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supporting and promoting mathematics education online

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#cwmday16


# CONNECT WITH MATHS DAY

## at the Victorian Space Science Education Centre

# program

## Friday 18 March, 2016

A partnership between MAV and VSSEC, and supported by AAMT Inc.

VICTORIA State Government | Education and Training

aamt

VSSEC

THE MATHEMATICAL ASSOCIATION OF VICTORIA

The Connect with Maths project is funded by the Australian Government Department of Education and Training through the Mathematics and Science Participation Program

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# welcome

## Welcome from Senator the Hon. Simon Birmingham, Minister for Education and Training

I would like to congratulate the Australian Association of Mathematics Teachers and all Connect with Maths Day participants for your innovative work in supporting the teaching of mathematics in schools through access to high quality online networks, resources and activities.

The Australian Government has funded this project in recognition of the need to enhance the teaching of mathematics in schools across the country. Three-quarters of the fastest-growing occupations in Australia require skills in science, engineering, technology and maths (STEM). We need to put our students in the best possible position to access these exciting opportunities.

The Australian Association of Mathematics Teachers is a partner in this endeavour, as the Connect with Maths project amply demonstrates. The Government is also appreciative of the Association's contribution to the $7.4 million Mathematics by Inquiry initiative, which is helping to strengthen the nation's all-important STEM capacity through the development of innovative mathematics resources for primary and secondary school teachers and students. The effort you contribute to projects like Connect with Maths and Mathematics by Inquiry will reap big rewards in the future. The more we engage our students in primary and secondary schools in mathematics today, the stronger our STEM capacity will be tomorrow.

I wish you all the best for Connect with Maths Day and look forward to hearing about its outcomes.

Yours sincerely,

**Simon Birmingham**

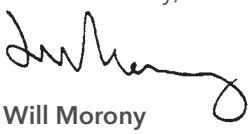
## Welcome from Will Morony, AAMT CEO

The Connect with Maths Day is a celebration of the achievements of the project over the last three years. Our intention was to establish online learning communities that provide teachers across Australia with access to high level expertise and resources in school mathematics. Certainly the range of presentations reflects the wide range of interests and needs among teachers across the five Connect with Maths communities.

The day is also a springboard into the future. As this first phase of building online learning communities in mathematics draws to a close in the middle of 2016, AAMT is building towards continuing to foster and inform connections between members of these communities as part of the Dimensions portal of professional learning resources. Dimensions, which will be available in beta form later in 2016, will make high quality professional learning programs available to schools around the country—the legacy of Connect with Maths will be the online communities that will connect people around those programs, thus providing deeper and more sustained engagement in improving school mathematics for our young people.

On behalf of the Council of AAMT I would like to take this opportunity to thank our partners in the Connect with Maths day—especially all the presenters who have been prepared to work with us on this ambitious and innovative venture—and to recognise the vision and drive of project manager Renée Hoareau.

Yours sincerely,



**Will Morony**

# program am

**9.00am** **Registration**

**9:15am** **Welcome and launch**
Daniel Pearson

**9:30am** **Opening keynote**: Teaching maths and YouTube
Burkard Polster, Monash University, Vic.
**Online session link** https://connect.vic.edu.au/cwmd-160318-polster/

**10:20am** **Morning tea**

**10:40am** **Concurrent session A**

| Concurrent session A | | | |
|---|---|---|---|
| A1 | Make it Count with Indigenous Learners (MIC) | **Tackling the seven year spread in your classroom: Exploring an algebra task**<br>**John Bradbury**, Shepherdson College, Galiwinku Elcho Island, NT<br>**Matt Skoss**, Australian Association of Mathematics Teachers, SA | **Online session link**<br>https://connect.vic.edu.au/cwmd-160318-indigenous |
| A2 | Early Years in Mathematics (EY) | **Notice, explore and talk about mathematics in the early years**<br>**Bob Perry**, Charles Sturt University, NSW | **Online session link**<br>https://connect.vic.edu.au/cwmd-160318-earlyyears |
| A3 | Maths in Action (MIA) | **SAHMRI: Where's the maths?**<br>**Steve Thornton**, Australian Academy of Science, ACT | **Online session link**<br>https://connect.vic.edu.au/cwmd-160318-mathsinaction |
| A4 | Engaging All Students (EAS) | **Engaging contemporary learners with mathematics**<br>**Catherine Attard**, Western Sydney University, NSW | **Online session link**<br>https://connect.vic.edu.au/cwmd-160318-engaging |
| A5 | Digital Learning and Mathematics (DL) | **Mathematics of wind energy and solar energy**<br>**Gary Bass**, MacLeod High School, Vic. | **Online session link**<br>https://connect.vic.edu.au/cwmd-160318-digital |
| A6 | Digital Learning and Mathematics (DL) | **Making functions real**<br>**Peter Flynn**, Texas Instruments | **Online session link**<br>https://connect.vic.edu.au/cwmd-160318-digital2 |

