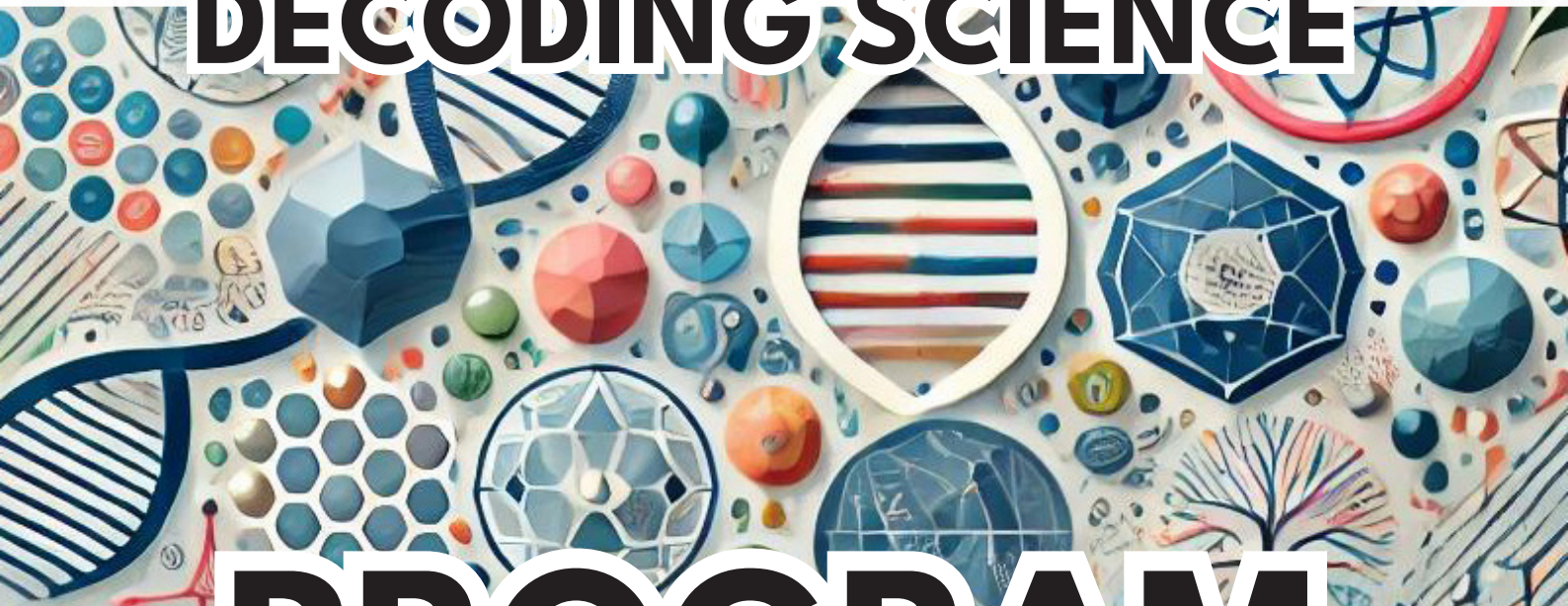


ANNUAL CONFERENCE

14 & 15 April 2025

Glenunga International High School

DECODING SCIENCE



PROGRAM





PROGRAM OVERVIEW

MONDAY 14 APRIL

7.30 am	Registration & light breakfast
8.50 am	Welcome & Awards Presentation
9.30 am	Keynote Presentation
10.35 am	Morning Tea & Exhibition
11.15 am	Workshop Session 1
12.20 pm	Workshop Session 2
1.20 pm	Lunch & Exhibition
2.15 pm	Workshop Session 3
3.20 pm	Workshop Session 4
4.20 pm	Happy Hour

TUESDAY 15 APRIL

8.30 am	Registration
8.50 am	Welcome & Awards Presentation
9.10 am	Keynote Presentation
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 5
3.15 pm	Workshop Session 6
4.15 pm	Happy Hour

KEYNOTE PRESENTATION

Rethinking Physics Education from Newtonian to Einsteinian Paradigms in Schools

Rahul Choudhary, Flinders University

At the turn of the 20th century, physics entered a new era with the emergence of quantum physics and relativity, forming the foundation of modern, or Einsteinian, physics. Despite their critical role in advancing our understanding of the Universe and shaping modern technology, these concepts are typically reserved only for upper secondary school students following their introduction to Newtonian physics in middle school. This sequential approach that follows the historical progression of physics can build a classical worldview among students. However, an entrenched classical perspective can make it difficult for students to comprehend the “counterintuitive” ideas of modern physics.

In contrast, research suggests that middle school students, who have not yet internalised Newtonian frameworks, are more receptive to the abstract concepts of quantum physics and relativity.

This talk advocates for introducing modern physics concepts at an early age through activity-based learning. It will showcase how innovative teaching strategies can enable educators, regardless of their academic background, to effectively introduce middle school students to the fundamental concepts of Einsteinian physics. The presentation will feature evidence-based research and practical learning resources for building a conceptual foundation in modern physics education, with a focus on quantum physics. It will also present findings on how middle school students, especially girls, show improved attitudes toward physics after participating in modern physics education programs.

A follow-up workshop will cover practical demonstrations for teaching quantum physics and showcase how activity-based learning makes abstract ideas tangible.

Rahul has a background in physics with a specialisation in Optics but his love for teaching led him to pursue a PhD at the Einstein-First project. He has experience in working in the industry as well as the academia. He specialises in developing innovative hands-on learning resources for teaching science, and physics in particular. He has worked as a research associate and has also undertaken casual teaching roles at The University of Western Australia (UWA). He has also collaborated with universities and academic organisations such as Swinburne University of Technology, University of Hildesheim, University of Oslo, LIGO and OzGrav.

Rahul has taught and evaluated undergraduate physics courses at UWA. He has designed and delivered numerous teacher professional development programmes and science enrichment workshops across Australia. Rahul has worked as a curriculum developer and educator in the industry with companies such as Singular Health Limited and Fizzics Education for developing educational technology resources and active learning resources.



KEYNOTE PRESENTATION

DNA tools to identify and help eliminate illegally logged timber from global supply chains

Professor Andy Lowe, Environment Institute, The University of Adelaide

Illegal logging drives a range of environmental and societal problems including greenhouse gas emissions, biodiversity displacement, tax evasion and forest community displacement and ranks up there with illegal arms, drugs and people trafficking in terms of economic impact. But new scientific methods can be used to identify the species and region of origin of timber products and can now be applied to police global timber supply chains. Prof Lowe will give an accessible talk on the problems behind illegal logging and how science can and is helping to control and reduce one of the world's wicked problems.

