



Inspiring Agents of Change
Annual Conference of the
**Mathematical Association of
Tasmania 2021**

Date: 3rd & 4th September 2021
Venue: St Michaels Collegiate
218 Macquarie Street, Hobart

Conference Schedule

Friday 3rd September

8.15 – 3.30	Early Career Day
4.45 - 5.30	Registrations
5.30 – 6.30	Keynote Address – Bruce Stack Linmor Hall
7.00	Conference Dinner – The Duke

Saturday 4th September

8.00 – 9.00	Registration
9.00	Opening
9.15	Keynote Address - Rachael Whitney-Smith Linmor Hall
10.20 – 11.10	Workshop 1
11.10 – 11.30	Morning Tea
11.30 – 12.20	Workshop 2
12.25 – 1.15	Workshop 3
1.15 – 2.00	Lunch
2.00 – 2.50	Workshop 4
2.55 – 3.45	Workshop 5
3.45	Prizes and Closing

Keynote Address and Closing
is in **Linmor Hall**

All workshops and Trade
Displays are in the **IF LAB**

Ground Floor

IF 11
IF 12

First Floor

IF 21
IF 22

Second Floor

IF 31
IF 32
IF 35



Keynote Speakers

Bruce Stack



Rachael Whitney-Smith



Keynote 1: Bruce Stack, Friday September 3, 5.30 – 6.30, Linmor Hall

Bruce has been a college mathematics specialist and an AST with the Department of Education. In his keynote address, Bruce will outline his teaching philosophy and will explore how mathematics education has changed in the last 40 years. He will discuss the skills required to teach mathematics in the future and the challenges faced by the teaching community. He is particularly passionate about practices that focus on the individual student and developing collegial student communities. Bruce will discuss his innovations, realisations, and will explain why, after 40 years, he still feels like he's learning the craft.

Keynote 2: Rachael Whitney-Smith, Saturday September 4, 9.15 – 10.15, Linmor Hall

Mathematical processes are central to doing mathematics - How have they been incorporated into the revised Australian Curriculum and why?

When students are provided opportunities to learn and develop their mathematical process skills through meaningful applications, they are able to see how mathematics is relevant, useful and achievable. This empowers students, assisting them in developing a positive disposition towards mathematics. Thinking, reasoning and problem-solving skills essential to building proficiency in mathematics can be cultivated in an integrated way, when students engage in the mathematical processes. What are these mathematical processes and what do they look like in practice?

Rachael is the Australian Curriculum: Mathematics Specialist at ACARA and is currently leading the Review for the Australian Curriculum: Mathematics. She is also undertaking her PhD at Notre Dame University in Mathematics Education. Rachael is passionate about applied mathematics, STEM and teaching mathematics through rich tasks that engage student thinking and reasoning, problem-solving, modelling and inquiry processes. Rachael has worked on National and International projects focussed on improving the mathematical outcomes of Australian students and has actively participated in the OECD Education 2030 project through her role at ACARA. Rachael is an active member on a number of mathematics advisory and reference groups and led the work in revising the National Numeracy Learning Progressions Version 3 as part of the National Online Formative Assessment Initiative. Rachael has been the Executive Officer, Professional Learning consultant and is currently a board member for the Mathematical Association of Western Australia and a Councillor of the Australian Association of Mathematics Teachers.

Workshop I

10.20 – 11.10

1. Louise Hodgson: *Developing Number Relationships in the Early Years* (Room IF 31)

In this session, we will explore the development of number relationships including counting, subitising, concepts of comparison and part-part whole ideas. These foundational ideas can all be extended to larger numbers, operations, basic facts and computation.

Year K - 2

2. Ben Johnson, Michelle Dennis, Greg James: *Secure Written Methods for Addition and Subtraction* (Room IF 22)

Do your students seem to have gaps in their learning? Do they have an over reliance on formal algorithms when they should be calculating mentally? Are they rigid thinkers, always relying on the same method no matter what the numbers? Are they poor estimators? Do they implement algorithms blindly without real understanding? Do they view decimal numbers as a mystery?

Building alignment in conceptual understanding, mental strategies, secure written methods and estimation strategies will be the focus of this workshop (for the operations of addition and subtraction). There will be an emphasis on deep understanding of place value, flexible thinking (choosing the most appropriate strategies for the numbers in the contexts) and helping students revisit important strategies that they might have not understood properly in previous years. Rote learning of the formal algorithms will be challenged by better alternatives and participants will be provided with criteria to help evaluate the written methods of students.

