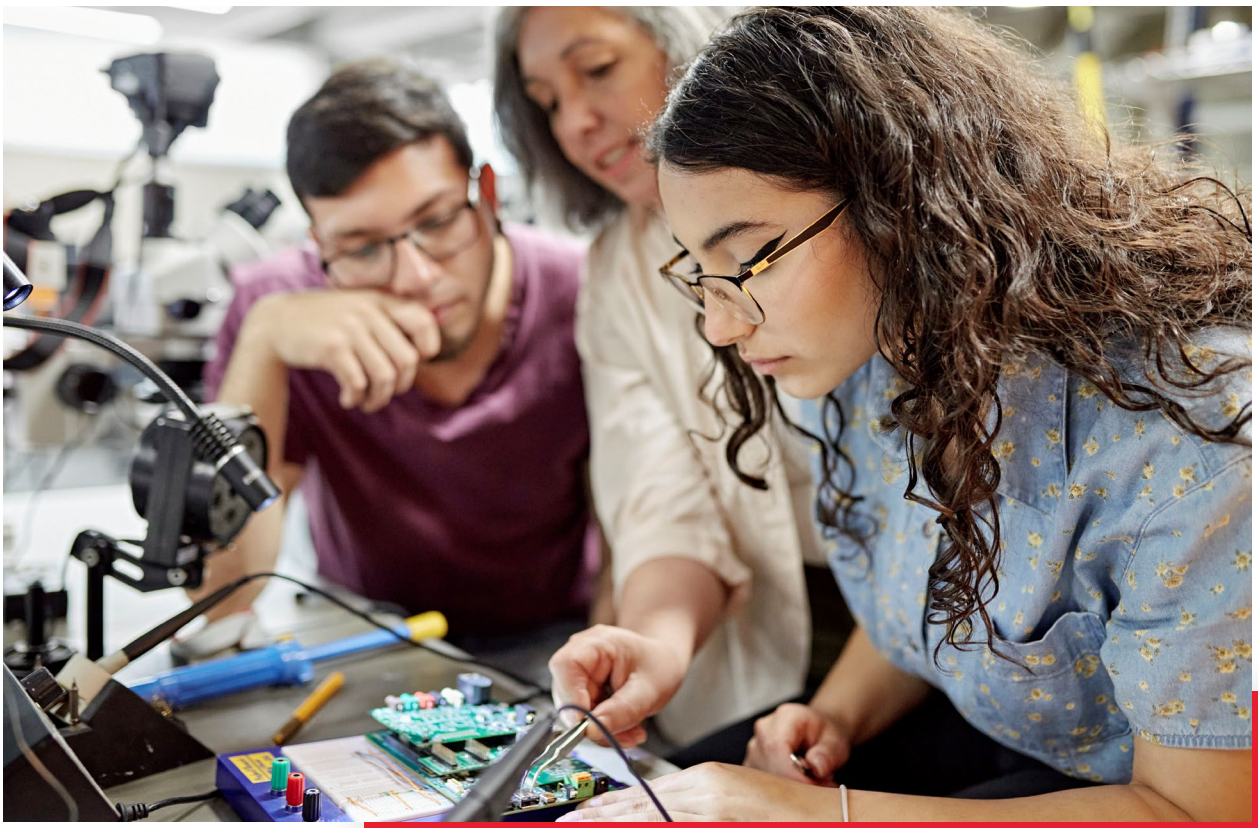
GRIFFITH UNIVERSITY

2023 Cutting Edge STEM Teachers Conference



Griffith University

Gold Coast Campus

Tuesday 28 November 2023

GRIFFITH UNIVERSITY

OPENING KEYNOTE SPEAKER

Dr Mike Todorovic

Power of the Post

The COVID-19 pandemic necessitated a rapid shift to online teaching and learning. While this presented significant challenges for educators and learners, it also illustrated the potential of online platforms, such as social media, to provide inclusive and flexible learning opportunities. Today, social media platforms are increasingly being used by educators as a tool to create innovative and engaging educational content that promotes discussion and fosters a community of learners. Platforms such as Twitter, TikTok, Instagram, Podcasts, and YouTube offer educators an opportunity to connect with learners beyond the classroom, and facilitate interactive and diverse learning experiences across geographic and socioeconomic boundaries. By leveraging social media, educators can democratise access to evidence-based information and shape the learning landscape, ultimately contributing to a more equitable education system. In addition, academics can leverage these platforms to advance their careers through digital scholarship, showcase their work, build a professional network, and establish a reputation as an expert in their field.

