



UNIVERSITY  
OF WOLLONGONG  
AUSTRALIA

# 2016 STEM Teacher Conference

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## Cross Pollinating the Curriculum

**SATURDAY, 6<sup>TH</sup> AUGUST 2016**

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# Conference Convenors

## Conference webpage

Information about the conference can be found at: <http://www.uow.edu.au/~sandison/stemconf.html>

## Location

This conference will be held in the McKinnon Building (Building 67) on the University of Wollongong campus (<http://www.uow.edu.au/about/campusmap/index.html>). There is a lift and ramps for wheelchair or easy access to all venues.

If you require accommodation: <http://visitwollongong.com.au/accommodation>.

## Getting here

If you require directions to get to the university please consult: <http://www.uow.edu.au/transport/index.html>. The university is a short walk from the North Wollongong train station. Trains run regularly on a Saturday from Sydney (<http://www.uow.edu.au/transport/train/index.html>), however please check closer to the time in for any rail works on the line.

There is a free Wollongong city shuttle bus that stops at the university on a Saturday. For further information see: <http://www.uow.edu.au/transport/shuttles/index.html>.

## Parking

There is free parking available in most parking areas on the day of the conference. The closest free parking areas to the conference location are P4 Western carpark and P5 Northern carpark.

Please ensure that you do not park in restricted parking areas or disabled car spaces unless you have the authority to do so. The campus parking is monitored and fines may be issued with penalty notices that are processed by the State Debt Recovery Office, Office of State Revenue, NSW Government. Further information: <http://www.uow.edu.au/parking/restricted/index.html>.

## Facilities

The rooms for today's talks will be on all three levels of the building. There is a stairwell close to each of the rooms for easy access on the north eastern corner of the building. If you require the lift, it is located on the south eastern corner of the building. Please see one of the team if you require further assistance.

Bathrooms are located on each level in the south western corner of the building. Please refer to Figures 1, 2 and 3 located on pages 18 and 19.

There are water stations to refill bottles available on each level near the bathrooms.

## Catering

All catering will be served in the foyer of the McKinnon Building. If you advised us of any dietary requirements when you registered, you may have a plate made up for you. Please check on the table for special orders or ask one of our helpers for assistance.

# Professional Development

This conference has been endorsed by BOSTES as professional development for registered participants. Attendance at this conference will contribute to 6.5 hours towards Proficient Teacher accreditation. Please ensure you have signed the register on the day.



Completing **STEM Teacher Conference 2016: Cross Pollinating the Curriculum** will contribute 6 hours and 30 minutes of QTC Registered PD addressing 2.1.2, 2.5.2, 3.1.2, 3.2.2, 3.3.2 3.4.2, 6.2.2 from the Australian Professional Standards for Teachers towards maintaining **Proficient** Teacher Accreditation in NSW.

# Welcome

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## Associate Professor Caz Sandison

### **IMSITE PROJECT LEADER**

School of Mathematics and Applied Statistics  
Faculty of Engineering and Information Sciences

### Biography

Caz Sandison is an Associate Professor in mathematics and the Head of Students in engineering at the University of Wollongong. An award winning lecturer, she has a keen interest in mathematics education, spending lots of time with students and working out more effective ways of teaching and assessing—while thinking about Topological Groups in her spare time. Caz is presently leading a project at UOW looking at how to better recruit, train and retain maths and science teachers through collaboration between discipline experts (mathematicians and scientists) and educationalist experts.

## Dr Tricia Forrester

### **IMSITE PROJECT LEADER**

School of Education  
Faculty of Social Sciences

### Biography

Dr Tricia Forrester is the Head of Students at the School of Education, University of Wollongong. She lectures in Secondary, Primary and Early Childhood mathematics education, having completed her B.Ed (Hons 1) and PhD in mathematics education. Her mathematics education research interests are currently focused on improving the mathematics content knowledge and pedagogical content knowledge of pre-service primary school teachers, and the utilisation of whiteboard rooms to improve the engagement and learning outcomes of students in mathematics classrooms in a range of educational settings.

# Keynote Address

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## Dr Karl Kruszelniki, AM

When NASA classified Karl as non-astronaut material in 1981 he walked straight into ABC Radio station Double J and offered to talk about the Space shuttle launch. They said 'Okay' and his radio career took off from there. 'Great Moments In Science' ran on Double J while Karl moonlighted as a medical student.