Year 3 – 6

3. Janine Sprakel, Australian Maths Trust: *Structuring a Problem-Solving Session* *This session will be run virtually with a local facilitator* (Room IF 11)

Planning your session is planning for success in problem-solving! In this session we will look at the phases of a good problem-solving session and the role of the teacher. Some lovely problems will be shared, and we will 'think like a student' as we develop enabling and extending prompts for you to use in your classroom.

Year 3 - 10

4. Naomi Heaven: Networks Knowledge - A teachers take (Room IF 35)

With the inclusion of Networks in the grade 9 and 10 curriculum change for 2022, this workshop is a chance to refresh/learn about networks. This will be an introduction to the terminology and concepts that may be covered under the new curriculum. How networks are already covered in General Maths 2 and 3 for Year 11 and 12 will also be covered, some of which will change in the coming years.

Come and get some resources to start you off with the networks unit and ask questions to help clarify your understanding.

Year 7 – 10

5. Brett Stephenson: Life death and chaos with sequences (Room IF 21)

This workshop will investigate recursive sequences that often model life and death situations and exhibit order/pattern and/or chaos. A Casio graphing calculator (Classpad 2) will be used to investigate how the behaviour of the sequences can be tabulated, graphed and subsequent patterns discovered and analysed for the underlying order and chaos. The use of other technologies such as Desmos and Excel will be demonstrated, and you should be prepared to accept that there are other constants in mathematics other than Pi and e.

Year 7 - 12

Morning Tea

11.10 – 11.30

Workshop 2

11.30 – 12.20

1. Blake Nuto: Maths and Philosophy: Letting Wisdom and Values Shape our Classrooms (Room IF 35)

Mathematics and philosophy have walked hand in hand through the ages. So why does mathematics appear to live in isolation in our modern classrooms?

In this workshop we will explore the marriage of mathematics and philosophy over time. We will look at the importance and practicalities of how to encourage this relationship in our teaching. This will follow the specific focus of embedding wisdom and values into our practice, both for the benefit of the individual and society. We will conclude the session by combining our collective wisdom in a brainstorming session on how to apply philosophical thinking with attention to project-based learning.

Year K - 12

2. Toni Popowski: Draw a table - The importance of mathematical vocabulary (Room IF 31)

In this workshop we will:

- Explore the importance of vocabulary in teaching and learning maths.
- Look at the why and how of building consistency across the school.
- Discuss what the learning of mathematical vocabulary looks like in the classroom.
- Have a look at some classroom examples and try out some practical tasks.

Year F - 6

3. Jane Watson, Bruce Duncan: Improving Catapults: Linking Statistics and Science using Fair Tests

(Room IF22)

Learning activities that integrate mathematics and science can provide valuable experiences from which learners can develop understandings in both these disciplines, as well as understandings of the relationship between them.

Through exploring the operation of toy catapults and investigating a factor that improved their performance, Year 4 students were observed to engage productively in learning about statistical variation, forces and energy, and fair testing. The value in integrating learning across the STEM disciplines lies in the richness of understandings that can form, potentially greater than those that develop when these disciplines are focused on separately.

The participants will explore variables and design a fair test, collect, analyse and interpret data, and discuss findings. Tinkerplots will also be used to represent the observed relationships.

Year 3 – 6+

**4. Daniel O’Kane, Mathspace: Using technology to blur the line between assessment and learning (Commercial Presentation)
(Room IF 11)**

Mathspace has released a new continuous assessment and growth reporting program called Waypoints. A separate program to Mathspace, it allows teachers to track student growth against achievement standards from the Australian Curriculum. More info can be found here: <https://www.mathspace.co/au/waypoints>

This workshop will demonstrate how both Waypoints and Mathspace can be used together to combine assessment and learning in a single digital ecosystem for Years 3 - 12. Teachers should bring their own laptops/tablets, as you will use both Waypoints & Mathspace from a student's perspective.

Year 3 - 12

**5. Rachael Whitney-Smith: Computational thinking - What does this mean for mathematics teaching?
(Room IF21)**

Computational thinking is a problem-solving method that can be used to solve complex problems. It involves employing a variety of techniques and strategies that can be implemented by digital systems. These may include, but are not limited to, organising information and data logically, decomposing problems into smaller more manageable parts, defining abstract concepts and designing and using algorithms, patterns, models and simulations.