NAME OF PRESENTER	INSTITUTION OR ORGANISATION	TITLE	WORKSHOP ABSTRACT
Ryan Stewart	Griffith University	Senior Chemistry Practicals	Our team of experienced chemistry experts will showcase a range of practical experiments that align with the senior chemistry curriculum. Through hands-on demonstrations and step-by-step explanations, teachers will gain valuable insights into the underlying principles and concepts behind each experiment.
Dr Richard Walding	Griffith University	Physics: Two Faraday's law pracs and marking the external exam;	Student experiments involving Faraday's law of induction are rarely done because it's hard to get sufficient and reliable data. Richard will demonstrate two great pracs that could be ideal for your keener students. As an external exam marker for the past four years, he will also run through some pitfalls for students and how to avoid losing marks. This is based on his presentation to students and parents at this year's TSXPO.
Rebekah O'Keeffe	The University of Adelaide: Maths in Schools Professional Learning	Culturally responsive maths pedagogy + Digital Technologies (secondary)	This hands-on workshop will explore a range of strategies to make Maths authentic and meaningful for your students, by finding ways to connect to culture and everyday maths. First Nations Australians have been weaving baskets, nets and traps for thousands of years for various uses. Natural materials, such as grasses and reeds, are used to make different, purposeful everyday objects. In this activity, teachers will design and construct a fishing net, using either concrete materials or AR, while exploring the mathematics involved. Walk away with a framework for designing culturally responsive lessons and lots of activity ideas to get you started – with and without technology.
Elisabeth Jessop	Education Queensland	Metacognitive Tactics for Test Questions	We have an expectation that expertise in exams is achieved by students. A student does so many exams in their schooling career, surely how could they not have learned to cope by now? However, yes, metacognition is developed with maturity, but any metacognitive tactics for exam situations is not always implicitly learned. Literature indicates that metacognition is best learned when applied to contextualised and familiar cases. If this is the case and if metacognition for exams is rarely addressed, how can we expect that students perform with optimal functioning? I propose that metacognition for testing is explicitly taught and learned, and repeatedly.

Glycomics – Dr Phillip Ellery	Griffith University	Glycomics Facility tour, talk and Q&A	Griffith University's Institute for Glycomics invites you to experience first-hand, the ground-breaking research and science behind the discovery and development of drugs, vaccines and diagnostics. Our Institute applies innovative multidisciplinary science in a unique research environment centred around 'glycomics' a field that explores the structural and functional properties of sugars and their roles in disease. With a focus on translational research, we are committed to delivering life-saving diagnostics, preventions and cures to those who need them most. General Manager, Dr Phil Ellery, will give a short presentation in the Lecture Theatre (Level 4, Building G26) followed by a tour of our state-of-the-art facilities including the new ACRF International Centre for Cancer Glycomics. We look forward to welcoming you to the Institute.
Associate Professor Thomas Haselhorst	Griffith University	Molecular Visualisation Software for Science Teachers	'Many students and educators encounter challenges when trying to grasp the three-dimensional (3D) structures of molecules, a fundamental concept in the fields of chemistry and biology. The ability to 'see' molecules in 3D can be a game-changer in enhancing understanding and learning outcomes. Molecular Visualization software is an exciting tool that brings molecules to life and enables us to explore their 3D structures. In this engaging workshop, we will empower science teachers with practical skills for molecular visualization. Through interactive activities, participants will learn to construct and manipulate 3D molecules on their screens. We'll begin with simple molecules like water, alcohol, and formaldehyde, gradually progressing to more complex structures such as proteins, enzymes with drug interactions, and the iconic DNA double helix. Join us in this hands-on experience, where you'll gain the tools to make the invisible world of molecules come alive in your classroom, transforming the way your students perceive and understand the wonders of chemistry and biology."
Rhetta Chappell	Griffith University	Harnessing the power of data storytelling to improve data fluency in the age of GenAI	Data literacy and fluency have long been heralded as crucial skills for future generations, especially now with the rise of free AI and analytics tools like chatGPT. Our workshop will dive into the art of data storytelling, showcasing its significance with a fresh and innovative NAPLAN case study that shifts the focus to celebrating Indigenous academic achievement, moving away from the prevalent deficit-focused (close-the-gap) narratives. We'll also explore how GenAI can responsibly boost data skills in the classroom, demonstrating its potential as an interactive, educational resource that can help break down complex data for a wider audience