## 11:40am Concurrent session B

| Concurrent session B | | | |
|---|---|---|---|
| B1 | Make it Count with Indigenous Learners (MIC) | **Exploring quality teaching and learning for Aboriginal students in mathematics**<br>**Chris Matthews**, Griffith University, ATSIMA, Qld | **Online session link**<br>https://connect.vic.edu.au/cwmd-160318-indigenous |
| B2 | Early Years in Mathematics (EY) | **Number fluency and fun in the early years**<br>**Jennifer Bowden**, Mathematical Association of Victoria, Vic. | **Online session link**<br>https://connect.vic.edu.au/cwmd-160318-earlyyears |
| B3 | Maths in Action (MIA) | **Surviving Mars**<br>**Luca Bertolacci, Ian Christie and Michael Pakakis**<br>Victorian Space Science Education Centre, Vic. | **Online session link**<br>https://connect.vic.edu.au/cwmd-160318-mathsinaction |
| B4 | Engaging All Students (EAS) | **The community impact on our work**<br>**Robyn Anderson**, YuMi Deadly Centre, Qld | **Online session link**<br>https://connect.vic.edu.au/cwmd-160318-engaging |
| B5 | Digital Learning and Mathematics (DL) | **Capitalising on ICT in the mathematics classroom**<br>**Tracey Muir**, University of Tasmania, Tas.<br>**Sharyn Livy**, Monash University, Vic. | **Online session link**<br>https://connect.vic.edu.au/cwmd-160318-digital |
| B6 | Engaging All Students (EAS) | **Unstuck learning**<br>**Chris Harte**, John Monash Science School, Vic. | **Online session link**<br>https://connect.vic.edu.au/cwmd-160318-digital2 |

## 12:30pm Lunch

# program pm

## 1:30pm Concurrent session C

| Concurrent session C | | | |
|---|---|---|---|
| C1 | Make it Count with Indigenous Learners (MIC) | **What makes for successful numeracy learning in remote contexts? A synopsis of 30 case studies in remote Australia**<br>**Robyn Jorgensen**, Canberra University, ACT | Online session link<br>https://connect.vic.edu.au/cwmd-160318-indigenous |
| C2 | Early Years in Mathematics (EY) | **Teaching maths through problem solving: Facilitating student reasoning**<br>**Louise Hodgson**, PhD Candidate, Monash University, Tas. | Online session link<br>https://connect.vic.edu.au/cwmd-160318-earlyyears |
| C3 | Maths in Action (MIA) | **An international maths modelling contest for high-school students**<br>**Ross Turner**, Australian Council for Educational Research, Vic. | Online session link<br>https://connect.vic.edu.au/cwmd-160318-mathsinaction |
| C4 | Engaging All Students (EAS) | **Engaging all students in mathematics through purposeful inquiry**<br>**Steve Thornton**, Australian Academy of Science, ACT<br>**Kate Manuel**, Australian Association of Mathematics Teachers SA | Online session link<br>https://connect.vic.edu.au/cwmd-160318-engaging |
| C5 | Digital Learning and Mathematics (DL) | **NAO robots for engaging children with STEM**<br>**Leon Sterling**, Swinburne University of Technology, Vic.<br>**Jonathan Kingsley**, The Brainary, Vic. | Online session link<br>https://connect.vic.edu.au/cwmd-160318-digital |
| C6 | Digital Learning and Mathematics (DL) | **Gamification vs maths anxiety**<br>**Brent Hughes**, Matific Australia and New Zealand | Online session link<br>https://connect.vic.edu.au/cwmd-160318-digital2 |

# program pm

**2:30pm** Concurrent session D

| | | | |
|---|---|---|---|
| D1 | Make it Count with Indigenous Learners (MIC) | **Mathematics and Indigenous learners**<br>**Jacynta Krakouer, Sarah Buckley and Jim Spithill**<br>Australian Council for Educational Research, Vic. | **Online session link**<br>https://connect.vic.edu.au/cwmd-160318-indigenous |
| D2 | Early Years in Mathematics (EY) | **SmartStart: Growing a generation of new learners**<br>**Nicola Yelland**, Victoria University, Vic. | **Online session link**<br>https://connect.vic.edu.au/cwmd-160318-earlyyears |
| D4 | Engaging All Students (EAS) | **Challenging tasks and engaging learners**<br>**Dr Sharyn Livy**, Monash University, Vic.<br>**Dr Tracey Muir**, University of Tasmania, Tas. | **Online session link**<br>https://connect.vic.edu.au/cwmd-160318-engaging |
| D5 | Digital Learning and Mathematics (DL) | **VCE algorithmics**<br>**Steven Bird**, University of Melbourne, Vic. | **Online session link**<br>https://connect.vic.edu.au/cwmd-160318-digital |

**3:30pm** **Closing keynote**, Denise Neal, Department of Education Tasmania, Tas.
**Online session link** https://connect.vic.edu.au/cwmd-160318-neal

**4:30pm** Finish

## Online session links

Sessions throughout the day can be accessed online by following the links below.

### Opening keynote

https://connect.vic.edu.au/cwmd-160318-polster

### Engaging All Students community

https://connect.vic.edu.au/cwmd-160318-engaging

### Early Years and Mathematics community

https://connect.vic.edu.au/cwmd-160318-earlyyears

### Indigenous community

https://connect.vic.edu.au/cwmd-160318-indigenous

### Digital Learning and Mathematics community

https://connect.vic.edu.au/cwmd-160318-digital

https://connect.vic.edu.au/cwmd-160318-digital2

### Maths In Action community

https://connect.vic.edu.au/cwmd-160318-mathsinaction

### Closing keynote

https://connect.vic.edu.au/cwmd-160318-neal

# presenters

## 9.15am Welcome and launch

### Brett Biddington

**Brett Biddington** is the founder of a Canberra-based consulting company which specialises in space and cyber security matters from policy, advocacy and national capacity development perspectives, including in education. He also addresses broader questions of institutional behaviour, especially governance, leadership and strategy, against backgrounds of uncertainty and technological change.

