



Science Teachers' Association of Victoria Inc.

ABN 59 004 145 329

Patron: Associate Professor Misty Jenkins BSc (Hons), PhD, MAICD

Science Victoria

ABN 94 108 759 762



VCE Science Teachers Conference Series 2021

PHYSICS

19th February 2021

All sessions will be recorded and available to view until late 2021

Focussed on the Future

Welcome to VCE Physics Teachers 2021 Online Conference

Welcome to the VCE Physics 2021 Online Conference. We have an exciting, diverse and engaging program with a mix of live and prerecorded presentations and workshops. Expert climate modeller, Professor Todd Lane will open the conference with a timely keynote on the physics of climate change and insight into the future of climate modeling, followed by a small group discussion forum for exchanging teaching ideas and resources on climate change.

There will be three live sessions with twenty five choices of workshops covering curriculum, pedagogy, assessment, technology as well as extension topics. The live program concludes with a review of the 2020 VCE examination led by the Chief Assessor, Andrew Hansen. The online format enables a great new feature for this conference. This year, the Chief Assessor will pre-record a detailed review of the paper and you will be able to post questions and comments prior to the live session that concludes the conference. The live session will address the questions and comments and allow opportunity for further interaction.

In addition, there will be the opportunity to network with colleagues, interact with exhibitors and to access multiple pre-recorded presentations on-demand. All sessions will be recorded and available for viewing after February 19th, providing you with a great ongoing resource. We acknowledge and thank our generous exhibitors and sponsors and we encourage you to click on their logos on the interactive wall and learn more about their products and services during the breaks in the program. Many of them will also present a short twenty min live session or pre-recorded presentation and be available on the day for answering your questions either via the chat function on Zoom or directly via phone or email.

Finally, thank you for participating in this conference, thus ensuring you stay fully informed of the key issues in the VCE sciences. We trust you will enjoy and find the sessions interesting and rewarding.

Alexandra Abela, President, Science Teachers' Association of Victoria Inc.

Jane Coyle, President, VicPhysics Teachers' Network Inc.

Science Teachers' Association of Victoria Inc. acknowledges the support of the Department of Education and Training through the Strategic Partnerships Program.



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Live Sessions

live on 19th February 2021

8:45am - 9:00am Welcome by Alexandra Abela, STAV President and Jane Coyle, VicPhysics President

9.00am - 9:45am Keynote Professor Todd Lane introduced by Jane Coyle



“Telling the future: the latest advances in climate modelling”

Climate change is one of the greatest challenges facing future generations, with the promise of increasing temperature and changes to our extreme weather. Predictions of future climate come from climate models, which are complex computational models based on the fundamental laws of physics. In this talk Todd will cover the basics of climate modelling and how climate models will improve in the future. He will also explain how some aspects of model predictions of future climate are uncertain, but how we use our physical understanding to supplement those uncertainties.

Todd Lane is a Professor in atmospheric science at The University of Melbourne and the Deputy Director of the Australian Research Council’s Centre of Excellence for Climate Extremes. He is the former President of the Australian Meteorological and Oceanographic Society. Todd Lane completed his PhD at Monash University, held research scientist positions at the U.S. National Center for Atmospheric Research, and then commenced an academic position at The University of Melbourne where he has been since 2005. His research spans a range of topics in climate science, including extreme rainfall, bushfire weather, thunderstorms, and atmospheric modelling.

9:45am - 10:10am **Small group discussion session**

Breakout groups exchanging ideas/resources on teaching climate change

10:10am - 10:30am **Morning Break/Lightning Session A**

A10.1 StudyClix

A11.1 Bankfirst

Session A

10:30am - 11:15am

A1 Adele Hudson and Christian Inturrisi

Giving students choice in Units 1&2 Physics

Researchers have found that students are more motivated to learn when they are given choice and opportunities to approach their learning in their own way. There is also the additional benefit that these type of learning experiences better reflect STEM careers. This session will showcase how these principles can be embedded into Unit 1 and 2 Physics, giving focus to the Unit 2 Areas of Study, Motion, Options, and the Practical Investigation. Using these principles to design Year 10 science has correlated with an increased participation of girls in Units 1 and 2 Physics and an overall increase in student numbers in VCE sciences.

A2 Theo Hughes

Weighty Issues

A discussion of curriculum issues, definitional issues, notational issues, conceptual issues, real-world issues etc. about "weight". You might think you've thought about it all... but VERY likely you haven't!"