Since then, his media career has exploded from radio, to TV, books, newspapers, magazines, scripting, professional speaking, and of course, the Net.

Karl made his TV debut in 1985 as the presenter of the first series of Quantum. Since 1986 he has reported science on the Midday Show, Good Morning Australia (including a full-time stint in 1991-2 as the TV Weatherman and science reporter), the Today Show and Sunrise. Along side his fellow geek Adam Spencer, he has written and co-produced two series of Sleek Geeks for ABC TV.

Karl popularises science on ABC radio stations across Australia and, on the BBC, for several hours each week. Many of you will be familiar with the original talk back programme each Thursday on JJJ from 11am to midday.

Karl has written (so far) 38 books, beginning with 'Great Moments In Science' in 1984, and includes such titles as 'It Ain't Necessarily So...Bro' (2006), which was launched, quite literally, via rocket at Sydney's Bondi Beach (a world first).

November 2009 saw the simultaneous release of Karl's 28th book, 'Never Mind The BULLocks.. Here's the Science', board game ('Fact OR Fishy'), and first ever music single, 'Get Fact'. In August 2010 Karl's 29th book, 'Dinosaurs Aren't Dead', was released. In November 2010, Karl's 30th book, 'Curious & Curiouser', was released into the adult non-fiction market. His latest book, 'Short Back and Science' was released in October 2015.

In 1996 Karl was invited by the United States Information Agency to be a Distinguished Foreign Guest in their International Visitor Program. Previous Alumni of this program include Julius Nyere, Anwar Sadat, Indira Gandhi and Margaret Thatcher. As part of this program he visited NORAD, Dryden Air Force Base and the Jet Propulsion Laboratory - and got to sit in the front seat of an SR-71 Blackbird.

In August 2000 Karl was one of first eight Australian Apple Masters to be announced (there are fewer than 100 in the entire world). The Apple Masters Program celebrates the achievements of people who are changing the world through their passion and vision, while inspiring new approaches to creative thinking.

In 2002, Dr Karl was honoured with the prestigious Ig Nobel prize awarded by Harvard University in the USA for his ground-breaking research into Belly Button Lint and why it is almost always blue.

In September 2003, Dr Karl was bestowed with the great honour of being named 'Australian Father of the Year'.

Dr Karl Kruszelnicki received the Member of the Order of Australia Award in the 2006 Australia Day Honours list. In 2007 the Australia Skeptics Society awarded Dr Karl the Australia Skeptic Of The Year Prize.

In 2012 Karl was delighted to have Asteroid 18412 named after him. Asteroid Dr Karl/18412 was discovered by Robert H. McNaught at the Siding Spring Observatory in Coonabarabran, New South Wales, Australia, on June 13, 1993.

Karl has degrees in Physics and Maths, Biomedical Engineering, Medicine and Surgery and has worked as a physicist, tutor, film-maker, car mechanic, labourer, and as a medical doctor at the Kids' Hospital in Sydney.

Dr Karl is currently the Julius Sumner Miller Fellow at Sydney University, where his 'mission' is to spread the good word about science and its benefits.

His enthusiasm for science is totally infectious and no one is better able to convey the excitement and wonder of it all than Dr Karl Kruszelnicki.

# Parallel Session 1 - 11.30-12.10

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## Science across the curriculum

**VATCHÉ ANSOURIAN**

Department of Education, Science 7-12 Advisor

**ROOM: 107**

Audience: Secondary

### Abstract

Science is a dynamic subject which can be taught through inquiry, allowing students to explore different scientific principles, engage in scientific processes and discover different branches of science. Science can be seen in our everyday lives and can be used a tool to explain as well as to investigate. Investigations and working scientifically underpin science teaching and the nature of science. While science can be taught discretely, developing cross curricular activities can engage students in science in an authentic and contextual way. Science can be woven into subject areas that may not at first glance lend themselves to the nature of science. Key learning areas such as English, history, arts, physical education, as well as mathematics and technology can blend science as a functional and integral part of lessons and classroom activities. Participants will be able to investigate how science can be integrated into other key learning areas to create contextually engaging units and lessons which blend inquiry and project based learning. There will be an opportunity to create a product during the session which demonstrates cross curricular approaches to teaching science.