He is a Director of the Space Environment Research Centre (SERC) and the Australian Cyber Security Research Institute Ltd (ACSRI). He is also a Director and the Treasurer of the Institute for Regional Security (IFRS), a Canberra-based 'think tank' that addresses the long-term national security challenges faced by Australia and the Asia Pacific region. He is responsible, on behalf of the Space Industry Association of Australia (SIAA), for organising the International Astronautical Congress, the world's largest annual space conference (3500 delegates), which will be held in Adelaide in September 2017.

He is a past chair of the SIAA and sits on several advisory boards and committees concerned with the governance of Australia's space and astronomy activities and with science, technology, engineering and mathematics (STEM) education and outreach.

Between 2002 and 2009 he was a member of Cisco Systems' global space team. In 2002 Brett left the Royal Australian Air Force (RAAF) on completion of almost 23 years of service. He served as the senior intelligence officer and later as the Provost Marshal (head of policing and security) of the RAAF before moving into capability development. There he sponsored a two billion dollar portfolio of projects in the command and control, intelligence, surveillance, reconnaissance and electronic warfare domains. This included the Jindalee Over the Horizon Radar project and classified and unclassified space initiatives. He holds Adjunct Professorial appointments in the Security Research Institute at Edith Cowan University in Perth, Western Australia and also in the School of Mathematical and Geospatial Sciences at the RMIT University in Melbourne, Victoria. In June 2012 he was admitted as a Member of the Order of Australia (AM) for services to the Australian space sector.

## 9.30am Opening keynote

### Teaching maths and YouTube

**Burkard Polster**, Monash University, Vic.

In this presentation **Burkard Polster** will talk about his experiences communicating mathematics as The Mathologer on YouTube and on using his own and other people's videos in this teaching.

Burkard is a maths lecturer at Monash as well as the university's resident mathemagician. He is the author of a number of books including *Math Goes To The Movies* (with Marty Ross), *Q.E.D. Beauty In Mathematical Proof* and *The Mathematics Of Juggling*. For all his dark secrets check out his website www.qedcat.com and his YouTube channel, www.YouTube.com/c/mathologer

# presenters

## 10.40am Session A

### A1/ Tackling the seven year spread in your classroom: Exploring an algebra task

**John Bradbury**, Shepherdson College, Galiwinku Elcho Island, NT
**Matt Skoss**, AAMT, SA (formerly Centralian Senior College, NT)

A challenge for all classroom teachers is to cater for the 'seven year spread' of mathematical ability present in their classroom. This presentation will model a simple, low-entry algebra task that can be adapted for young children, but scaled up to challenge highly capable students in senior secondary. The task structure is relevant for all settings, including remote Indigenous classrooms.

**John Bradbury** is currently working at Shepherdson College, Galiwin'ku as Assistant Principal in charge of teaching and learning across the school. He has a special interest in facilitating the delivery of key maths ideas by community teachers in first language. Prior to Shepherdson he worked across the Groote Archipelago, assisting cross cultural teaching teams to use the *Talking Namba* program; a resource designed to support targeted teaching and the delivery of key mathematics concepts in first language. He has spent over 10 years working in remote Indigenous schools across the Territory in both school and consultancy roles focused on the effective teaching of mathematics in these contexts. He is an architect of the *Talking Namba* resource and was also a lead writer of the 2009 NTCF Mathematics strands.

**Matt Skoss** is an experienced classroom teacher, having taught for over 28 years. He has enjoyed several curriculum roles with a maths and ICT focus for NT Department of Education. Matt has recently left his role as Assistant Principal/Maths Coordinator at Centralian Senior College in Alice Springs, to take up a role at the Australian Association of Mathematics Teachers (AAMT) as the Manager of the Maths by Inquiry Engagement project in South Australia. He also works as a consultant for schools in Australia, with a strong interest in supporting remote and country schools. Matt has a strong belief in using ICT to make maths accessible and highly visual to all students, using digital resources. He likes to make powerful, but incidental use of learning technologies and Web 2.0 tools to amplify student learning.

### A2/ Notice, explore and talk about mathematics in the early years

**Bob Perry**, Charles Sturt University, NSW

Let's Count is an early childhood mathematics program run by The Smith Family in early childhood settings in 31 geographical sites across Australia. In this presentation, the key ideas of Let's Count will be introduced, particularly ways in which educators might engage parents and other family members in children's mathematics learning, and the mantra: Notice, Explore and Talk About. Through an extensive longitudinal evaluation from 2012 to 2015, we know that Let's Count works for children, educators and families. Some of the evaluation results will be shared in the presentation but mainly we will celebrate the mathematics learning of the participants.

After 45 years in tertiary institutions, **Bob Perry** retired as a mathematics education professor at Charles Sturt University in February, 2016. His most recent, substantive research areas include educational transitions, mathematics education, and researching

with young children. He has published widely. In 2015, Bob received two particular honours: an Honorary Doctorate from Mälardalen University in Västerås, Sweden in recognition of his work in educational transitions and international collaborations, and the Mathematics Education Research Group of Australasia (MERGA) Career Research Medal in recognition of his work in mathematics education. Bob is currently a director of a consultancy company, Peridot Education.