Prof Andy Lowe is Executive Director of the Environment Institute at the University of Adelaide in Australia. He is an expert in plants and trees, particularly the management of genetic, biological and ecosystem resources. Andy has discovered lost forests, championed to eliminate illegally logged timber in global supply chains, served the United Nation's Office of Drugs and Crime and is a lead author of the Intergovernmental Platform for Biodiversity and Ecosystem Services - Land Degradation and Restoration report. The work of his group solves some of the most pressing global resource, production and landscape sustainability challenges through the application of technology innovations delivered in a responsible and economically realistic framework.

Andy has published over 300 scientific articles and books and is an experienced and respected executive leader, board member, as well as mid-career mentor. He is a passionate science communicator, speaker, writer and podcast host, and has served as Scientist in Residence at The Australian Financial Review and The Advertiser.





WORKSHOP OUTLINE

SESSION 1

11.15am - 12.15pm

		Primary (R-6)	Junior Secondary (7-10)	Senior Secondary (10-12)	Lab Officers
1.01	Phasor wheels - an innovative tactile tool for teaching quantum path integrals and vectors		●	●	●
1.02	AI in Education - Sharing Success & Learning Together	●	●	●	
1.03	CK-12: A Pathway to Cost-Free Science Learning	●	●	●	
1.04	Applying primary school science in the real world	●			
1.05	The Science of Storytelling: Unlocking Engagement, Memory & Meaning in the Classroom	●	●		
1.06	The Ethics of Scientific Discovery: Teaching Critical Thinking in STEM		●	●	
1.07	The art of the segue - storytelling for memorable science learning		●	●	

SESSION 2

12.20pm - 1.20pm

2.01	The Art of Inspiring a Love for Science in Junior Primary Students	●			
2.02	Experiential approaches to teaching the Australian deep time story through science	●	●		
2.03	Decoding what students know		●	●	
2.04	Open Access Bioinformatic Tools to Decode Genetic Data		●	●	●
2.05	Astronomy, a Gateway Science into STEM		●	●	
2.06	Physics Playground - Exploring High School Physics		●	●	●
2.07	Positive behaviour management strategies for years 7-12		●	●	

SESSION 3

2.10pm - 3.10pm

		Primary (R-6)	Junior Secondary (7-10)	Senior Secondary (10-12)	Lab Officers
3.01	Drones in Education: why in the Territory?	●	●	●	
3.02	It's not a Fringe Show, but... Tips for creating engaging primary science lessons without losing your mind!	●			
3.03	Creating Curiosity Collections	●	●		
3.04	Running Design Practicals in the Middle School (DOUBLE SESSION - 2 hours)		●		
3.05	From Classroom to Orbit: How you can use space technology in the classroom		●	●	
3.06	The Science of the Ridiculous		●	●	●
3.07	Introducing Electro-Magnetism to Explain Bonding Electron Models		●	●	
3.08	Igniting Curiosity all year round - Strategies to celebrate Science all year round		●	●	

SESSION 4

3.20pm - 4.20pm

4.01	Using the Oliphant Science Awards to Assess Science	●	●	●	
4.02	Primary Science: A structured approach to planning for the Australian Curriculum v9	●			
4.03	The Neuroscience of Science Learning: Decoding the Path to Deep Understanding	●	●		
4.04	Flipped Learning in Senior Biology to develop an inclusive and ethical classroom		●	●	
4.05	Atomic Emission Spectroscopy in the Secondary School Classroom		●	●	
4.06	A Healthy Land - Measuring the environment with Vernier dataloggers		●	●	●



SESSION 5

2.10pm - 3.10pm

		Primary (R-6)	Junior Secondary (7-10)	Senior Secondary (10-12)	Lab Officers
5.01	Using agriculture to inspire your students	●	●	●	
5.02	Turning students into scientists using game-based approaches	●			
5.03	Science as a human endeavour embedded into teaching	●	●		
5.04	Nuclear-powered submarines: A deep dive into the fundamentals of radioactivity, fission and radiation safety			●	
5.05	Exploring visual communication of climate change using technology.		●	●	
5.06	Strategies for metacognitive thinking		●	●	
5.07	Scanning Electron Microscopy in the Classroom - Decoding the unseen world of science	●	●	●	

SESSION 6

12.20pm - 1.20pm

6.01	Immersive Learning Unlocked: Implementing VR Strategies for Engaging Classrooms	●	●	●	
6.02	Decoding Vision Science: A Hands-On Approach to Teaching Light, Sight, and Health	●			
6.03	Bringing the Fun to Physics!		●		●
6.04	Uncover the secrets of radioactivity using real-world data		●	●	
6.05	The Science of Us - Measuring humans using Vernier Data Loggers		●	●	●
6.06	Decoding environmental science and ecosystem exploration with GIS technology		●	●	
6.07	Transforming Science teaching to a Skills-based approach in years 7 - 10		●		



CUTTING EDGE SESSIONS

11.15 AM

CUTTING EDGE SESSION 1

1A Turning failed antibiotics into weedkillers

Dr Tatiana Soares da Costa, The University of Adelaide

Weeds are popping up everywhere! Not just in our backyards, but also in farms all around Australia and the world. Weeds reduce the quality and size of food harvests, costing Australian farmers over \$5 billion every year and driving up food prices. We rely on chemical weedkillers called herbicides to control weeds. However, the existing herbicides on the market are failing as weeds have become resistant. To make matters worse, very few new herbicides have entered the market in the past 40 years. As the world population is set to pass 10 billion people by 2050, how are we going to keep feeding people if weeds are winning the war against crops?

In this presentation, Dr Tatiana Soares da Costa will discuss how her research team at the University of Adelaide research team is turning failed drugs into new, environmentally friendly weed killers to safeguard food production. This approach can help us develop herbicides quicker and cheaper by leveraging the research already done on superbugs and applying it to weeds.

1B Decoding Science - Glasses and optical fibres

Florian Calzavara, The University of Adelaide

This presentation aims to highlight some benefits of research into glassy materials and optical fibres. Optical glasses are promising material candidates since they enable optical functions such as light transmission, absorption and generation and are also capable of being prepared in a wide variety of compositions. This provides opportunities to scientists to work on the glass chemistry with the aim to finely tuning their properties (optical, thermal, mechanical, among others) for the desired applications. For example, among the different glass compositions, SiO₂-based glasses present for instance high thermal robustness and remarkable mechanical stability. Submarine fibre optics cables – the backbone of the internet – contain optical fibres made of SiO₂-based glasses. Other glass systems such as heavy metal fluorides (ZrF₄ etc.), heavy metal oxides (GeO₂, TeO₂, etc.) or chalcogenides (As₂S₃, As₂Se₃ etc.) are promising for their extended transmission window enabling applications up to the mid-infrared region. One of the heavy metal fluoride glasses (so-called ZBLAN) has the potential to be used in the next-generation fibre-optics cables to enhance the internet speed and capacity. In addition to this, optical glasses offer the ability to be shaped as optical fibres capable of confining and guiding light in optimized sub-micrometric complex geometries. Some of those glass material and fibre features will be presented in this workshop, along with some applications such as sensing arising from this cutting-edge research.