A3 Colin Chapman

Wolfram System Modeler and Mathematica for meaningful circuit modelling and simulation

Wolfram SystemModeler and Mathematica are computational software offerings that allow diverse systems in the sciences to be modelled, manipulated and displayed as a learning and teaching tool. During this presentation representations of both voltage and current dividing circuits will be built and simulated using Wolfram SystemModeler and manipulated using Wolfram Mathematica. Links will be explored between experimental and modelling activities in learning and teaching, with a focus on the capabilities of Wolfram SystemModeler to modify parameters for components such that models may be moved from idealised representations of a system, towards increasingly realistic, non-idealised representations.

A4 Maria James

Planning and developing SAC tasks for teachers new to VCE Physics

Are you new to teaching VCE Physics? Using other people's SAC tasks, or those from commercial companies, or VCAA past examination questions, can often compromise the VCE assessment principles of fairness, balance, equity and efficiency. This workshop will outline common pitfalls in designing SAC tasks as well as providing suggestions and stimulus materials as starting points for the development of tasks that will be unique to each school, thereby avoiding authentication issues. The use of VCAA performance descriptors will also be discussed. Participants will be provided with a SAC task development checklist.

A5 Sam John

Brain-Computer Interfaces

A Brain-Computer Interface is a device that can enable users to interact with computers or machines using their thoughts. This technology can be used to restore lost function such as movement and speech or to treat people with neurological and psychological conditions. Our group works a revolutionary new technology called the Stentrode. The device is about the size of a paper clip and has been implanted into people with paralysis allowing them to type emails and browse the internet using their thoughts. The Stentrode records brain signals, analyses users thoughts and can be used to control computers or machines.

A6 Michael Rosenbrock and Deepa Jain

Victorian Young Physicists' Tournament: Tips

A panel of teachers who have organised teams in previous years as well as a student from a winning team will share their ideas on generating interest among your students in forming a team, how to support them during the investigation phase and the benefits the students gain from the experience.

A7 Jackie Bondell

Detecting the Unseen: Australia's Hunt for Dark Matter and Gravitational Waves

How do we detect that which cannot be seen? Australia is at the forefront of research in cutting-edge topics in modern physics and astrophysics. In this interactive session, we will review the latest discoveries in gravitational waves physics and dark matter particle physics that have opened new windows to understanding the universe and will discuss how Australian scientists and experiments are contributing to this research. Participants will then have the opportunity to take part in activities appropriate for incorporating these topics into their Physics classes and will receive materials with curriculum links to incorporate these activities in their own classrooms.

A8 Merryn Dawborn-Gundlach and Sydney Boydell

Supporting pre-service Physics teachers in their initial teacher education

Initial teacher education programs offer pedagogy, modelling and teaching practice to pre-service teachers. These programs must provide relevant support so that new teachers can link theory to practice to become confident, independent and proficient teachers. In preparing pre-service Physics teachers for teaching in secondary schools, it is important to support the development of pedagogy, skills, content knowledge and assessment approaches to ensure they are ready to teach, but are there other requirements for ensuring pre-service teachers are classroom ready? What are the teaching and learning approaches that pre-service Physics teachers should understand in making the transition to early-career teachers?

A9 Caroline Cotton and Stephen Pinel

Biobrain - a Physics learning tool

Biobrain, is a Physics learning app that helps VCE Physics students understand key concepts and test their knowledge with real time feedback on their progress. Students are now be able to learn and revise Physics anytime and anywhere, on their mobile devices. Key Areas of Study are separated into topics and graded over three levels of difficulty. Biobrain uses diagrams and text to illustrate key concepts, and has a variety of question types for students to test their knowledge. Students can also keep track of their scores, review answers, and retake quizzes to ensure full understanding and learning over time. Biobrain's learning materials include links to an illustrated glossary to assist learning without leaving the screen. All participants will receive a free trial of Biobrain.

This session is promoting a commercial product

Session B

11:30am - 12:15pm

B1 Dino Cevolatti and Stuart Bird

DIRTSCAN - A Scaffolded Problem-Solving Strategy

We will present a scaffolded problem-solving strategy that we call DIRTSCAN that we use to explicitly teach students to use metacognitive strategies using worked examples and multiple exposures. In brief, DIRTSCAN includes stages of Diagramming, Identifying, Relating, Transposing, Substituting, Calculating, Answering, and, Noticing, that encourage students to document their thinking and communicate their understanding to support their active problem-solving of physics questions. We will provide some examples of how we use this strategy across multiple areas and provide opportunities for participants to share their approaches and reflect on how this strategy can be used to address common misapplications of physics.