## A3/ SAHMRI: Where's the maths?

**Steve Thornton**, Australian Academy of Science, ACT

A challenge that was undertaken in the recent International Science Fair held in Adelaide was "Designing new buildings which aren't cuboids or rectangular prisms: Do walls have to be straight?" Students considered sustainable architecture and structures exploring a range of mathematically architectural options. The focus of the challenge was the newly completed, intriguing and stunningly beautiful SAHMRI (South Australian Health and Medical Research Institute) building.

**Steve Thornton** is Executive Director of reSolve: Mathematics by Inquiry. He was formerly a mathematics teacher and Head of Department in public and private schools in SA, director of a national professional development program with the Australian Mathematics Trust, and lecturer in mathematics teacher education at the University of Canberra, Charles Darwin University and the University of Oxford.

## A4/ Engaging contemporary learners with mathematics

**Catherine Attard**, Western Sydney University, NSW

In education we talk about student engagement every day, but what do we actually mean when we use the term 'engagement'? What does it look like in a contemporary classroom, and how can we use technology to promote substantive engagement? In this session I will explore the construct of engagement and ways we can use technologies to enhance teaching and learning of mathematics.

**Catherine Attard** is an Associate Professor in primary mathematics pedagogy and a Western Sydney University Distinguished Teaching Fellow, and comes from a primary teaching background. She is a Senior Researcher at the Centre for Educational Research within the School of Education at Western Sydney University. Her PhD research was focused on engagement with mathematics and issues surrounding the pedagogical practices that influence students' engagement. Catherine is currently researching a range of areas including the effective use of mobile technologies to enhance the teaching and learning of mathematics, the effectiveness of sustained professional development on building teacher capacity and improving student learning outcomes, and the use of financial literacy education as a tool to engage children with mathematics. Catherine has won several teaching awards, including an Office of Learning and Teaching citation for Outstanding Contributions to Student Learning. She regularly presents workshops and keynotes nationally and is currently the Vice-President of the Mathematical Association of New South Wales and Secretary of the Mathematics Education Research Group of Australasia. Catherine is the Director of the Education Knowledge Network within the School of Education at Western Sydney University, which provides high quality professional learning for practicing early childhood, primary and secondary teachers.

# presenters

## A5/ Mathematics of wind energy and solar energy

**Gary Bass**, Macleod High School, Vic.

Mathematics is everywhere! Renewable energy has a curiosity factor which can encourage student investigation and experimentation. The Academy of Technological Sciences and Engineering-Science and Technology Education Leveraging Relevance (ATSE-STELR) has developed wind turbine and photo-voltaic solar cell student kits which are a rich source for mathematical modelling and prediction.

This workshop will provide insights into the readily available online resources and uses of *Mathematica* for reporting experimental observations. The format of the session is to provide a case study of a typical student investigation with reference to teacher support materials.

Extension activities include: prototyping turbine blades by designing and 3D-printing them, then testing for efficiency; to design and construct a 2D or 3D sun tracker and compare the most efficient method (fixed-flat, inclined, azimuth tracking, 2D tracking or 3D tracking) for aiming solar cells.

Interactive *Mathematica* simulations are freely available online. Each simulation is able to be edited and modified after download.

Recently awarded DLTV IT Leader of the year 2016 and previously an Apple Distinguished Educator 2011, **Gary Bass** has provided support and advice across content areas of Physics, IT and mathematics for many years, most recently through the ATSE-STELR curriculum project with an emphasis on renewable wind and solar energy. Simulations and modelling with *Mathematica* provide a simple means of visualising data quickly with intuitive code and is hugely powerful. Gary is a serving member of Mag-Net: THE magnificent network-online association of STEM educators.

## A6/ Making functions real

**Peter Flynn**, Texas Instruments, Vic.

In this session, participants will experience how simple data collection and readily accessible data analysis can be used to augment the teaching of linear and non-linear functions.

**Peter Flynn** was a secondary school mathematics teacher for approximately a decade before joining the University of Melbourne's Graduate School of Education where he currently teaches a variety of mathematics and mathematics education subjects. His mathematics education interests involve implementing technology into mathematics teaching, learning and assessment. Peter is an experienced T-cubed Instructor who has presented many workshops to both Australian and international audiences.

# presenters

## 11.40am Session B

### B1/ exploring quality teaching and learning for Aboriginal students in mathematics

**Chris Matthews**, Griffith University, ATSIMA, Qld

The Aboriginal and Torres Strait Islander Mathematics Alliance (ATSIMA), formally incorporated in 2015, aims to improve educational outcomes for Aboriginal and Torres Strait Islander students in mathematics. This presentation will reflect on the learnings from three main projects of ATSIMA: the Garma Maths project, a partnership with Yirrkala Community School, Eastern Arnhemland; NSW STEM Camp, a partnership with the NSW Department of Education and the NSW Aboriginal Education Consultative Group (NSW AECG); and the 2014 ATSIMA Conference. Drawing on these experiences, we will explore what it means to have quality teaching and learning in mathematics for Aboriginal students. Quality teaching and learning will be the focus of ATSIMA's 2016 conference.