1C Unlocking AI's Potential in Engineering and the Water Sector

Jessica Bohorquez, Aurecon / Our Water Connection

Water is one of our most valuable resources, essential for life, ecosystems, and economies. Yet, managing water effectively is becoming increasingly complex due to climate change, aging infrastructure, and growing consumption demand. Engineering plays a critical role in ensuring safe and sustainable water supply, and today, Artificial Intelligence (AI) is revolutionizing how we tackle these challenges.



CUTTING EDGE SESSIONS

In this session, we will explore how AI-driven solutions are being used to enhance water management. Explored applications will include using Machine Learning to interpret pressure data to detect leaks and bursts in pipelines, rapid flood modelling to support emergency response and much more.

This session will not only highlight groundbreaking AI applications but also spark curiosity about water and its future. Through engaging discussions and real-life applications, participants will gain a deeper appreciation for the intersection of AI, engineering, and water sustainability. Whether you are a STEM educator, a curious learner, or simply passionate about the environment, this talk will provide inspiration and practical insights into how technology is shaping the future of water.

12.20 PM CUTTING EDGE SESSION 2

2A **Microplastic and plastic pollution: The latest research for educators**

Dr Nina Wootton, The University of Adelaide

Plastic pollution is a pressing environmental issue, with microplastics now found in our oceans, seafood, and even the air we breathe. This session provides teachers with the latest Australian and global research on plastic and microplastic pollution, equipping them with evidence-based knowledge to bring into the classroom. Led by Dr Nina Wootton, a marine ecologist specialising in plastic pollution, the session will cover key sources, impacts, and solutions, including research on microplastics in seafood and the marine environment, and circular economy approaches for industry. Educators will engage with real-world case studies, hands-on activities, and initiatives such as Toys for Turtles, which integrates marine science with Indigenous knowledge. The session will provide practical strategies, curriculum-aligned resources, and up-to-date research to help teachers inspire the next generation of students to understand and take action on marine plastic pollution.

2B **Microscopy - Decoding the unseen world of science**

Angus Netting, Inspire STEM

more information to come!

2C **Genetic Diversity in Plants**

Professor Michelle Waycott, The University of Adelaide

more information to come!



WORKSHOP DESCRIPTIONS

11.15 AM WORKSHOP SESSION 1

1.01 Phasor wheels - an innovative tactile tool for teaching quantum path integrals and vectors

Rahul Choudhary, Flinders University

junior secondary (7-10) teachers, senior secondary (11-12) teachers, lab officers

In the late 1940s, quantum electrodynamics (QED) emerged as an exceptionally precise theory describing the interactions between light and matter. A central concept of QED is that particles take all possible paths between two points rather than a single trajectory, formally known as quantum path integrals. Despite its significance, QED is considered beyond school-level education due to its abstract nature and advanced mathematical framework.

This workshop introduces phasor wheels, an innovative graphical tool designed to make QED concepts accessible to high school students. Phasor wheels provide an intuitive way to visualise and compute photon arrival probabilities using graphical vector summation, effectively translating the abstract idea of photon path integrals into a comprehensible hands-on activity. Through this approach, school students can intuitively explore and understand physical phenomena, including interference, diffraction, reflection, and refraction, without requiring advanced mathematical knowledge.

The workshop combines real-world analogies, tactile tools, and videos to elucidate fundamental principles of quantum physics. Single-photon interference videos and simple laser demonstrations reveal students to the quantum world as observational facts. The phasor-wheel method reinforces student understanding of vectors and illustrates quantum physics as well as classical optics. The hands-on, interactive approach makes quantum physics tangible and engaging for school students.

This workshop is suitable for all high school science and mathematics teachers including those who do not teach physics.

1.02 AI in Education - Sharing Success & Learning Together

Jarrold Johnson, Pulteney Grammar School

primary (R-6) teachers, junior secondary (7-10) teachers, senior secondary (11-12) teachers

Join us for an interactive one-hour session where educators come together to share how they are using AI in their teaching practice. Whether you've experimented with ChatGPT for lesson planning, used AI for student feedback, or created custom GPTs to streamline your workload, this is an opportunity to showcase ideas, discuss challenges, and refine your approach.

An open, collaborative space to exchange insights, discover new applications, and learn from each other's experiences. Bring your successes, questions, and curiosity as we explore how AI is transforming education, one prompt at a time!

Suitable for all educators, whether just starting or already embedding AI into everyday teaching.

MONDAY 14 APRIL

1.03 CK-12: A Pathway to Cost-Free Science Learning

Paul Gavini, Modbury High School

primary (R-6) teachers, junior secondary (7-10) teachers, senior secondary (11-12) teachers

CK-12.org is revolutionising education by providing free, high-quality resources tailored to science, technology, engineering, and mathematics (STEM). Designed to support educators and students alike, CK-12 combines customisable content with innovative tools, creating an engaging and flexible learning environment.

This workshop will focus on the platform's key features, including its renowned FlexBooks® - digital textbooks that can be customised to suit specific curricula - and its interactive tools such as simulations, PLIX (Play, Learn, Interact, and eXplore) activities, and adaptive practice exercises. These tools not only engage students but also provide immediate feedback and adjust to individual learning levels. Participants will also explore the marks book feature, which allows educators to track student progress and mastery of concepts in real-time, enabling data-driven teaching strategies.

The session will be highly interactive. Participants are invited to bring their laptops to engage in hands-on exploration of CK-12's tools and resources. Attendees will have the opportunity to customise FlexBooks®, test simulations, practise using the adaptive learning system, and experience how the marks book simplifies assessment and feedback processes.

By the end of the workshop, participants will be equipped with the skills and knowledge to implement CK-12 in their classrooms, creating cost-free, interactive, and student-centred learning experiences. Join us to discover how CK-12 can transform your approach to STEM education while providing practical solutions to support diverse learning needs.