So how is computational thinking relevant and essential to the learning of mathematics? This session will unpack what the computational thinking process is, why it is important that students learn computational thinking and how you can build computational thinking into your mathematics lessons.

Year 7-10

**6. Willem Olding: Creating beautiful teaching resources using LaTeX
(Room IF 12)**

LaTeX is a typesetting system commonly used in academia to produce high quality research documents. It is free, open source, and although it has been around since the 80s it is more popular today than ever. Once mastered it can be an incredible productivity tool but most importantly it is a whole lot of fun.

In this interactive workshop we will write a short exam paper together. We will see how LaTeX can take care of many of the tedious aspects: layout, equations, tallying marks etc., leaving us free to focus on the content itself.

Year 9 - 12

Workshop 3

12.25 - 1.15

1. Helen Prochazka: Why I love maths and many students don't! (Room IF 31)

This session will include some of the latest neuroscience research relating to learning that builds on growth mind set and experiences gained from many years spent as a mathematics teacher. Other content will give a different perspective of mathematics through a poetry reading, a maths song that almost made it to Eurovision, and some snippets from "The Mathematics Book". Hopefully, you will have some fun and leave with an idea or two that you can implement in your classroom next week!

F – 10

2. Carol Murphy: Hop, split and jump! Modelling calculation strategies (Room IF 35)

Theories in embodied cognition suggest key grounding concepts that characterise mathematical ideas. In this workshop we refer to two of these concepts - arithmetic as object collection/construction and arithmetic as motion/measurement - and relate these to additive calculation strategies. We explore how distinctions between these two concepts can support fluency and understanding for young students in addition and subtraction as well as making connections between informal and formal methods.

In the workshop you will have an opportunity to explore materials and representations, including ten frames and empty number lines that reflect how the two concepts underpin a range of additive calculation strategies and determine progression in a meaningful way.

Year 1 – 4

3. Ben Johnson, Michelle Dennis, Greg James: Secure Written Methods for Multiplication and Division (Room IF 22)

Do your students seem to have gaps in their learning? Do they have an over reliance on formal algorithms when they should be calculating mentally? Are they rigid thinkers, always relying on the same method no matter what the numbers? Are they poor estimators? Do they implement algorithms blindly without real understanding? Do they view decimal numbers as a mystery?

Building alignment in conceptual understanding, mental strategies, secure written methods and estimation strategies will be the focus of this workshop (for the operations of multiplication and division). There will be an emphasis on deep understanding of place value, flexible thinking (choosing the most appropriate strategies for the numbers in the contexts) and helping students revisit important strategies that they might have not understood properly in previous years. Rote learning of the formal algorithms will be challenged by better alternatives and participants will be provided with criteria to help evaluate the written methods of students.

Year 3 - 6

4. Brett Riley: Pattern to early Algebra (Room IF 11)

Developing the links between pattern in shapes and number is an important part of the early algebra journey. Connecting this to ideas around tables and rules helps students to develop a deeper understanding of the connections between structures in pattern and their algebraic equivalent. See some new and old resources and the connections between them.

Year 5-8

5. Vesife Hatisaru & Greg Oates: Mathematical Problem-Solving and Strategy Use (Room IF 21)

As teachers and educators, we want our students to understand and solve given mathematical problems. In addition to understanding, procedural fluency, and reasoning (three of the Proficiencies stipulated in the Australian Curriculum: Mathematics), one of the chief goals of the national curricula in many countries (e.g., USA, Australia, the UK, Singapore) is developing the problem-solving skills of students (the fourth Australian Curriculum: Mathematics proficiency). Problem-solving skills include using one or a combination of solution strategies, such as using a variable, drawing a picture, making a list, using cases, using properties of numbers, looking for a formula, and solving an equation. The use of these strategies facilitates student understanding and success in solving mathematical problems. In this workshop, we provide a range of problems involving different types of solution strategies, with the aim of guiding teachers to assist their students in formulating, representing and solving mathematical problems.