			and enhances communication of essential insights to non-expert audiences.
Cath Menzler	QCAA	Digital innovation in planning for AC v9.0: Science	Our role as Science teachers is to ensure students develop 'an interest in science as a way of expanding their curiosity and willingness to explore, ask questions about and speculate on the changing world they live in'. This aim from Australian Curriculum Version 9.0: Science encapsulates the challenge teachers face as they plan for teaching science in 2024 and beyond. The QCAA P–10 Planning app is an innovative digital solution for teachers. More efficient, evidence-based planning empowers teachers to use v9.0 to rethink teaching, learning and assessment so that our students are knowledgeable and confident to engage in science in the world they live in.
Emma Itsimaera	Sycamore Education	From Boxes to Brilliance: The STEM Magic of Cardboard	An engaging and hands-on workshop designed to explore the exciting intersection of STEM education and creative cardboard crafting. This workshop is tailored for primary school educators eager to enhance their teaching toolkit with innovative approaches. Our focus will be on harnessing the potential of MakeDo tools and cardboard joining techniques to foster a dynamic learning environment that sparks curiosity and problem-solving skills in young minds.
Reshmi Kumar	Saint Stephens College	Integrating Visible Learning Pedagogy and Cognitive Load Theory in Senior Science classrooms	This workshop provides a brief overview of visible learning pedagogy, focuses on the importance of making teaching and learning explicit, and cognitive load theory, which places emphasis on understanding and managing the cognitive demands placed on students during instruction. Join us for a collaborative session that will empower you and your colleagues to facilitate the senior science instruction more effectively while reducing cognitive overload, enhancing understanding and retention.
Ryan Nelson	Currumbin Wildlife Sanctuary	Enclosure Design	As we work towards fully respecting our wildlife by not handling them in Education sessions and instead teaching in/alongside our enclosures, the Education Team has developed new programs, aligned to v8.4 of the Australian Curriculum. In this workshop, Enclosure Design, you will participate in activities that illustrate the elements of design and technology, including the considerations of the animal, the keepers, the guests and the zoo, when new enclosures are considered. This program is designed for Year 3 - Year 8 students.

Rebekah O'Keeffe	The University of Adelaide: Maths in Schools Professional Learning	Culturally responsive maths pedagogy + Digital Technologies (primary)	This hands-on workshop will explore a range of strategies to make Maths authentic and meaningful for your students, by finding ways to connect to culture and everyday maths. First Nations Australian Peoples of Australia have creating art through the use of symbols or iconography. Symbols or icons can represent items such as animals, people, meeting places, and nature. In this activity, teachers will design geometric art inspired by First Nations Australian string games, while exploring the mathematics of the shapes involved. To finish the session, teachers will create algorithms to represent their artwork. Walk away with a framework for designing culturally responsive lessons and lots of activity ideas to get you started – with and without technology.
Tom Fitzpatrick	Griffith University	Senior Physics Practicals	The Physics academic and technical staff will demonstrate a selection of Unit 2/3/4 mandatory practicals that we can offer as an On-campus experiences for your students. Through hands-on demonstrations and step-by-step explanations, teachers will gain valuable insights into each experiment.
Dr Richard Walding	Griffith University	Chemistry: Two great acid-base equilibrium pracs for senior chem	The conductivity of weak acids in solution make great pracs for the student experiment. Richard will present a couple of reliable ones that he's tried out. He'll also present a heat of neutralisation titration prac that works really well for student experiments.
Talis Blums	The Urban Bee Co.	Pollinator friendly garden to support our Native bees and environment	Everyone has the ability to create and support a pollinator friendly garden. From the urban back yard to the school veggie patch, we can all do our part. In this workshop we discuss the importance of all pollinators to our environment, the food web and human food security. Unfortunately, human interactions with our environment are having a detrimental effect on our pollinators due to loss of habitat, reduced food sources and the use of pesticides in our gardens. We showcase simple ideas that schools or parents can do with their children to create habitat for these amazing little insects and help to regenerate our soils and gardens in the process.
Jake Williamson	Education QLD	SER STEM Teachers Network Collaboration Hub	Sharing of a team's site that can be utilised by STEM network attendees to engage with resources, learnings and contacts shared at network meetings. We will also be covering a resource sharing model that can be utilised by primary and secondary schools.