1.04 Applying primary school science in the real world

Dr Sue Gaardboe, Department for Education

primary (R-6) teachers

Providing fun science lessons helps keep students engaged, but it's not enough to keep them connected with science learning. By providing students with opportunities to immediately apply their new knowledge to current, relevant problems, an understanding of the importance of science and its relevance to everyday life is developed. These connections to real-world problems are provided by industry partners who bring genuine, unsolved, multifaceted problems that primary school students investigate through Problem-Based Learning. This seminar will describe the research background for the use of PBL with primary school students. The process of implementing PBL with an industry partner in primary school classrooms will be explained, and information will be provided on the program for primary schools being run through the Department for Education in 2025.

1.05 The Science of Storytelling: Unlocking Engagement, Memory & Meaning in the Classroom

Ross Riach, Trinity College

primary (R-6) teachers, junior secondary (7-10) teachers

Storytelling isn't just for bedtime or bookworms - it's a powerful tool for educators! Research shows that stories enhance engagement, boost memory, and create deeper connections to learning. But how do we harness this power in the science classroom?

This session will explore the art of storytelling in education, exploring techniques to transform lessons, making abstract concepts tangible and content unforgettable. We'll unpack strategies to embed storytelling into teaching and assessment. Whether it's framing a lesson like a mystery, weaving in historical breakthroughs, or crafting immersive fantasy narratives for assessment, you'll leave with practical, ready-to-use ideas and resources to captivate your students.

Come ready to ignite curiosity, build connections, and bring science to life - one story at a time!



1.06 The Ethics of Scientific Discovery: Teaching Critical Thinking in STEM

Dr Roger Yazbek and Prof. Catherine Abbott, Scotch College and Flinders University
junior secondary (7-10) teachers, senior secondary (11-12) teachers

Scientific discovery has delivered transformational outcomes for humanity; however, every breakthrough comes with ethical dilemmas that challenge society. This workshop, The Ethics of Scientific Discovery—Teaching Critical Thinking in STEM, will provide educators with tools to engage students in meaningful discussions about the ethical and societal implications of scientific advancements. By integrating the Science as a Human Endeavour (SHE) concepts into their teaching, educators can help students develop a deeper understanding of science's role in shaping the world.

The session will begin by exploring the ethical dimensions of modern research, from medical biotechnology to genetics and diagnostics. We will introduce a structured approach to incorporating ethical discussions into science lessons, highlighting case studies drawn from our research. For example, we will examine the development of breath test diagnostics for gastrointestinal diseases (Dr Yazbek) and the implications of enzyme-based medical applications (Prof. Abbott), raising questions about accessibility, commercialisation and patient rights.

Participants will engage in an interactive ethical debate activity, taking on roles such as scientists, policymakers, and ethicists to discuss complex bioethical scenarios. Additionally, educators will receive a toolkit for ethical discussions, including adaptable lesson plans, frameworks for guiding debates, and strategies for fostering student engagement with scientific ethics.

By the end of this workshop, teachers will leave with practical strategies for integrating ethics into STEM education, helping students develop critical thinking skills and an appreciation for the broader impact of science on society.

1.07 The art of the segue - storytelling for memorable science learning

Lara Lang and Angeline Buckler, ASMS and Aldinga Payinthe College
junior secondary (7-10) teachers, senior secondary (11-12) teachers

Capture the attention of all learners with stories that connect to science. Engage in memorable learning with an hour of storytelling, telling yarns, and ingenious segues that link the wonders of the real world with curriculum and other life lessons. Open up a whole new world of science's backstory and inspire curiosity with your students. From the potato chip of the sea to pigeon poo and worm trumpets, monks and buttons, songlines, safety and sandwiches - learn fun stories that connect learning and make scientific ideas stick in people's minds.

12.20 PM WORKSHOP SESSION 2

2.01 The Art of Inspiring a Love for Science in Junior Primary Students

Laura Brace, Mitcham Primary School
junior primary (K-3)

Discover practical and creative strategies to spark curiosity and excitement for science in young learners. Drawing on over 20 years of teaching experience, this workshop will equip you with easy, engaging techniques to make science lessons meaningful, accessible and fun. Leave with ready-to-use ideas that bring science to life!



2.02 Experiential approaches to teaching the Australian deep time story through science

Vera Weisbecker, Flinders University

primary (R-6) teachers, junior secondary (7-10) teachers

The deep time Australian story begins between at least 55,000 to 65,000 years ago. Of this long and diverse history, less than 1% is recorded in written documents. It is, therefore, essential that Australian students are introduced to key sources of primary data relating to both the deep-time story of people and of Country. Archaeology (the excavation, analysis and interpretation of material culture from the past) and palaeoecology (the interpretation and reconstruction of past landscapes, climates and ecologies) are two science disciplines that can actively contribute to the Australian Curriculum (v9), particularly in the themes of science as a human endeavour and science inquiry. Fortuitously for teachers, both archaeology and palaeoecology are outstanding examples of interactive and engaging disciplines that ideally lend themselves to experiential and object-based learning approaches.

This workshop introduces “Deep Time Detectives”, a hands-on excavation, analysis and interpretation education program using 3D printed objects to teach scientific excavation and environmental analysis. The program includes a comprehensive teacher manual designed to provide core foundational knowledge in both archaeology and palaeoecology and five engaging animated short videos to explain the core scientific concepts to students. All materials will be available for free and are aligned with the Australian Curriculum. The workshop is ideal for those wanting to build their confidence in data analysis relating to the Australian deep time histories of people and Country.

2.03 Decoding what students know: assessment that embraces metacognition, collaboration and personalisation in senior Chemistry

Lara Lang and Daniel Simons, The Australian Science & Mathematics School

junior secondary (7-10) teachers, senior secondary (11-12) teachers

How do you know what students know and if they really understand a concept? What are the trends shaping learning design and assessment in science? Come along to hear how two Chemistry classes are embracing oral assessment, collaborative hands-on SATS, metacognition and personalisation - and what the students think of it!

2.04 Open Access Bioinformatic Tools to Decode Genetic Data

Masha Smallhorn, Flinders University

junior secondary (7-10) teachers, senior secondary (11-12) teachers, lab officers

Understanding molecular biology, particularly genetics can be challenging for students due to its focus on microscopic elements. Terms like ‘chromosome’, ‘gene’, and ‘DNA’ can be difficult to grasp without access to advanced technology. Bioinformatics, an emerging field in education, offers open-access tools that help decode and interpret genetic data, making these complex concepts more accessible to students.

In this workshop, we will introduce basic open-access bioinformatics tools that teachers can use to explore the genetic code with their students. Co-presented by educators from Flinders University and the Australian Science & Mathematics School, the workshop will demonstrate how bioinformatics can be integrated into the Year 10 Science curriculum and SACE Stage 1 and 2 Biology curricula.

Participants will gain hands-on experience with these tools, learning how to navigate and utilise them effectively in their classroom. We will provide step-by-step guides and practical examples to ensure that teachers feel confident in using these resources. This workshop aims to empower educators with the knowledge and tools needed to make genetics more engaging and comprehensible for their students.