B2 Penelope Hale and Kathryn Grainger

The heated practice of uncertainty: using thermal physics to improve practical and analytical skills

Thermodynamics is an ideal place to introduce practical skills in physics, as these experiments often measure one variable (temperature) over time they are critical in developing the concept of uncertainty in measurements and errors in methods. In this workshop, we will distribute data sets for teachers to work on collaboratively in order to explore the effective use of spreadsheets to record, sort, manipulate, calculate, and graph data. This will allow concrete examples of data analysis and discussions of random and systematic errors to be identified, explored, and quantified. The aim of this workshop is to develop better practical analysis skills.

B3 Rachael Gore

Applets for Activating Thinking

The workshop will canvas a series of applets from multiple sources (e.g. oPhysics, Phet, etc) and provide examples of how these can be used during lessons to develop a conceptual understanding of physics. The benefit of allowing students to play in these online environments will be highlighted. Participants will be shown how applets can facilitate students to develop theories and generalisations collect data and and connect physics to real-world contexts. Techniques for integrating applets with hands-on learning will be showcased. The session will emphasise the importance of targeted teacher questioning drawn heavily from visible thinking routines.

B4 Jane Coyle

Designing creative and effective SACs and ATs that aren't tests

The study design offers many alternatives for SACs and assessments in our year 11 & 12 study, but often when we are pushed for time and energy, and we fall back to using a test or similar. In this session Jane will present some of the alternatives she has used and examine how we can use understanding by design, UbD (also known as backwards by design) as a model to enhance our physics instruction and assessment. The primary goal of UbD is student understanding the ability to make meaning of big ideas and transfer their learning. Effective curriculum is planned backwards from long-term desired results through a three-stage design process (Desired Results, Evidence, Learning Plan). She encourages any attendees to bring any SACs they have created that could be shared with the group.

B5 Yuriy Verkhatsky

Algorithms in solving physics problems

In many areas of Physics, solving problems can be organised in certain order of steps applicable if not to all, but to most of them. If students will follow those steps, they will most probably avoid mistakes and get it right. Algorithms were developed for solving problems in many areas of physics: motion, circuits, wave properties of light, wave properties of particles, photoelectric effect, induced EMF etc. Following those steps increases study score on average by 5.

B6 Robert Hollow**What's Up? CSIRO's Initiatives in Space**

CSIRO is a major leader in Australian space initiatives. Specific examples including the Space Roadmap, the newly-established Center 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.

B7 Colin Hopkins**Tips and hints for teachers returning to Physics**

Recently retired from Head of Science at Bialik College, Colin will share tips and hints for engaging students in VCE Physics. Useful resources will also be shared. The presentation will conclude with a question and answer session.

B8 Maria James**VCAA Physics Update**

The review of VCE Physics has re-commenced with the consultation draft to be available for public comment 1 June - 3 Aug 2021. What factors are being considered by the panel? What are the expectations, including numeracy, for students entering Units 1 and 2 Physics? Should all students be able to apply $F = ma$ to familiar and unfamiliar situations by the end of Year 10? How will School-assessed Coursework audit outcomes inform assessment? What have we learned from COVID-19 restrictions that will inform the review process? This session will outline the factors that influence VCE study design reviews.

B9 Luke Webb, Mark Gleeson & Peta Kenny**Searching the Stars: Creating a World-First Radio Astronomy Experience for Victorian Government Schools**

In 2020, VSSEC devised and commissioned a new radio telescope Observatory in regional Victoria, now being operated remotely by Victorian Government schools as part of the Victorian Challenge and Enrichment Series. As far as we know, it's the world's first radio telescope exclusively devoted to school-students. In conjunction with our new Observatory we also developed a new teacher resource package for teachers. In this session, we share our insights so far about developing and trialling this exciting new opportunity for Years 7-12 students, including using it as an extension to the existing curriculum that brings the galaxy a little closer to the next generation of Astronomers.