**Chris Matthews** is from the Quandamooka people of Minjerribah (Stradbroke Island) in Queensland. Chris has received a PhD in Applied Mathematics from Griffith University and is currently a Senior Lecturer at the Griffith School of Environment. Chris has undertaken numerous research projects within applied mathematics and mathematics education. More recently, Chris was the patron and expert advisor for the Make It Count Project; a large mathematics education project coordinating education research within clusters of schools across Australia with the specific aim of improving mathematics education for Indigenous students. Chris was the co-chair of the Griffith University Working Party to develop and implement an Indigenised curriculum across the whole university. The work is part of an Office of Teaching and Learning (OLT) Grant, DEEWR. Currently, Chris is the chair of the Aboriginal and Torres Strait Islander Mathematics Alliance (ATSIMA) which aims to improve educational outcomes in mathematics for Aboriginal and Torres Strait Islander learners.

### B2/ Number fluency and fun in the early years

**Jennifer Bowden**, Mathematical Association of Victoria, Vic.

This workshop will explore early number concepts. Jen will explore a variety of play-based activities, games and investigations that will engage and challenge your early mathematicians.

**Jennifer Bowden** is a Mathematics Education Consultant working in primary schools across Victoria to support teachers in analysing school data, implementing curriculum and effective teaching and learning programs. Jennifer enjoys working with inspiring teachers and using a hands-on approach in her workshops.

# presenters

## B3/ Surviving Mars

**Luca Bertolacci, Ian Christie & Michael Pakakis,**
Victorian Space Science Education Centre (VSSEC), Vic.

The underlying problem we are attempting to attack is the disengagement of secondary school students from mathematics. This disengagement is anecdotally expressed as: "What is the use of this to me?", " I don't like maths" or "I am no good at maths".
To save our stranded Martian astronaut during our Surviving Mars program:

- Students will work in Mission Control communicating with a stranded astronaut.
- Their aim will be to keep the astronaut alive until rescued.
- They will work on supply of air, water, energy, shelter and food.
- There will be events/disasters to cope with.
- We won't place great emphasis on the solution of equations, but on the construction of equations.
- We will use simple computer algebra systems to provide solutions.
- We want students to understand what a solution means more than how it is found.

**Luca Bertolacci** is the Program Manager at VSSEC. In the four years he has worked at VSSEC he has been involved in the development of a range of programs and curriculum as well as implementing these programs. He has also taught Mathematics and Physics at Strathmore Secondary College. These experiences have allowed Luca to teach science and maths to students from Years 5 to 12. This has given him insight into problems frequently encountered when trying to deliver STEM curriculum inside the classroom. Luca has completed the McREL Designing Effective Maths Lessons and Designing Effective Science Lessons Workshops and will be undertaking a Masters of Education by research next year.

**Ian Christie** is the Curriculum developer at VSSEC. He was part of the team which developed VSSEC's innovative outreach program for primary schools, delivering lessons, teacher professional learning and equipment to rural and disadvantaged schools. Ian designs educational programs which incorporate games as well as designing and commissioning the games themselves. Ian works as part of the team responsible for VSSEC's world leading Mission to Mars, Robotic Mission to Mars and Mission to the Orbiting Space Laboratory programs for secondary school students. His roles include software review, staff training, technical support and program design.

Ian has been responsible for designing and delivering short workshops on Classroom Instruction that Works for pre-service teachers in Australia, teachers visiting Australia from Indonesia, and for teacher groups in Beijing, Toronto and Jerusalem. In a previous life he was a builder of fine tandem bicycles.

**Michael Pakakis** has been a teacher of science and mathematics since 1985. During this time he has held a number of positions of responsibility from Head of Science to Curriculum Co-ordinator. He has also worked in a variety of Government schools and is presently employed at Strathmore Secondary College as a Leading Teacher, occupying the position of Director of the Victorian Space Science Education Centre (VSSEC). During 2007 he was awarded by Latrobe University the Deans' Medal for his contributions to science education in Victoria. Through his role as Director of VSSEC he has been involved in providing teacher professional learning programs and establishing

collaborative working relationships with many of Australia's universities. This experience has given him an understanding of the Department of Education's future teaching and learning strategy and its implications for the evolving school environment and the skills needed to implement policy.

## B4/ The community impact on our work

**Robyn Anderson**, YuMi Deadly Centre, Qld

I will be considering how community influences the engagement of students in YuMi Deadly Maths, why some strategies are more effective and how this connects with what is mathematically important.

**Robyn Anderson** is currently Research Associate and Project Coordinator, YuMi Deadly Maths Centre, QUT, Brisbane. She joined YDC in 2013 bringing her extensive teaching experience, curriculum knowledge, facilitation, mentoring and coaching skills to contribute to the ongoing development of the YuMi Deadly Maths research project. Before that, Robyn worked as Mathematics Curriculum Officer, DET, Queensland, and as Principal Project Officer, Mathematics, for the greater Brisbane region, working with mathematics curriculum leadership and training, developing mentoring and coaching strategies in schools. Prior to this she taught preschool, primary and secondary students in ACT, NT, and Queensland.

Robyn has a passion for teacher professional learning and working within an adult learning model. Through her work encouraging and assisting colleagues in schools and with the Queensland Association of Mathematics Teachers, she has developed and presented a range of maths workshops at regional, state and national professional training partnerships and conferences. Robyn holds a strong belief that every child can learn and excel in maths and that it can be enjoyable to do so.