Please bring a laptop to get the most out of this session.

2.05 Astronomy, a Gateway Science into STEM

Robert Hollow, CSIRO, Space and Astronomy

junior secondary (7-10) teachers, senior secondary (11-12) teachers

Astronomy can be regarded as a Gateway Science that inspires students and the public into STEM pathways. Its strength is that it is a discipline in which real scientific data is freely and easily accessible, making it ideal for first-hand and second-hand student investigations.

This workshop introduces participants to a range of Australian and international datasets, where to access them, and how to use them to engage and challenge students. Topics such as exoplanets, pulsars, and galaxy classification are explored, with key databases and science tools identified. Participants will work through examples of some datasets and use online tools for data analysis that they can readily implement in their classrooms. Participants will need to bring a device to work on.

2.06 Physics Playground - Exploring High School Physics

Stuart Lewis, Scientrific Pty Ltd

junior secondary (7-10) teachers, senior secondary (11-12) teachers, lab officers

“Physics is science where you think with your hands”

Are you looking for ways of collecting data related to experiments in the Australian Curriculum - Physics (Especially when inertia keeps you at home)?

This workshop explores Physics using Vernier Dataloggers. With multiple workstations and support from our presenter, participants will use dataloggers to explore different physics experiments. Topics will include:

- Examining motion using a Motion Probe, a Photogate and Video Analysis
- Investigating electrical induction using magnets
- Magnetic fields in a coil
- Newton's Laws of Motion

2.07 Positive behaviour management strategies for years 7-12

Sylvia Charalambous, Adelaide Botanic High School

junior secondary (7-10) teachers, senior secondary (11-12) teachers

This workshop will focus on practical strategies you can apply to create a supportive and positive environment for both you and your students. We will look at the three levels of intervention: preventative, supportive, and corrective.

2.15 PM WORKSHOP SESSION 3

3.01 Drones in Education: why in the Territory?

Jodi Gulley, Northern Territory School of Distance Education

primary (R-6) teachers, junior secondary (7-10) teachers, senior secondary (11-12) teachers

This workshop is for anyone interested in using drones to enhance a course or develop an integrated STEM course. I will present an example of the use of drones in a Stage 1 Integrated Learning—Environment subject in a remote community. However, I have also developed units of work that incorporate the use of drones in primary and secondary settings. These units are fully aligned with the Australian Curriculum: Science and Technologies.

I have taken a special interest in working with drones. Why? Because they are an amazing advancement in technology that is making a difference in the world in so many areas

- Sustainability through wildlife monitoring and identification
- Life-saving support to the health industry
- Improving safety and efficiency in the construction industry
- Reducing chemicals in the agriculture industry
- Drone racing

And they get students excited and engaged because they are a lot of fun!

3.02 It's not a Fringe Show, but... Tips for creating engaging primary science lessons without losing your mind!

Miriam Doull, Unley Primary School

primary (R-6) teachers

Students often arrive at specialist Science lessons expecting fun and excitement - a bubble show, buckets of slime, sherbet to scoff, volcanoes going kaboom, rockets to fire, and geysers of elephant's toothpaste. It's wonderful to see their excitement and interest in doing hands-on science! In fact, it's one of the joys of the job (and can make you a popular teacher??). However, we are typically running this show with no labs, little equipment, and no support to set up and clean up - plus we have a whole curriculum to teach, not just an entertainment schedule to deliver.

So, how can we use that excitement and interest, grounding it in good pedagogy and organisation, to support deep science learning and keep our sanity at the same time?

In this session, you will be introduced to a series of Australian Curriculum aligned learning activities that support hands-on science in the primary classroom, with tips to make the logistics achievable in our context and grounded in good pedagogy.

3.03 Creating Curiosity Collections

Alexandra Fowler, Woomera Area School

primary (R-6) teachers, junior secondary (7-10) teachers

This professional development session explores the value of diverse collections in enriching science education. Participants will learn about building various collection types, including specimens, books, bones, and more, and their role in sparking curiosity and inquiry. Strategies for acquiring items on a budget will be shared, such as self-collecting, student contributions, DIY methods, and cost-effective purchasing.

The session will also discuss approaches to student access, balancing free exploration with structured lesson integration to maximise learning opportunities. Practical tips for maintaining collections, ensuring longevity, and displaying items effectively will be covered, with an emphasis on provoking discussion and engagement. Educators will leave equipped with actionable ideas to build, manage, and utilise classroom collections, fostering hands-on, experiential learning that supports the science curriculum while provoking engagement in the wider aspects of science.

3.04D Running Design Practicals in the Middle School (DOUBLE)

Jason Greenslade, Westminster School

junior secondary (7-10) teachers

In this workshop, we will examine the important role that practical design plays in the middle school science classroom. We will begin by looking at a practical task that could be given (and differentiated) and then talk through strategies to teach/brainstorm this in the classroom. A variety of ICT tools will be employed to get students to brainstorm in a group in real time. We will then discuss how students might show some basic evidence of this design before moving to the practical component. Attendees will have the opportunity to carry out a practical. At the end, we will analyse the data and discuss errors in a way that might help middle school students 'get it'.

In short, the entire practical process will be modelled (in a shortened timeframe) to allow participants to see how it might work in their classroom, and you will leave with a new task and some other new tools.

Please note: this is a double session and will run for 2 hours

3.05 From Classroom to Orbit: How you can use space technology in the classroom

Edward Robinson, Robinson Aerospace

junior secondary (7-10) teachers, senior secondary (11-12) teachers

Come along and learn about space technology, build a real satellite and learn how you can use space technology in your classes! You'll learn how to teach science in the context of space, showing students why things matter.

Robinson Aerospace is a local STEM education company with a mission to inspire students to pursue careers in STEM while giving them the hands-on skills and knowledge required. Since there's nothing more exciting than space, we provide students with replica satellite kits. Students get to build the satellites, get wireless data from the sensors and conduct experiments in class. Teachers also access our library of ready-to-go lesson plans and PD.

3.06 The Science of the Ridiculous

Stuart Lewis, Scientrific Pty Ltd

junior secondary (7-10) teachers, senior secondary (11-12) teachers, lab officers

The everyday, all around us, is filled with so much wonder that we are flooded by it. We make the extraordinary normal. We forget to take time to play, to be silly, and to find the little sparks that turn it into back into the extraordinary, the ridiculous.