12:30pm - 1:30pm Lunch Break/Lightning Session B**12:30pm -12:50pm****B10.1 Ciderhouse****B11.1 Education Perfect****12:50pm -1:10pm****B10.2 Emerging Sciences Victoria****B11.2 Jacaranda****1:10pm -1:30pm****B10.3 Engineers Australia****B11.3 Pearson**

Session C

1:30pm-2:15pm

C1 Sandor Kazi

Encouraging students to engage in meaningful discussions in physics and to get students to teach each other.

Do you find that when you ask a question to students in class, most sit there like the statues on Easter Island and only the same student responds? I will present a strategy developed by Professor Eric Mazur at Harvard University that I have used successfully in class which encourages discussion, peer teaching, and fosters building a deeper understanding of physics concepts. I will give an example using a PHeT interactive and socrative.com.

C2 Dan O'Keeffe

Topics for the Practical Investigation

This talk will demonstrate several topics for the Practical Investigation in Units 2 and 4 that use basic equipment, that students can set up quickly each period and begin taking measurements and quickly pack up afterwards and also have hidden depths. This will largely be a repeat of the presentation in 2020 with a couple of extra topics.

C3 Gary Bass and Rebecca Hansen

Wolfram Mathematica - Physics simulations and data visualisation

This presentation provides insights into using Wolfram Language to visualise physics phenomena and improve understanding of data relationships. A variety of Wolfram application software allows pre-programmed simulations to demonstrate established relationships, with user manipulation to adjust settings as well as data entry for plotting and line of best fit and trend analysis with curve fitting. Examples will be chosen from the Wolfram Demonstrations project, where there are over 12,000 interactive demonstrations and 300 specifically for High school physics. <https://demonstrations.wolfram.com> Further details will be provided on how to modify an open source Wolfram demonstration using Mathematica. Raspberry Pi and Arduino are low cost digital devices which can collect data. Mathematica is pre-installed on the official Raspberry Pi NOOBs image (New Out Of the Box). A workflow will be presented which takes raw data from the digital device, posts to a Wolfram Databin and can be accessed by any browser with the URL. This IoT monitoring allows for longer term data collection projects to be observed remotely. Analysis with Wolfram Programming Laboratory online will also be outlined. No installation of software is necessary, although the full version of Mathematica is a free download. Note A Wolfram ID using employer email will be necessary. This is NO cost for any Victorian secondary teacher. <https://lab.wolframcloud.com>.

C4 Martin Levins

Digital Technologies in Physics Teaching

Digital Technologies has a lot more to offer than powerpoint. In this session we will explore the opportunities using simple microcontrollers and keyboard replacements to generate interactive posters, collecting and processing data, and how the student's mobile phone can be used in your teaching.

C5 Bernadette Young

Using evidence-based learning strategies in your classroom

This session aims to make you a more effective teacher and your students more efficient learners. It will summarise the latest research into how the brain works and learns, and show you how you can apply this in your physics classroom, as well as teach it to your students. You will leave with a better understanding of the science of learning, as well as a range of strategies you can use in your lessons straight away.our physics classroom, as well as teach it to your students.

C6 Spiro Liacos

Usain Bolt vs Spiro Liacos: It was neck and neck! And then the gun went off

Pracs, print resources, videos, and activities that will help you to fire up your Unit 2 and/or Year 10 Motion units. For example, using nothing more than a digital camera, find out how fast you can kick a soccer ball. In this session you will also compare Usain Bolt's 100m sprint with your own 100m sprint, analyse the motion of NASA's Space Shuttle as it blasts off into orbit, investigate how the velocity and acceleration of projectiles change, and a whole lot more. Activity sheets will all be provided.

C7 Deepa Jain

Instructional strategies targeting the 3 'L' s - Language, Learners and Literacy

"Teachers can teach however they like, as long as it is ethical and effective in imparting valuable learning, within applicable curriculum and resource constraints" (Scriven, 1994), However, in order to turn Physics from challenging to interesting, convert challenging sophisticated language and texts into meaningful settings; students have to learn how to learn. Learn how and what instructional strategies could make your teaching more effective and valuable in order to activate prior knowledge, setting a purpose, comprehending text; or modelling the process of being an effective reader/writer. Walk away with ideas and strategies, which are applicable from year 7 to 12. Develop a shared language to talk and feel acknowledged, supported and challenged.