## B5/ Capitalising on ICT in the mathematics classroom

**Tracey Muir**, University of Tasmania, Tas.

**Sharyn Livy**, Monash University, Vic.

Information and communication technology (ICT) can be a powerful tool for enhancing student learning. Although many classrooms have been resourced with computers, interactive whiteboards and mobile technologies, teachers need to be able to transform these technological tools into meaningful teaching and learning experiences. In this session the presenters will share some of the ways in which technology can be integrated into the mathematics classroom. Participants will be provided with examples of activities and experiences that have the potential to transform teaching pedagogy and engage students in using technologies in purposeful ways which enhance learning.

**Tracey Muir i**s a Senior Lecturer in Mathematics Education at the University of Tasmania where she works with early childhood and primary pre-service teachers. Her research interests include effective teaching for numeracy, teachers' pedagogical content knowledge, and teachers' use of ICT in the mathematics classroom. She has presented at a range of international, national and state-wide conferences and regularly conducts professional learning with practising teachers.

# presenters

**Sharyn Livy** is a lecturer of early years and primary mathematics education in the Faculty of Education at Monash University. Her experience includes teaching under graduates and post-graduates. Sharyn's research interests include effective numeracy teaching and knowledge for teaching mathematics. Her PhD investigated the development and contributing factors in primary pre-service teachers' mathematical content knowledge. Teaching and working with pre-service teachers, practising teachers and university colleagues has shaped Sharyn's beliefs and understanding of what is needed for transforming mathematical experiences for the 21st century.

## B6/ Connecting learners and building knowledge networks

**Chris Harte**, John Monash Science School, Vic.

Access to knowledge is so much easier in the internet age with platforms like the Kahn Academy and massive open online courses teaching mathematics on tap. But how do we leverage technology to actually connect learners to expert teachers and each other and build genuinely supportive, robust and organically growing knowledge networks. This presentation will explore what it takes to move from knowledge consumption to knowledge creation using technologies like Adobe Connect and Google Apps for Education. There will be some practical maths activities demonstrated live so feel free to bring along your device and join in!

**Chris Harte** is passionate about learning. He has 15 years' experience in many different roles: as an award winning languages teacher, a senior leader in one of the UK's most innovative schools, Director of the Emerging Sciences Victoria and his role as a Google Certified Innovator and member of the Google for Education International Advisory Board. Chris has expertise in design thinking, digital technology and learning spaces, learner centred pedagogy and learning models, strategies to enhance higher order thinking, learner efficacy and engagement, formative assessment strategies and learning analytics, leadership of learning organisations and language learning pedagogy.

# presenters

## 1.30pm Session C

### C1/ What makes for successful numeracy learning in remote contexts? A synopsis of 30 case studies in remote Australia

**Robyn Jorgensen**, Canberra University, ACT

This presentation draws on the outcomes of a national study into the practices of successful remote schools that work with Aboriginal and Torres Strait Islander students. The schools represent the diversity in Australian schooling and are in five States/Territories. The presentation will discuss an overarching model as well as providing examples of work undertaken in the schools. Particular attention is drawn to those practices that appear in many of the sites, as well as practices that are nuanced to the particular sites. It is recognised that there is considerable diversity across the nation and as such there needs to be diversity in practice.

**Robyn Jorgensen** is Professor of Education: Equity and Pedagogy at the University of Canberra. She has spent her career working in the most disadvantaged schools seeking to find practices that can bring about success in mathematics for those students who are most at risk of failing. Her work focuses on teaching practices and how these can be developed for the needs of the learners while ensuring that success is achieved. She is a highly accomplished researcher but has also spent time out of the University sector working in schools as a principal and CEO of a remote Indigenous school in Central Australia (2009–2010). She brings a practical wisdom to her work that speaks to teachers, educators and students.

### C2/ Teaching maths through problem solving: Facilitating student reasoning

**Louise Hodgson**, PhD candidate, Monash University, Tas.

This session will focus on teacher actions that promote problem solving and reasoning in early years classrooms. We will workshop some tasks and have opportunities for discussion.

**Louise Hodgson** has been a classroom teacher and teacher leader across grades, schools, geographic regions and organisations. Her recent work has included working in schools with primary school teachers to implement the *Australian Curriculum: Mathematics.* Louise is currently a full-time PhD candidate at Monash University. She has been an executive member of the Mathematical Association of Tasmania (MAT) for the past ten years and has presented at a number of conferences and run webinars for AAMT Connect with Maths.

### C3/ An international maths modelling contest for high-school students

**Ross Turner**, Australian Council for Educational Research, Vic.

Mathematical modelling involves using mathematics to solve important real-world problems. In this session, a new mathematical modelling contest will be discussed. We will explain why this is a good idea, and will give some information and examples as well as links to where more support material can be found.

**Ross Turner** was a maths teacher, curriculum developer, research manager, and managed the mathematics domain for the OECD's PISA survey. He is a member of the organising committee for the International Mathematical Modelling Challenge.

# presenters

## C4/ Engaging all students in mathematics through purposeful inquiry

**Steve Thornton**, Australian Academy of Science, ACT
**Kate Manuel**, Australian Association of Mathematics Teachers, SA

This session links work in two important national projects: reSolve: Mathematics by Inquiry and Mathematics Inside. The Mathematics by Inquiry project is a Commonwealth funded project administered by the Australian Academy of Science in collaboration with the Australian Association of Mathematics Teachers. It seeks to develop classroom materials and professional resources for teachers from Foundation to Year 10 to promote inquiry approaches to mathematics, particularly stressing reasoning and problem solving. Mathematics Inside is a collaboration between the University of Technology Sydney, CSIRO and AAMT. It uses case studies and videos to uncover the mathematics that lies behind significant CSIRO scientific innovations such as the Square Kilometre Array telescope and Zebedee, a hand-held mapping device. We will introduce a draft set of principles that underpin Mathematics by Inquiry and exemplify those using some exemplary materials from Mathematics Inside.