In this workshop, we will start playing with science (if necessary, applying it to the curriculum). Fun will be had with (but potentially not limited to):

- People and their reactions
- The mind and what it can hold
- Colours
- And Food



3.07 Introducing Electro-Magnetism to Explain Bonding Electron Models

John Drew, Department for Education

junior secondary (7-10) teachers, senior secondary (11-12) teachers

As merciful educators, we show secondary school students pattern puzzles as analogies to electron shell energy level patterns encountered in the Periodic Table of Elements. To use quantum mechanics to explain electron spin-pair orbitals would evoke the Niels Bohr quip: "If you have studied quantum mechanics without getting a headache, then you have not understood it."

After an initial heavy-handed attempt to present a not-so-simplified quantum mechanical explanation of spin-pairing to a secondary school student, they responded by saying:

"I got a headache reading about quantum mechanics, but I still don't understand it."

Presenting the inner workings of bonding electrons using a simplified quantum mechanical perspective to improve secondary student understanding required much more effort. Long-time collaboration with various Laboratory Managers has produced an eclectic collection of firsthand practical activities for students that complement their online experiences of electromagnetism in bonding electrons.

Workshop participants will have their own firsthand experiences with a spinning wave model powered by a ticker timer, an electromagnetic inductor, and a large-scale electrical coil connected to a Variable Current power pack that provides analogies for students to experience wave behaviour and the wave-like properties of electromagnetism.

Digital and hard copy student learning activities that develop electron spin-pairing notation leading to Bonding Models will be provided to workshop participants. In other words, show that all chemical bonding between atoms starts with wave-like electromagnetic interactions of electrons.

3.08 Igniting Curiosity all year round - Strategies to celebrate Science all year round

Paul Beneke, Glenunga International High School

junior secondary (7-10) teachers, senior secondary (11-12) teachers

Science is more than just a subject—it's a way of thinking, questioning, and exploring the world. Yet, enthusiasm for Science often peaks during National Science Week or major events before fading into routine. This workshop focuses on strategies to embed a culture of curiosity and scientific celebration throughout the year, making Science a dynamic and engaging presence in your school community.

Participants will explore creative approaches to sustaining student engagement, from whole-school Science challenges and interdisciplinary collaborations to student-led investigations and public showcases. We will discuss practical ways to connect Science with real-world applications, integrate it into everyday learning, and create traditions that keep the excitement alive. By the end of the session, attendees will leave with a toolkit of ideas to inspire students and staff alike, ensuring Science remains a vibrant and celebrated part of school life all year round.

3.20 PM WORKSHOP SESSION 4

4.01 Using the Oliphant Science Awards to Assess Science

Kathleen Best, Clarendon Primary School

primary (R-6) teachers, junior secondary (7-10) teachers, senior secondary (11-12) teachers

This workshop will explore how we use the resources available from the Oliphant Science Awards to plan and assess science in a way that includes diverse learners. I will show you how our school plans to use the Oliphant Science Awards categories as a tool for quality assessment while supporting learners. At the end of this session, you will be confident in using the tools available online to create quality learning tasks that support all learners while encouraging excellence in science learning.

4.02 Weaving it all together: The art of planning a Primary Science program aligned to the Australian Curriculum v9

Miriam Doull, Unley Primary School

primary (R-6) teachers

The Science curriculum can seem overwhelming, as it is very dense. At times, it can seem simpler to design an engaging program that is centred on investigations, but then it can be hard to demonstrate accountability for ensuring students are accessing learning aligned with the Curriculum.

In this session I will shine a light on a range of planning structures that I use to plan my Primary Science program. This includes the templates and conceptual approach that I use for working through a Science Understanding topic each Term, underpinned by Science as a Human Endeavour and Science Inquiry Skills. You'll even leave with a copy of the Primary Science Curriculum on a page!

The conversation will also include a thread of reality, recognising that often, we need a planning structure that works with delivering a responsive and engaging program. I will show how I include elements of "just-in-time" planning that considers what students bring to the learning and teaches from where they are at.

Bring a device and we can look at the Australian Curriculum v9 together. Participants will have the opportunity to share their approach to planning, and even do some collaborative planning on the spot.

4.03 The Neuroscience of Science Learning: Decoding the Path to Deep Understanding

Michelle Kueh, Britannica Education

primary (R-6) teachers, junior secondary (7-10) teachers

How do students truly learn science? Understanding the neuroscience behind science learning can help educators design more effective lessons that move beyond memorisation to meaningful comprehension and long-term retention. In this session, we will explore the cognitive science of learning - how knowledge is acquired, recalled, and expanded upon - and discuss how these principles can be applied in STEM/science teaching.

One key challenge in K-8 STEM/science education today is that many teachers do not have specialist science training, making it difficult to teach complex topics confidently. This presentation will provide a structured, neuroscience-backed approach to scaffolding science learning, helping teachers spark curiosity, build understanding, and facilitate recall. We will compare current teaching practices with research-based strategies that activate prior knowledge, develop depth in explanations, and guide students through the essential process of recall, connection, and knowledge expansion.

We will also touch on the science of curiosity and intrinsic motivation, exploring how making learning meaningful can lead to stronger engagement and better retention. A practical focus will be placed on plug-and-play resources, such as Britannica Science—Expedition Learn, which provide structured lessons that any teacher can confidently implement. Based on current popular STEM topics, such as climate change and animal life cycles, we will demonstrate hands-on strategies that teachers can take back to their classrooms and apply immediately.

The session will conclude with an exit quiz, reinforcing the importance of retrieval practice in strengthening memory and confirming a growth mindset in both teachers and students. By the end of this workshop, participants will have a practical, neuroscience-informed framework for decoding science learning, making high-quality science education accessible for all students - regardless of their teacher's background.

4.04 Flipped Learning in Senior Biology to develop an inclusive and ethical classroom

Alice Leppitt, Darwin High School

junior secondary (7-10) teachers, senior secondary (11-12) teachers

Are you sick of boring students with content-heavy lectures and looking for strategies to teach senior Biology in a more interactive and engaging way?

This workshop aims to:

- define and explain the rationale for Flipped Learning,
- go through how to implement Flipped Learning in your classroom
- provide specific examples of the engaging, ethical and inclusive learning activities Flipped Learning provides the time and space for,
- discuss the impact of Flipped Learning on student well-being and achievement, and
- provide strategies to continually improve your classroom practice.