Year 7 – 10

6. Barry Gardner: Variations on the irrationality of the square root of 2 (Room IF 12)

We present the standard proof that $\sqrt{2}$ is irrational and consider other irrationalities demonstrated by “the same” argument. This leads to an examination of the extent to which these arguments make use of the uniqueness of prime factorization. We follow with some other proofs that $\sqrt{2}$ is irrational and examine what these rely on. It is helpful to an appreciation of the uniqueness of prime factorization to see an example where there are things like primes, but the uniqueness fails. We describe such a system which (like the integers) is contained in the complex numbers. We explore the existence of a square root of 2 in this latter system, or rather in the larger system which imitates the rationals. For good measure we mention another subset of the complex numbers, bigger than the integers, in which uniqueness of prime factorization is essentially valid. This system can be used to provide information about natural number topics such as Pythagorean triples and sums of squares.

Some questions which a good student might ask (or might have asked) which, with a bit of good will, can be linked to the above:

- (i) How do we know that 2 has a square root anyway?
- (ii) Do irrational numbers, like rationals, have some other representation besides as decimals?
- (iii) Why do we use radians rather than degrees in trigonometry?

Year 11 - 12

Lunch

1.15pm – 2.00pm

Workshop 4

2.00 – 2.50

1. Rachael Whitney-Smith: Computational thinking in the Mathematics classroom (Room IF22)

Computational thinking is a problem-solving method that can be used to solve complex problems. It involves employing a variety of techniques and strategies that can be implemented by digital systems. These may include, but are not limited to, organising information and data logically, decomposing problems into smaller more manageable parts, defining abstract concepts and designing and using algorithms, patterns, models and simulations.

So how is computational thinking relevant and essential to the learning of mathematics? This session will unpack what the computational thinking process is, why it is important that students learn computational thinking and how you can build computational thinking into mathematics lessons.

Year F-6

2. Gerald Tuffield, Matific: Developing thinkers, not calculators (Commercial Presentation) (Room IF 12)

A demonstration of the online P-6 mathematics resource Matific and how it develops students' ability to problem-solve, use logical reasoning, and to think mathematically. All session attendees will receive complimentary access to Matific for their class for Term 4

Year F – 6

3. Ben Smethurst: Prime Climb - a method for teaching factors and multiples (Room IF 35)

Put on your 'Game Face'. Come along to participate in some games that allow students to learn about factors and multiples in an active and visual way. This will be a presentation with a focus on Dan Finkel's Prime Climb® as well as some tasks from reSolve® to show how visual representations can help students develop/practice multiplicative thinking. This play-based session allows teachers to practice some activities that could be used to teach students Years 5-8.

Years 5 – 8

4. Robyn Gregory: A Potpourri of Beautiful Ideas in Mathematics (Room IF21)

After a brief introduction, we will investigate some 'hands-on' work over two topics. In addition, some valuable resources relating to other classroom activities will be introduced.

FIGURES OF CONSTANT WIDTH

One of the richest topics to inspire students of all ages from Years 8 to 12 in an application of mathematics. The following questions are great starting points for students to consider before introducing them to this fascinating topic.

Do wheels have to be circular? Can we drill square holes? Is the circle the only closed curve of constant width?

ANAMORPHIC ART

Anamorphic Art is distorted and must be viewed in a particular way. In this workshop we will consider a particular type which must be viewed in a cylindrical mirror. Over many years students in Years 7, 8 or 9 have really enjoyed being able to design such pictures for themselves, draw them on pavement outside, and then view them in a highly polished stainless steel cylindrical mirror.

We draw a picture, which we hope to see in the mirror, on a rectangular grid. To create our distorted picture, we then plot our points on a polar grid.

Note: It can also be a classroom activity using mini cylindrical mirrors made from cardboard cylinders and mirror paper.

RECOMMENDED RESOURCES

Recommendations of the very best resources to use in the classroom which have already been prepared by experts.

Year 7 – 10

5. Duncan Gillespie: Playing with Geometry using Geogebra Online (Room IF 31)

This hands-on workshop will introduce the online Geogebra Geometry Calculator and provide examples of concepts that students can play with using the tools available. The examples will include angle relationships in triangles and parallel lines, similar triangles and Pascal's Angle Machine from resolve®.

The workshop will also cover the construction and measurement tools and techniques available in Geogebra Geometry Calculator.

Participants will benefit from having access to a laptop or tablet connected to the internet, and a Google or Microsoft account.