Cherie Nelson	Education Queensland	Engaging students with VR	Learn how to use VR to easily engage your students in Math, Science and STEM (and other subjects) concepts with the use of CoSpaces and headsets.
Amber Salmon	QCAA	Senior science curriculum: Familiarisation and implementation of the revised General senior syllabuses	In 2024, Queensland schools will have the opportunity to engage with the revised QCAA senior syllabuses for familiarisation ahead of implementation with Year 11 students in 2025. In this session we'll explore the revised General Senior Science syllabuses, focusing on the role of inquiry in teaching, learning and assessment in the senior science curriculum.
Lisa Sullivan	Horizon Educational	Renewable Energy Box	Hydrogen-Solar-Wind-Ethanol-Saltwater Battery experiments Learn in a 50-minute interactive session how renewable energy works. Make hydrogen, store then reverse to use as electricity or to fuel a car all mapped to ACARA.
Ellen Wallbank	SeaWorld	Marine Educational Programs and Career Opportunities	The Marine Education team at Sea World offer educational programs on a wide range of topics including marine ecosystems, climate change, snorkelling skills, water testing, surveying, ocean health, animal behaviour, husbandry, adaptations and training techniques. We will be showing the resources we use for each of these programs and explaining the practical elements included. We will also be discussing some of the research and rescue work our non-for-profit organisation the Sea World Foundation takes part in and how education is an integral part of promoting marine conservation.
Maria Barrett and Josie O'Shea	CSIRO	CSIRO STEM Professionals in Schools: Cutting Edge partnerships with Industry.	CSIRO STEM Professionals in Schools is Australia's largest skilled volunteer program for STEM professionals and schoolteachers from F-12. Teachers and STEM professionals are individually matched to form flexible, ongoing partnerships through which they explore real world STEM in innovative and creative ways to bring STEM to life in the classroom. Each partnership is unique as the partners determine what works best for them based on their combined expertise, the curriculum or student needs, and their availability. Partnership activities are diverse and can range from mentoring teachers and students, providing hands-on demonstrations, career talks and presentations, to supporting specialist STEM clubs and student projects and hosting site visits or virtual lab tours. These activities enhance teachers' and students' STEM skills, knowledge, and confidence. In this workshop we will showcase Queensland partnerships which have created a culture of innovative teaching and learning by bringing

			real-world STEM experiences into the classroom.
Micha Andersson and Kirsty Wallis	LORDS	Saving koalas: turn your students into citizen scientists	Would you like your students to become citizen scientists? Working together with conservation ecologists to conduct authentic assessments and collect data from local, endangered wildlife? In this workshop, you will learn how to conduct a koala habitat study and how this can be used both for your senior biology IA2 as well as primary and middle school ecology units.
Dr Munkhbayar Batmunkh	Griffith University	Next generation photovoltaic (PV) technologies and design	Nanocrystalline dye-sensitised solar cells (DSSCs) are a promising new technology based on principles involved in natural photosynthesis. In this session, you will fabricate an efficient photovoltaic (PV) device using nanocrystalline titanium dioxide (TiO_2) which you will sensitise with natural dyes and synthetic dyes.
ADaPT	Griffith University	Facility tour, talk and Q&A	ADaPT integrates all of Griffith's key R&D equipment that enables advanced design and prototyping as well as leveraging expertise and equipment located elsewhere on the university's campuses. From the latest medical grade metal 3D printer, to advanced post-fabrication processing and nano-technology equipment, ADaPT is a high-tech one-stop-shop.
Rebekah O'Keeffe	The University of Adelaide: Maths in Schools Professional Learning	Combining concrete materials and digital technologies in the maths classroom	This workshop will demonstrate how teachers can use the Concrete-Representation-Abstract model as an explicit teaching approach to provide instruction, demonstrate concepts, and build student knowledge and skills in maths. Participants in this workshop will also explore effective strategies for integrating technology into the classroom, harnessing its potential to enhance the learning experience. By the end of the session, educators will leave with a toolkit of practical techniques to create dynamic, technology-enhanced lessons that cater to diverse learning styles and foster a deeper understanding of mathematical concepts.
Dr Sreejith Kamalalayam Rajan	Griffith University	Antigravity using sound: Science, engineering and applications in Space Research	Levitating in the air against gravity has always fascinated people of all time. Here is an opportunity to witness the levitation of objects in the air using sound energy. This is a lecture combined with a practical demonstration of an antigravity levitation experiment using sound energy. The audience will learn the fundamental science and engineering behind the phenomenon. The session will also provide insights into various applications of this technology in space research.