4.05 Atomic Emission Spectroscopy in the Secondary School Classroom

John Drew, Department for Education

junior secondary (7-10) teachers, senior secondary (11-12) teachers

A significant perspective for secondary school students to investigate the inner workings of atoms is to place a superior quality handheld spectroscope in their hand and look at the sustained light emissions from a glow discharge tube connected to an Extra High Tension power pack. Seeing emission line spectra with their own eyes facilitates believing that something inside atoms is emitting a fixed quantity of energies. This provides the classroom capital and accompanying confidence to analyse personally obtained Atomic Emission Spectroscopy AES observations. Students can then push on developing concrete models about quantum mechanics to explain what is going on inside an atom within a constructionist learning framework. The initial emission line spectra were so clear that a student declared:

“I have read all the textbook references provided, including Wikipedia; I have watched so many online animations about this AES stuff, but I did not really understand any of it until now. Flame tests look pretty but give no idea about what is really going on because they flicker and go out before you can even find the flame. Glow tubes are just there.”

Workshop participants will directly compare flame tests with light emissions from glow discharge tubes using a variety of handheld spectroscopes. This comparison will demonstrate the learning advantage for students of viewing and recording bright clearly defined line spectra that remain in view with the power supply turned on.

Digital and hard copy student learning activities that develop s, p, d, f subshell notation leading to AES based Periodic Table of the Elements will be provided to workshop participants. In other words, show that the modern Periodic Table displayed in science laboratories and classrooms is based on AES as well as periodic chemical reaction groups.

4.06 A Healthy Land - Measuring the environment with Vernier dataloggers

Stuart Lewis, Scientrific Pty Ltd

junior secondary (7-10) teachers, senior secondary (11-12) teachers, lab officers

The natural world is made up of many complex systems that connect. This workshop will look at using datalogging to measure various environmental conditions in plants, the soil and water.

- Looking at chlorophyll in plants
- Investigating plant photosynthesis
- Investigating respiration
- Abiotic conditions
- Water analysis



2.10 PM WORKSHOP SESSION 5

5.01 Using agriculture to inspire your students

Sue Pratt, AgCommunicators

primary (R-6) teachers, junior secondary (7-10) teachers, senior secondary (11-12) teachers

The Lead Agriculture Teacher for SA will lead you through a workshop exploring how to add agriculture at your site - no school farm needed! Ag is the ultimate STEM subject; technology-rich and innovative, the food and fibre context brings explorations of sustainability, the scientific method and Science as a Human Endeavour alive. And with six jobs for every ag science graduate, the sector offers meaningful and inspiring career pathways for your students. The workshop will showcase ACARA-mapped resources that deliver ag content in the Primary and Middle Years, as well as SACE Physics, Chemistry, Biology and Research Projects.

5.02 Turning students into scientists using game-based approaches

Karl Klose & Michael Kasumovic, Loxton Lutheran & Arludo

primary (R-6) teachers

Together we will highlight how we have used a game-based approach coupled with rapid and accurate data collection to help students better understand the scientific process and practice critical and analytical thinking. We will start by providing the background of the aspects students find difficult when thinking about experimental design and hypothesis testing. Additionally, we will highlight how certain steps in the scientific process are more difficult for students to understand relative to others.

In this workshop, we will undertake 1-2 digital experiments where we will collect and analyse data, while also discussing student learning objectives. The majority of the workshop will be interactive. Teachers will leave with at least two different experiments that they can run in their classroom immediately when they return

5.03 Science as a human endeavour embedded into teaching

Hilary Schubert-Jones, Future You

primary (R-6) teachers, junior secondary (7-10) teachers

Research has found that gender stereotypes, biases and poor understanding of how STEM subjects relate to exciting and rewarding STEM careers are barriers to girls' participation in STEM. The free-to-access 'Future You' program aims to address these issues to improve future education and opportunities for underrepresented people in STEM and to strengthen the STEM pipeline so Australia's future workforce can meet the challenges of the future. Pathfinders is a national program that has been designed to show children the breadth and scope of STEM careers, and the diversity of people who can work in those careers. We will show you how to link the Science National Curriculum to teaching resources to weave Science as a Human Endeavour content into your lessons seamlessly.

5.04 Nuclear-powered submarines: A deep dive into the fundamentals of radioactivity, fission and radiation safety

Bridget Murphy, ANSTO

senior secondary (11-12) teachers

South Australia's Submarine Construction Yard at Osbourne will build Australia's next generation of nuclear-powered submarines. The AUKUS program will require many professionals trained in managing radioactivity, fission and radiation safety to ensure the success of this endeavour. The nuclear workforce of the future is sitting in your classroom now!

ANSTO has over 70 years of experience in nuclear science and operates Australia's only nuclear reactor in Lucas Heights in southern Sydney. In this workshop, teachers will deep dive into concepts such as radioactive decay, half-life, measuring radiation, radiation safety, fission and uranium enrichment. Join us to see real dosimeters and radiation monitors in action and learn how they are used to work safely with radiation. Perform radiation experiments safely to learn about alpha, beta and gamma radiation and the effects of shielding. We will also demonstrate two of our free student activities that teach these concepts in a real-world context; 1) Using authentic science data to determine the half-life of radionuclides; 2) Using models to understand the dynamics and requirements of fission chain reactions.

5.05 Exploring visual communication of climate change using technology.

Kelly Sharrad, Geoscience Pathways Project

junior secondary (7-10) teachers, senior secondary (11-12) teachers

Climate change is one of the biggest threats our society faces. The problem, however, is convincing others of its effects when they are often not visible or occur over a longer period. Scientific communication of the evidence of and the effect climate change has on our planet is crucial to inspiring others to act. This workshop will explore the use of technology to visually communicate the effects of climate change in an approachable way.

This workshop is aligned with the new SA Curriculum, embedding science dispositions such as curiosity and environmental responsibility. It also links to Year Levels 5, 9, and 10. These examples are meant to be hooks and conversation starters. They encourage students to drive their learning with teachers as facilitators.

5.06 Strategies for metacognitive thinking

Renee Rees, Cardijn College

junior secondary (7-10) teachers, senior secondary (11-12) teachers

This workshop introduces effective strategies for student learning. It will explore metacognition and raise students' awareness of the learning process through classroom activities and strategies. It will also examine how teachers can encourage students to use higher-order thinking skills.

5.07 Scanning Electron Microscopy in the Classroom - Decoding the unseen world of science

Jessica Jones and Andrew Chua, Inspire STEM Education

primary (R-6) teachers, junior secondary (7-10) teachers, senior secondary (11-12) teachers

In this 1-hour workshop, participants will learn how a scanning electron microscope (SEM) works. Attendees will gain insights into career pathways for students, industry applications of SEM and how to apply SEM investigations to the classroom. Complete a cycle of inquiry, decoding the unseen world of science using a research grade scanning electron microscope. You will gain direct hands-on experience in sample preparation, imaging, analysis and interpretation of your own micrographs. Complete the workshop with a collection of investigations to run with students and access to a library of supporting resources to help you.