**Steve Thornton** is Executive Director of Mathematics by Inquiry. He was formerly a mathematics teacher and Head of Department in public and private schools in SA, director of a national professional development program with the Australian Mathematics Trust, and lecturer in mathematics teacher education at the University of Canberra, Charles Darwin University and the University of Oxford.

**Kate Manuel** is the Manager, National Projects for the Australian Association of Mathematics Teachers. She joined the association as a professional officer in the middle of 2010, after a career as a teacher of mathematics and science in South Australian schools and most recently as Head of Mathematics at a secondary college. Kate was also a senior years moderator for many years and Chief Assessor for Mathematical Applications. In her work with AAMT, Kate manages national projects involving the provision of teaching resources to the mathematics community.

## C5/ NAO robots for engaging children with STEM

**Leon Sterling**, Swinburne University of Technology, Vic.
**Jonathan Kingsley**, The Brainary, Vic.

NAO robots are a great way of engaging students. Students instinctively respond to the robots and their curiosity can inspire interesting and meaningful STEM activities. This talk will describe a range of activities undertaken at Swinburne and by the Brainary, including running programs at schools, engaging with the general public, and a NAO robot performing exercises with children at the Victorian Pediatric Rehab Service, .

**Leon Sterling** has been an academic for over 35 years. Leon received a BSc(Hons) from the University of Melbourne and a PhD in Pure Mathematics from the Australian National University. He has worked at universities in the UK, Israel, the US, and Australia. Leon was Professor of Software Innovation and Engineering and Director of e-Research at the University of Melbourne, and Dean of Information and Communication Technologies at Swinburne University of Technology. Most recently he has been the Pro Vice-Chancellor (Digital Frontiers) at Swinburne.

# presenters

**Jonathan Kingsley** is the Sales and Marketing Manager at The Brainary, a supplier of cutting-edge assistive technology and therapeutic resources. He has considerable experience working with educators and clinicians to provide technology solutions that add to and enhance practice. This year, he was part of a team that successfully applied for funding from the Transport Accident Commission (TAC) to trial the use of a NAO humanoid robot in paediatric rehabilitation. Jonathan is also completing an Executive Master of Arts at the University of Melbourne.

## C6/ Gamification vs maths anxiety

**Brent Hughes**, Matific, Australia & New Zealand

Maths anxiety is real but does it have to be as prevalent as it is in our primary classrooms? Children have enjoyed playing games since the dark ages; Piaget was trying to tell people this for years. Today Brent Hughes will show you how gamification in his classroom and the classrooms of teachers he works closely with has changed children's opinions of maths from "yawn" to "yay".

**Brent Hughes** is a primary school teacher, tech enthusiast and full time maths nerd. He works with teachers all over Australia and New Zealand helping them bring their maths learning experiences to life!

# 2.30pm Session D

## D1/ Mathematics and Indigenous learners

**Jacynta Krakouer, Sarah Buckley & Jim Spithill**

Australian Council for Educational Research, Vic.

This session will provide insight into ACER's work in Indigenous education. It will also present information on ACER's work in the Science of Learning Research Centre (SLRC), including work on a project investigating mathematics anxiety with pre-service primary teachers. This project aims to determine the efficacy of an informational, interactive workshop in providing an understanding of and approaches to reducing mathematics anxiety. The workshop is designed to educate participants about the experience and impact of mathematics anxiety using data collected from the SLRC experimental classroom and other psychological and educational techniques Jim will discuss progress on the XE—Excellence and Equity in Mathematics project with University of South Australia. He will also report on recent work by ACER in the use of technology to facilitate learners' transition to school and engagement with mathematics.

**Jacynta Krakouer** is an Indigenous Graduate Research Fellow in the Indigenous Education Team at ACER. She is a Noongar Aboriginal woman originally from Southern Western Australia. Jacynta holds a Bachelor of Science (Psychology) and a Master of Social Work degree from the University of Melbourne. Jacynta's professional interests are in the area of Indigenous education and policy. She is also interested in Indigenous wellbeing and the socio-emotional factors that impact Indigenous learning outcomes. Jacynta has been involved in a range of projects since joining ACER in 2015. She has previously conducted research and data analysis for the University of Melbourne. Jacynta is currently completing her Master of Social Policy at the University of Melbourne.

# presenters

**Sarah Buckley** is a Research Fellow and member of the Australian Surveys team at ACER. She has contributed to a range of projects such as the Trends in International Mathematics and Science Study (TIMSS), the Progress in International Reading Literacy Study (PIRLS) and the Programme for International Student Assessment (PISA). She has also been part of several projects focused on improving educational outcomes for Indigenous students. Sarah completed her PhD in psychology at the University of Melbourne, which investigated adolescents' mathematics anxiety and the role that motivation and peer networks have in its development. Sarah is also a post-doctoral researcher with the Science of Learning Research Centre (SLRC).

**Jim Spithill** has been a test developer at ACER for more than five years, following a 30-year career teaching mathematics at secondary level in Melbourne schools. He is currently President of the MAV and a Council member of AAMT. He has worked on a number of ACER projects at school level and for the vocational and adult training sectors, both locally and internationally.