C8 Elizabeth Angstmann

An Online Physics Degree for Science Teachers

Across Australia there is a shortage of physics trained high school science teachers. Teachers confident in physics are able to contextualize physics in the junior science syllabus, which has a positive effect on students' physics identity and consequently their interest in a STEM career. To address this shortage, UNSW has introduced an online Graduate Certificate in Physics for Science Teachers. Feedback has been very positive. Graduates have commented on the impact it has had on their teaching of junior science, the applicability and relevance of the degree, and that it has led to many securing permanent jobs.

C9 Brendan Jackson and Dr Andrew McAlindon

Unit 2 AOS 2 - How do heavy things fly?

Participants attending this professional development workshop will be presented with a stand-alone course that they could implement in their school. The professional development session covers the theoretical and practical aspects involved with implementing an Aviation unit which co-incides with the Unit 2 AOS 2 - How do heavy things fly unit. After participation in this workshop, teachers will have the necessary knowledge, skillset, and insight to implement this course in their school with their students, Theoretical Components - Bernoulli's principle and its application to flight - Aircraft design and design considerations when dealing with flight - Electrical systems Practical Components - Create an aircraft using balsa wood, motor, propeller and landing gear - Make modifications to their original aircraft and study the impact of these design changes on flight characteristics

This session is promoting a commercial product

Chief Assessor 2:30pm - 3:30pm

Chief Assessor - Andrew Hansen

Review of the 2020 Physics Exam - lessons from challenging times

This session reviews the key learnings from student responses to the 2020 exam. You will have had a chance to look at Andrew's pre-recorded question by question analysis and to post questions and feedback. He will address those questions and feedback and also bring to you the principal take-home messages from the exam. This is an opportunity to engage in a discussion of strategies for improved student performance in 2021 and beyond.

3:30pm

Conference Close

Closing remarks and thanks by Alexandra Abela, STAV President and Jane Coyle, VicPhysics President

3:30pm - 4:30pm

Afternoon Tea and Networking

On Demand Sessions

available to view from 15th February 2021

Elke Barczak and Emily Rochette

Experiencing the Road to Zero Education Complex and Supporting Resources

In this presentation, we introduce the Road to Zero Education Complex and revised Physics Challenge program offered at the Melbourne Museum and through the Regional In-School Program. The focus of this session is exploring the suite of teaching resources designed in 2020 to scaffold students through hybrid on- and off-line learning experiences as they study motion at levels 9-10 of the Victorian Curriculum. As participants, teachers are offered these free resources to trial and reflect on how they might be adapted for different cohorts of learners in ways that may complement a Road to Zero excursion or incursion, or be used to enhance learning in a classroom setting.

Elke Barczak

Along for the ride: Engaging students in studies of motion using immersive technologies

How do you engage students in meaningful exploration of the physics of motion in a way that is equally appealing to the student who 'doesn't really get science' and the student who reads Cosmos in their spare time? Join Elke to see how this has been achieved at Road to Zero, TAC's world first Road Safety Education Complex at Melbourne Museum. Elke will take you on a virtual tour of the Physics Challenge program, designed for Year 9 and 10 students, and the interactive and immersive Experience Space gallery. The free programs both at Melbourne Museum and via the Regional In-School Program (a pop-up version of the Museum experience in regional schools) will be showcased.

Andrew Hansen

Detailed review of the 2020 VCE examination

This review has been made available so that you can post questions and comments prior to the live session. The live session will address your questions and comments and discuss the main issues arising from the examination and strategies for addressing them.

Glenn Trainor

Radiation Therapy - Exploring Medical Radiations

This presentation will explore the application of physics in healthcare, in particular, radiation therapy for cancer treatment. The intent of this session is to highlight the role that physics plays within this specific type of healthcare and how it can relate to students studying physics in VCE. (This presentation is usually an on-site visit but this year will be pre-recorded due to restrictions in visiting the hospital).

Dan O'Keeffe

The surprising physics of the bounce

When students conduct an experimental investigation into the bounce of a ball, measuring drop height, rebound height and impact time, they find a surprising and seemingly physically inconsistent result. This presentation looks at possible explanations for the result and how they could be tested.

Presenters



Alexandra Abela

Alex is the President of the Science Teachers' Association of Victoria. She has been a continuous member of STAV since joining as a pre-service teacher in 1993. Since first joining STAV Council in 2001, Alex has held a number of Executive roles, and she is currently STAV's representative on the board of the Australian Science Teachers Association. Alex has held a variety of leadership positions in science education throughout her career. She is passionate about curriculum design, committed to innovation in teacher professional learning, and loves teaching students of Chemistry at Penleigh and Essendon Grammar School.