Dr Maksym Rybachuk	Griffith University	Application of reverse materials engineering to STEM education	Reverse materials engineering, also known as reverse engineering of materials, is a process in which the composition, structure, and properties of a material are evaluated and understood in order to replicate, modify or improve them. This involves analysing a material employing deductive reasoning to determine its fundamental characteristics, such as its chemical composition, microstructure, mechanical properties, and thermal and electrical properties, by means of destructive and non-destructive methods. The hands-on practical workshop offers an introduction into an informed selection, application and use of common engineering materials including metals, polymers, and elastomers, in commodity products such as those present in an everyday home. It aims to offer an appreciation of the variety historical and modern imperative technological traditions to the selection, use and application of materials and enhance students' creativity, imagination and problem-solving skills in STEM disciplines.
Geraldine Squires SEQ Division President	Environment Institute of Australia and New Zealand	Career planning for environmental professionals	What do environmental professionals do, why is it rewarding, how to build a career as an environmental professional, who is EIANZ and how do they support environmental professionals?
Joshua Ferguson	Education Queensland	Using 3D Virtual Classroom for collaborative STEM Teaching and Learning	Demonstration of the use of the iSee Virtual Classroom, via example lesson. Demonstrate varied teaching practices and learning activities possible through use of 3D environment. Examples of STEM classes delivered by QVSA, to remote students across QLD
Stacey Martin	EDROLO	Score the trifecta! Skills, content and outcomes in secondary Science	This session will help you examine and strengthen the links between Science skills, content, and student outcomes in 7-10, helping you to plan lessons that set your students up to pursue and succeed in Science in the senior years. Former Science teacher and senior Biology assessor, Stacey Martin, will walk through unpacking the progression of Science skills from 7-10 in Australian Curriculum 9.0, highlight opportunities for embedding and teaching content alongside building skills, and how to make curriculum-aligned lessons that scaffold students through the achievement standards. There will be opportunities to collaborate and co-plan lesson activities within the session.
Dr Henry Nyugen	Griffith University	Fact-Checking with Big Data Lab	In the "Fact-Checking with Big Data Lab" activity, students will delve into the vital realm of fact-checking under the guidance of Big Data Lab experts. Through live demonstrations, they will witness cutting-edge fact-checking tools in action, learning how AI technology crawls and

			collects evidence to verify claims. Afterward, students will get hands-on experience using the fact-checking tool to assess claims of their choice, while exploring the evidence gathered by AI. This activity will encourage knowledge sharing and critical thinking as students analyse their findings, ultimately equipping them with essential skills to navigate today's information landscape and combat misinformation effectively.
Dr Heather Shearer	Griffith University	Harnessing AI tools in teaching and research.	Like it or not, AI tools such as ChatGPT are part of the future of education, and science. How can we use the power of in our teaching and research.
Miles Cornish	Griffith University	Engineering Facilities Tour	Tour the Electrical, Civil and Mechanical Engineering facilities from the School of Engineering and Built Environment including: - Composites manufacturing laboratory - Geotechnical and soils laboratories - Coastal and marine engineering test flumes. You will see the machinery, testing equipment and laboratory layouts, plus a detailed talk of the latest teaching and research projects plus a tour of the Griffith Racing Formula S.A.E teams workshop.
Alecia De Piazza	Natura Pacific	STEM Education in Schools- Mini Beast workshop	Mini beasts galore! Explore the fun program which allows students to get up close and personal with bugs from land and water while learning all about the way they live their lives and what they need to survive. This is an engaging way to connect children with the creatures that are living all around us and how important it is to care for the environment in which we all live.
Dr Munkhbayar Batmunkh	Griffith University	Next generation photovoltaic (PV) technologies and design	Nanocrystalline dye-sensitised solar cells (DSSCs) are a promising new technology based on principles involved in natural photosynthesis. In this session, you will fabricate an efficient photovoltaic (PV) device using nanocrystalline titanium dioxide (TiO_2) which you will sensitise with natural dyes and synthetic dyes.
Natalie Hughes	Women in Engineering	Bots, Bridges and Pollution - Mechatronic, Civil and Environmental Engineering concepts	Engineering is an incredibly broad industry, but remains a mystery to most people who are unfamiliar with it. This workshop aims to discuss some basic concepts from mechanical, electrical, civil and environmental engineering. A member from Griffith's Women in Engineering (WiE) Club will introduce Snap Rover electric circuits, bridge building using basic materials, and how to deal with oil spills in the ocean. You will be provided a USB containing the presentation and handouts so you can take the problem-solving concepts back to the

			classroom to share the importance and exciting potential of a career in engineering!
Dave Canavan	Stile Education	The science of study skills	What techniques actually help retain concepts over a long time? Do your students know how to study? Can you explain to them what techniques actually work? Join us for an insight into study strategies that work, based on extensive cognitive psychological research.

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