## D2/ SmartStart: Growing a generation of new learners

**Nicola Yelland**, Victoria University, Vic.

This webinar will present the findings from an ongoing study supported by IBM since 2012. We worked with preschool and early years teachers to encourage the use of iPads to promote new learning in early childhood education. The presentation considers the ways in which pedagogies and curriculum practices can be transformed when using tablet technologies with young children. It recognises that the starting point for playful explorations is fluency with the foundational skills inherent to literacy and numeracy which then enable young children to embark on innovative explorations of their everyday worlds. The presentation will provide examples to illustrate the ways in which these foundational skills can be acquired in the real world, and with accompanying activities on the iPad consider how new learning can be promoted via active exploration, inquiring and problem posing, and problem solving.

**Nicola Yelland** is a Research Professor and Director of Research in the College of Education at Victoria University in Melbourne Australia. Over the last decade her teaching and research has been related to the use of new technologies in school and community contexts. This has involved projects that have investigated the innovative learning of children as well as a broader consideration of the ways in which new technologies can impact on the pedagogies that teachers use and the curriculum in schools. Her multidisciplinary research focus has enabled her to work with early childhood, primary and middle school teachers to enhance the ways in which new technologies can be incorporated into learning contexts to make them more interesting and motivating for students, so that educational outcomes are improved. Professor Yelland is the founding editor of two journals *Contemporary Issues in Early Childhood* and *Global Studies of Childhood*.

# presenters

## D4/ Challenging tasks and engaging learners

**Sharyn Livy**, Monash University, Vic.
**Tracey Muir,** University of Tasmania, Tas.

Investigating how primary students engage in mathematics is important for helping them to develop and adapt their knowledge to different contexts. Our presentation will explore the lesson structure and potential of using challenging mathematical tasks. Participants will work together and discuss a selection of problems that are designed to extend and stimulate students' mathematical thinking, understanding and problem solving skills. We will also share some student responses to the tasks and findings from our research.

**Sharyn Livy** is a lecturer of early years and primary mathematics education in the Faculty of Education at Monash University. Her experience includes teaching under graduates and post-graduates. Sharyn's research interests include effective numeracy teaching and knowledge for teaching mathematics. Her PhD investigated the development and contributing factors in primary pre-service teachers' mathematical content knowledge. Teaching and working with pre-service teachers, practising teachers and university colleagues has shaped Sharyn's beliefs and understanding of what is needed for transforming mathematical experiences for the 21st century.

**Tracey Muir i**s a Senior Lecturer in Mathematics Education at the University of Tasmania where she works with early childhood and primary pre-service teachers. Her research interests include effective teaching for numeracy, teachers' pedagogical content knowledge, and teachers' use of ICT in the mathematics classroom. She has presented at a range of international, national and state-wide conferences and regularly conducts professional learning with practising teachers.

## D5/ VCE Algorithmics

**Steven Bird,** University of Melbourne, Vic.

VCE Algorithmics covers systematic methods for analysing real-world problems and identifying salient aspects of the real world to model. It explores the design of algorithms, resulting in a powerful approach to manipulating and reasoning about structured information. I will give an overview of VCE Algorithmics, including a selection of key topics in order to give participants a sense of what it would be like to teach this new study.

**Steven Bird** is researching new methods for documenting and revitalising the thousands of small languages still spoken in the world today. His career began with a BSc and MSc in computer science at Melbourne University, followed by a PhD in computational linguistics at Edinburgh University, completed in 1990. Since then he has worked at the Universities of Edinburgh, Pennsylvania, Melbourne, and Berkeley, and conducted fieldwork in Australia, West Africa, Melanesia, the Amazon, and Central Asia. He is co-author of a popular textbook in computational linguistics, and recently developed a new computer science curriculum for secondary students with colleagues at Monash and the VCAA. The *Aikuma* app developed with his students took out the grand prize in the Open Source Software World Challenge.

# presenters

## 3.30pm Closing keynote

### Everyday learning about maths and numeracy

**Denise Neal**, Principal Education Officer, Department of Education Tasmania, Tas.

Denise will focus on some of the key messages in the Early Childhood Association (ECA) publication *Everyday Learning about Maths and Numeracy* which she co-authored with Jenni Connor. Her session will emphasise some of the lay practices that support young learners to believe they can and should learn maths and the ways adults can support them.

**Denise Neal** started teaching as an early childhood teacher and developed an interest in mathematics/numeracy education early in her career. She has worked in a number of curriculum roles within the Department of Education and at the University of Tasmania as a seconded lecturer in early childhood/primary education and the mathematics curriculum.

In recent years Denise has been involved in the development of the *Australian Curriculum: Mathematics* as a member of the National Advisory Panel. As a Principal Education Officer she supported Tasmanian schools in the first phase in implementation of the *Australian Curriculum* and contributed to the development of resources to support teaching and learning.

As a member of the Tasmanian Department of Education's Professional Learning Institute team since 2014, Denise has been involved in the design and delivery of programs supporting mathematics/numeracy. She has also collaboratively developed online professional learning programs to support schools in the provision of school-based learning.

Denise is a Life Member of the Australian Association of Mathematics Teachers and a member of the Mathematical Association of Tasmania. She has a Master's degree and a Post-Graduate Certificate in Teaching for Numeracy and continues to learn something valuable about teaching and learning every day.