Elizabeth Angstmann

A/Prof Elizabeth Angstmann is an education focused academic and first year director in the School of Physics at the University of New South Wales. Prior this Liz was a high school physics teacher. She is passionate about assisting school teachers to provide the best possible science experience for students. Liz has received several awards for teaching including an AAUT citation for Outstanding Contributions to Student Learning in 2018 and has recently become chair of the Australian Institute of Physics (AIP) Physics Education Group (PEG).



Elke Barczak

Elke is a science communicator and educator who currently works at Melbourne Museum with TAC's Road to Zero Education Complex. Elke began her education journey in ESL before moving to secondary teaching, then finding her niche developing rich learning experiences in the research and cultural sectors.



Gary Bass

Gary is an Apple Distinguished Educator with a deep expertise in using technology to enhance teaching and learning. He is currently teaching at Virtual School Victoria. "I have attached an image of him I found on the internet (I know him, so it is definitely him!)"



Stuart Bird

Stuart Bird and Dino Cevolatti have known each other since 1993 during their undergraduate years in on-campus accommodation in Farrer Hall Monash University and later in share-house accommodation in Malvern and Richmond. They undertook their Post-Graduate Diploma of Education in the same year in 2004 at Melbourne University and have been teaching Physics on-and-off ever since. Stuart has been a Leading Teacher at Castlemaine Secondary from 2012 to 2016 and has since taken on VASS and now Integration coordinator roles. Stuart and Dino write and collaborate on commercially available resources for "Quality Assessment Tasks (QATs)".



Jackie Bondell

Jackie Bondell is Education and Outreach Coordinator for both the ARC Centre of Excellence for Gravitational Wave Discovery (OzGrav) and for the ARC Centre of Excellence for Dark Matter Particle Physics. She develops educational content for public outreach events and curriculum for school incursion programs, focusing on incorporating innovative technology. Prior to 2018, Jackie spent 15 years as a Physics instructor in the US. She holds a Masters Degree in Astrophysics and is a National (US) Board Certified Teacher of Secondary Physical Science.



Dino Cevolati

Dino Cevolatti and Stuart Bird have known each other since 1993 during their undergraduate years in on-campus accommodation in Farrer Hall Monash University and later in share-house accommodation in Malvern and Richmond. They undertook their Post-Graduate Diploma of Education in the same year in 2004 at Melbourne University and have been teaching Physics on-and-off ever since. Dino has been a Leading Teacher at Castlemaine Secondary since 2009 and in 2018 took on the role of Learning Specialist. Dino and Stuart also both write and collaborate on commercially available resources for “Quality Assessment Tasks (QATs)”.



Colin Chapman

Head of Learning - Mathematics at Caroline Chisholm Catholic College.
Victorian Curriculum and Assessment Authority State Reviewer – Systems Engineering.
Teacher Physics, Mathematics, Systems Engineering and Philosophy at Caroline Chisholm Catholic College.



Caroline Cotton

Caroline is the founder of the three Biobrain learning apps. Caroline has extensive experience in Science education.



Jane Coyle

She has been teaching physics for 25 yrs since mid way through her first year of teaching. She teaches a flipped classroom and use a website to support this instruction method. She is a strong proponent of activity based learning and Learning by design (Backwards planning). She has contributed to the VCAA review panel into the VCE Physics Study Design, and is a writer for the Jacaranda textbook and has presented at many conferences over the years.



Merryn Dawborn-Gundlach

Dr. Merryn Dawborn-Gundlach coordinates the Master of Teaching (Secondary) Internship program and is a lecturer in the Master of Teaching (Secondary) and Master of Education (International Baccalaureate) at the Melbourne Graduate School of Education, The University of Melbourne. She has over 40 years' experience teaching in the Victorian Certificate of Education and the International Baccalaureate program, teaching Mathematics, Physics and Science and has taught in Victoria, New South Wales and in the USA. Her research interests are transition to teaching and developing science reasoning competencies for pre-service and early-career science teachers.



Mark Gleeson

Mark has expertise in the disciplines of Science and Engineering. His role is to explore development of current and emergent curriculum areas across a wide audience. Mark has developed and led teacher STEAM professional development both nationally, and internationally over the past five years. This work focuses on contextualising skills-based teaching, and project-based units of work within the classroom.