3.15 PM**WORKSHOP SESSION 6****6.01 Immersive Learning Unlocked: Implementing VR Strategies for Engaging Classrooms**

Rosanna Cotino, edgedVR

primary (R-6) teachers, junior secondary (7-10) teachers, senior secondary (11-12) teachers

edgedVR is at the forefront of immersive learning, pioneering the integration of Virtual Reality (VR) and AI into education. With a focus on teacher training and student engagement, edgedVR empowers educators to create, implement, and deliver curriculum-aligned VR experiences that enhance learning outcomes. Through cutting-edge technology, edgedVR simplifies content creation, enabling both teachers and students to develop interactive, 360-degree learning environments. This seminar will explore how VR is transforming education, the challenges schools face in adopting immersive technologies, and how edgedVR provides scalable solutions to bridge the gap. Participants will gain insights into real-world implementations, hands-on training approaches, and strategies to future-proof teaching methodologies.



6.02 Decoding Vision Science: A Hands-On Approach to Teaching Light, Sight, and Health

Shaan Gilson, Mary Butler and Cecelia Howard, University of South Australia

primary (R-6) teachers

Vision plays a crucial role in learning, influencing literacy, numeracy, sports, and social development. Undiagnosed vision issues can lead to classroom struggles, disengagement, and learning difficulties. Yet, many students and educators remain unaware of how vision functions and varies between individuals. By integrating vision science into the curriculum, teachers can help students decode the complexities of sight while fostering inquiry-based learning.

This interactive workshop introduces the Vision Awareness Toolkit, an award-winning, interdisciplinary resource co-developed by optometrists, occupational therapists, product designers, and educators in collaboration with children. The toolkit empowers students to explore vision science through hands-on experimentation and real-world applications. The session will highlight student-led learning and cross-curriculum opportunities through the General Capabilities of the Australian Curriculum.

Workshop Highlights:

- Fair Testing in Vision Science - Students conduct peer-to-peer vision screening, applying scientific inquiry principles to explore human vision variability.
- Curriculum Connections—Aligned with Year 6 Science (light, sight, fair testing) and Health (eye anatomy, self-care, health literacy), which links to the General Capabilities through Ethical Understanding and Personal and Social Capability.
- Interdisciplinary Learning - Merging physics, biology, and health education, this resource fosters curiosity while supporting early detection of vision issues.

Participants will gain practical tools, lesson plans, and free teaching materials and explore cross-curricular opportunities, equipping them to bring vision science into the classroom in an engaging and impactful way. At the end of the session, an opportunity will be offered to participate in an Australian study evaluating the toolkit's effectiveness in improving student learning and health outcomes.

6.03 Bringing the Fun to Physics!

Amanda Brick, Modern Teaching Aids (MTA)

junior secondary (7-10) teachers, lab officers

Discover new and exciting ways to teach Year 7-10 Environmental and Physics concepts with simple, easy-to-run activities. Participants will explore exciting hands-on experiments and activities and see how easy it is to deepen students understanding in a fun and engaging environment with curriculum-aligned resources to take back to school. Participants will design an energy-efficient house, explore forces and motion using a rollercoaster, launch ping pong balls using slingshots and catapults, and more!

6.04 Uncover the secrets of radioactivity using real-world data

Bridget Murphy, ANSTO

junior secondary (7-10) teachers, senior secondary (11-12) teachers

We often think of radioactivity as an oddity, something special, rare, and even dangerous. But unstable atoms are all around us - in the air we breathe, the food we eat, the buildings we live in, and even in parts of our own bodies. Join us to measure real radioactive sources with a scintillation counter and learn about the everyday uses of radioactivity using student-friendly data about naturally occurring isotopes of the first twenty elements. We'll work together with this free, interactive resource that teachers can use to cover concepts of atomic number, mass number, isotopes and relative atomic mass, as well as graphing data, processing and analysing data and other Science Inquiry Skills.

6.05 The Science of Us - Measuring humans using Vernier Data Loggers

Stuart Lewis, Scientrific Pty Ltd

junior secondary (7-10) teachers, senior secondary (11-12) teachers, lab officers

Humans are not simple. We are a series of complex systems streamed through a conscious brain. This means that there is a lot that can be measured, from bioelectric impulses required to move muscles to an analysis of touch. This workshop will use Vernier datalogging equipment to explore topics such as:

- EKG and heart analysis
- Muscle analysis and strength
- Wavelengths of light that fool the eye
- How to tell if a room is well-ventilated
- Which feels warmer? tactile illusions
- How much dye is in foods?

6.06 Decoding environmental science and ecosystem exploration with GIS technology

Tessa Lane, Flinders University

junior secondary (7-10) teachers, senior secondary (11-12) teachers

Geography is pivotal to providing students with a framework for understanding complex interactions between Earth processes, ecosystems, climates, and human activities. Modern geography leverages the enormous power of Geographical Information Systems (GIS) and technology (e.g., satellites, drones, GPS) to capture, manage, analyse, and visualise data that allows us to make smarter decisions and solve real-world global challenges. Recent advancements in open-access web-GIS applications have created myriad opportunities for teachers and educators to integrate important environmental and ecological datasets into enquiry-based learning activities for students.

This workshop is aimed at middle school and high school teachers wanting to employ modern technology to help students decode environmental science and ecosystem exploration. We will focus on new open-source web-GIS applications that require no licence or sign-up and can be run directly from a browser. The example I provide will introduce students to the technology behind global temperature monitoring, both on land and sea. Students can access geographically referenced layers and relate temperature, latitude, rotation of the Earth (Coriolis effect) and oceanic circulation while answering a set of guided questions by querying geographic data through a GIS-web interface.

Please bring your questions, concerns, suggestions, and your laptop if you have one. I hope that you leave with new ideas, inspiration, and ready-made lesson plans.

6.07 Transforming Science teaching to a Skills-based approach in years 7 - 10

Paul Beneke, Glenunga International High School

junior secondary (7-10) teachers

As Science educators, we aim to develop students who can think critically, solve problems, and apply their knowledge in real-world contexts. However, traditional content-heavy approaches often limit opportunities for students to engage deeply with scientific skills. This workshop explores how to shift towards a skills-based Science curriculum in Years 7-10, fostering inquiry, analysis, and problem-solving abilities.

Participants will engage with evidence-based strategies for embedding Science Inquiry Skills, data literacy, and scientific communication into teaching and assessment. We will discuss practical approaches to designing lessons that promote student agency, connectedness, and deep learning. Through case studies and interactive discussions, attendees will leave with actionable steps to lead this transformation in their own schools, ensuring students are prepared for the demands of future STEM pathways.

THANK YOU TO OUR GENEROUS SPONSORS

Click on the logos below to visit the sponsor websites

Gold Sponsor



Exhibitors