Year 7 – 10

6. Peter Fox: Problems worth Coding (Commercial Presentation)

This session will be run virtually

(Room IF 11)

The ability to Code or program is an inestimable skill. Coding promotes logic and reasoning, critical thinking and perseverance, and the ability to contextualise and de-contextualise a problem. Combine these attributes with high quality mathematics-based problems for students to explore and you have a formidable combination that engages and empowers students. Participants will not be writing programs to determine the area of a circle given the radius; instead, participants will be given great mathematics problems to explore and the structures and basis of the code needed to enable such explorations.

Year 7 – 12

Workshop 5

2.55 – 3.45

1. Nathan Duhig and Steph Van der Schans: Adjusting good tasks for your purpose:

Differentiation, work smarter not harder

(Room IF 21)

Multiplicative Thinking continues to present ongoing challenges for our learners. This workshop will provide opportunities to explore sequenced challenging tasks that develop, consolidate and enable transfer of this Big Idea.

Investigation of Enabling and Extending Prompts, use of concrete materials, visual and pictorial representations will further develop our journey of embracing challenging tasks. We aim to provide practical opportunities for teachers to experience the cycles of a Structured Inquiry Instructional Model whilst highlighting the potential of rich challenging tasks to meet the range of learning needs presenting in our classrooms.

Nathan and Steph are two of six Lead Coaches in the DoE Numeracy Coach Initiative currently working across 19 schools to build teacher capacity and best practice. They look forward to sharing effective practices further with Tasmania's educators.

Year F – 10

2. Tracey Muir: Pedagogical practices that promote student thinking

(Room IF 22)

This workshop will provide participants with practical research-informed practices that facilitate mathematical thinking and promote purposeful discussion and reasoning. We will use problem-solving as a context to model and explore pedagogical practices that can be immediately implemented into the classroom. Suitable for primary, but easily adaptable to any year level.

Year K – 12

3. Neville Barnard: Performaths (Room IF 35)

Yes, maths is important. It's serious stuff. That doesn't mean it can't be fun - in fact maths is a **FUND**amental activity. Mathemagic offers a way to engage students and introduce them to a world where maths is enjoyable in its own right and not just a set of skills needed later in life. Having fun with maths also helps side-step maths anxiety, engages students in problem-solving and stimulates mathematical/critical thinking. Carefully selected activities can also support the learning of important skills and understandings.

The Mathemagic activities presented in this session are aimed at the mid/upper primary class but could also be used in higher grades. (You are encouraged to wear glasses to this session - apparently they improve division.)

Year 3 – 6

4. David Titherley and Ian Ackerley: Mathematical Minecraft (Room IF 31)

Mathematical activities can be augmented, modified and transformed through the power of Minecraft Education Edition. In this workshop you will discover the benefits of using Minecraft and how it can be successfully implemented in your Maths lessons. Activities will look at topic areas such as Perimeter, Area, Length, Co-ordinates, Algorithms, 3D objects, 2D shapes and Symmetry. Minecraft Education software is currently available at no cost to Department of Education students and staff.

Year 3 – 6+

5. Adrian Baron: The world of pi and the magic of circles (Room IF 12)

Ever wondered about π and its origin? Why is the circumference of a circle $2\pi r$ and the area of a circle is πr^2 ? What is the connection between circumference and area?

This workshop will answer the above questions and cover much more. We will look at the characteristics and properties of circles. From the parts of a circle through to the determining the area of a circle using geometry and integral calculus. We will also look at activities that you can do with students to around $2\pi r$. Activities that will not only engage and challenge your thinking but also that of your students.

Year 7 – 10

6. Brian Lannen: Know Your Limits - a Calculus Introduction (Commercial Presentation) This session will be run virtually (Room IF 11)

What are the very first activities that you do with your class when introducing them to Calculus? It's still probably not a good idea to divide by zero. But don't place limits on your imagination. Employing technology for the graphing & analysis of functions can help. CAS and non-CAS approaches to derivative functions, integration and solving exam questions will be in this workshop. We'll maximise our time to minimise yours.

Year 7 – 10

Conference Close and Spot Prizes

3.45 – 4.00

Trade Displays

Trade displays will be on the second floor, where lunch and morning tea are served. The following exhibitors will be displaying their products throughout the conference. Please take some time to have a look at these.

Stories Bookshop
Maths Space
Education Perfect
Helen Prochazka
Essential Assessment
Matific
Casio Education
Australian Maths Trust

Major Sponsor

EssentialAssessmentTM
Assessment and Curriculum made easy

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Thanks to all the people who donated to the event. We appreciate your continued support to our organisation.