Rachael Gore

Rachael Gore is an experienced VCE and IB Physics Teacher. She has a Masters in Physics from the University of Melbourne and also taught physics in tertiary settings. Rachael is passionate about developing staff and students who share in her love of Physics. She uses targeted questioning and immersive technologies to enhance student experiences and outcomes. Rachael is an active member of VicPhysics.



Kathryn Grainger

Kathryn is a very experienced Physics teacher currently at the John Monash Science School. She transitioned to teaching from mining engineering and has a particular love of explosions.



Penelope Hale

Penny Hale is a Physics Teacher at Templestowe College and is a passionate advocate for data literacy in science and technology. She promotes the use of data loggers and video analysis in order to develop a core understanding of physics principles using numerical, graphical, and visual representations.



Andrew Hansen

Andrew came to teaching after a career in health care. He has been assessing for over ten years and Chief Assessor for the last five years. Andrew believes that Physics is a discursive art and enjoys watching as students develop their conceptual knowledge through experience and discussion.



Rebecca Hansen

Rebecca is currently teaching Further Mathematics and Year 7 and 8 Mathematics Support at Virtual School Victoria. Rebecca's experience as a student, graduate, and teacher from Texas and a master's degree in education from the University of Melbourne offers a refreshing cross-culture perspective in how technology can be used as a tool to guide teaching and learning.



Robert Hollow

Robert Hollow is the Education Specialist and Student Coordinator with CSIRO Astronomy and Space Science. He leads the innovative PULSE@Parkes education program and delivers teacher professional development across Australia. He is the CSIRO representative on the Education College of the SmartSat CRC and a co-chair of the International Astronomical Union's Working Group on Astronomy Education Research and Methods.



Colin Hopkins

Colin is an expert teacher who has had a profound influence on many new and beginning teachers during his career. He regularly delivers VCE revision lectures and has many years experience with preparing students and as an exam assessor. Colin has recently retired from Head of Science at Bialik College.



Adele Hudson

Adele is Head of Science at Aitken College and currently teaches middle school science, and senior chemistry and physics. Coming from a background in research, Adele is passionate about providing students with opportunities to engage in open-ended investigations; finding that when students learn through exploration and discovery, this engenders in them a love of learning. As part of promoting the importance of science in student's futures, she facilitates numerous extracurricular STEM programs where students are drivers of the projects. One of these programs, EngGirls, is a program that aims to increase girl's awareness of STEM careers.



Theo Hughes

Theo has been a high school teacher, a university lecturer (and Education Manager) as well as having worked in senior roles in publishing and IT. Now he wants to help change education for the better, particularly physics, through his company Level 98.



Brendan Jackson

Brendan has over eight years experience as a secondary school Science, Mathematics and STEM Teacher, and has held various Positions of Leadership in curriculum. Brendan has completed a Bachelor of Science, Masters of Teaching (Secondary) and Masters of Education (Educational Management) at the University of Melbourne. Brendan is currently completing a Doctor of Education at the University of Melbourne, focusing on feedback and the applicability of metacognition. Brendan has also worked as both a lecturer and tutor at the University of Melbourne, within the Melbourne Graduate School of Education.



Deepa Jain

Having experience gained from India, UK and New Zealand, she is now currently teaching Junior science, Engineering and Physics at Kew High school. Teaching is her passion. She tries targetting all students to make them learn and understand by delivering the content using simple and yet effective strategies that make her learners engaged and active.



Maria James

Maria is the Science Curriculum Manager at the Victorian Curriculum and Assessment Authority, having previously held school positions including Head of Science, Dean of Students and Head of Senior College. Maria holds a Masters degree in Education and has written junior science and senior chemistry textbooks.



Sam John

Sam John is a Senior Lecturer in Neural Engineering at the Department of Biomedical Engineering in the University of Melbourne. He has a PhD in Biomedical Engineering and worked on the first Australian Bionic Eye. He has a passion for taking technology from the Lab to people who need it most. His present work aims to restore lost motor and sensory function in people who have lost their ability to move due to paralysis. This technology is called brain-computer interfaces and will provide people with severe paralysis the ability to control a computer or machines using only their thoughts.



Sandor Kazi

He has been teaching at Melbourne Girls' College since 2006. Previously he worked in particle physics at the University of Melbourne and spent time at CERN working on the LHC. The Australian Academy of Science chose me as one of ten young researchers to attend the 2005 Nobel Prize winners' conference in Lindau, Germany. Sandor has presented in the Advanced Physics Series of lectures and demonstrations, and was also a co-author of a series of mathematics text books. In 2014 he was awarded the Hugh Rogers Fellowship which allowed him to visit renowned educator in physics Professor Eric Mazur at Harvard University.



Peta Kenny

Peta has a BEng in Environmental Engineering from RMIT. She leads the day-to-day delivery of VSSEC programs, is responsible for new educator training and contributes to the development of new programs.



Martin Levins

Martin's professional life has been broad. From K-12 education, tertiary lecturer in Initial Teacher Education, he has designed, evaluated and taught courses in Science, Mathematics, Computing, Design & Technology and ICT in both NSW and South Australia and has worked with schools and their jurisdictions nationally. He regularly speaks at international conferences, contributes in global arenas such as EduSummit, and written extensively in the education domain. He is immediate Past President of the Australian Council for Computers in Education, a recovering Director of IT, a serial digital tinkerer and thinker.



Spiro Liacos

Spiro Liacos has been teaching Science, Physics, and PE since 1990. In 2011, he formed Liacos Educational Media with his wife Georgina and the two of them produce the famous Shedding Light series of educational programs.



Andrew McAlindon

Andrew has over ten years experience as a secondary school Science, Mathematics and STEM Teacher, has held various Positions of Leadership in curriculum, and is currently a Deputy Principal. Andrew has completed a Bachelor of Science (Honours), Masters of Teaching (Secondary) and Post Graduate Certificate in Mathematics Leadership at both the University of Melbourne, and Monash University. Andrew has recently completed a Doctor of Education at the University of Melbourne, focusing on the flipped classroom.



Dan O'Keeffe

Dan has been actively involved in promoting extended practical investigations since their introduction into the Physics course in the 1980's. He co-authored the STAV publication 'Investigating', published in 1992. More recently he prepared many of the secondary data videos for this year's COVID affected Practical Investigation. In 2018 he was awarded an OAM for his service to Physics Education. Dan is the current secretary of VicPhysics Teachers' Network and compiles the newsletter and looks after the Vicphysics website.



Emily Rochette

Emily Rochette is a classroom science teacher and lecturer at The Melbourne Graduate School of Education. Her research interests are situated with understanding teachers' use of digital technologies in the science classroom as they teach both in- and out-of-field.



Michael Rosenbrok

Michael is the Assistant Principal responsible for curriculum at Wodonga Senior Secondary College in regional Victoria. A passionate educational leader and a teacher of physics, multimedia, and mathematics, Michael has over 10 years' experience working in schools. He was seconded to the Victorian Curriculum and Assessment Authority (VCAA) for 2 years as a STEM Specialist Teacher and has sat on the Science Teachers Association of Victoria (STAV) Council for 7 years. Michael regularly presents at educational conferences and is a contributing author to 2 high school physics textbooks. He is a passionate advocate for those experiencing socio-economic disadvantage and for students in rural, regional and remote settings. Prior to working in schools Michael worked in the aerospace, automotive and software industries in Germany, the USA and Australia.



Glen Trainor

Glenn Trainor is the Education Coordinator for Radiation Therapy at the Peter MacCallum Cancer Centre in Melbourne. He oversees the largest radiation therapy clinical training program for students within Victoria and is passionate about sharing information about this career option for students with a passion for physics and healthcare.



Yuri Verkhatsky

Yuri teaches physics, mathematics, chemistry and science since 1989 in Australia and overseas. His students were winners of Australian Physics Olympiad, Australian Math Competition, Victorian Young Physicists Tournament, VCE Physics competition of University of Melbourne and so on. He also worked in science research with main area of interest on interaction of electromagnetic and sound waves in the solids as well as an electronic engineer and author of articles and patents. (Some devices designed by him were used in the space stations).



Luke Webb

Luke leads VSSEC's immersive science experience series. He's an aerospace engineer with experience in aviation safety regulation, strategic policy, science communications and business development. He's also a dark chocolate aficionado.



Bernadette Young

Bernadette Young is a maths and physics teacher at Seymour College in central Victoria. She began her teaching career as part of the Teacher for Australia program in 2017. Her professional learning interests are in applying evidence-based teaching and learning strategies, in order to bridge the gap between educational researchers and practicing teachers.