### Biography

Vatché Ansourian is the current Science Advisor 7-12 at the NSW Department of Education. He has taught in South Western Sydney as a classroom teacher and as a head teacher. Vatché has previously worked on action research project with university academics to develop literacy strategies to teach writing in science in the middle years. Vatché has a strong interest in science literacy and the teaching of science through student led inquiry. He is a faculty of science member at the University of Technology Sydney and was an advisor and facilitator for the UTS Inspiring Science Teaching program.

You can find more about Vatche's activities on his Twitter account: @mrscience.

## HOT STEM – A Holistic Approach to STEM Education

**DESTINY PARIS**

University of Wollongong

**ROOM: 104**

Audience: Primary and Secondary

### Abstract

STEM Education is not just about teaching subject matter or “making things”, but about inspiring students to engage with STEM tools to “make things happen” through themes that tie into social sciences and humanities. STEM is about people.

HOT (High Order Thinking) STEM addresses the question “Why STEM?” through enquiry-based learning, connecting the dots between personal passions, real-world issues, technical skills, creative thinking, and career pathways.

This presentation will explore HOT STEM and outline cross-curriculum themes related to society and humanity; it will provide an overview and examples of how we can team education providers with local industries and organisations to



develop real-world projects for students. This approach to STEM education aims to encourage and inspire teachers and students to engage with STEM tools so that they learn to infer from them, connect them to other facts and concepts, manipulate and reconstruct them, and apply them in creative new ways to seek novel solutions to topical and real-world problems.

In doing so HOT STEM prepares students for the needs of the ever-evolving workforce which requires people who can ideate, design, develop and deliver complete solutions involving complex integrated systems. This is needed in order to ensure the next generation of Australians have greater STEM-based skills which will give them the ability to create the future, solve challenges, and shape a better world.

## Biography

Destiny Paris started her career as a Mechatronic Engineer in the Defence and Mining industries. Whilst at university she worked as a 'Robotics Peer Mentor' in collaboration with eLabtronics, UniSA and the Department of Education and Child Services (DECS South Australia), teaching middle school students electronics, programming and robotics through structured, term-long classes.

Destiny later developed her career as an Electrical Engineer in the Building Services industry where she worked on a number of Green Building designs both nationally and internationally. Destiny specialised as a Lighting Designer within the Buildings Industry after receiving a scholarship to undertake a Master's in Design Science (Illumination). Based overseas she worked on UNESCO Heritage projects in Thailand and Ecuador, and was featured as an award-winning artist at Sydney's 'VIVID Festival of Light, Music, & Ideas' for her light sculpture – 'Water Droplet'. She has presented at engineering conferences in Paris, Bangkok, and Colombia, and before joining the University of Wollongong (UOW) she worked for an award-winning social enterprise, 40K Group, to develop a program to teach rural Indian primary children through gamified electronic tablets, and send Australian university students to India to build social businesses that empower locals.

In her current role as Schools Liaison Coordinator for UOW's Faculty of Engineering and Information Sciences, Destiny is collaborating with local schools and industries on STEM Education programs to ensure that future generations of Australian humanitarians, environmentalists, creatives, and entrepreneurs are equipped with the STEM tools needed to meet the challenges of the future.

For news on STEM Outreach activities, please visit the webpage (<http://www.uow.edu.au/stem-outreach/index.html>).

# Upskilling STEM Skills: 3D Printing & CAD

**HEIKE ROBERTS**

Modfab/Western Sydney University

**ROOM: REGISTER FOR THIS TALK AT RECEPTION DURING REGISTRATION\***

Audience: Primary or Secondary

## Abstract

3D Printing & CAD are STEM Skills of the future. Students from various disciplines will need to develop these skills for future career positions. Modfab believes that without training Australia will make little impact in one of the fastest growing technologies in the world, and subsequently become consumers of the products rather than its creators. Come and join us in a simple hands on Design – CAD- 3D Printing workshop. We will show you where you as teachers can unleash the great potential hidden within your students.

## Biography

Heike is currently working for Modfab P/L and has degrees in interpreting/ translation and a Bachelor of Teaching (Primary) from Western Sydney University. As a teacher she has worked in the classroom as a classroom teacher, RFF, ESL and Learning Support for six years. In 2014, Heike co-wrote a one day BOSTES "3D Printing & CAD" course accredited at proficient teacher standards for 7 hours of registered professional development. Modfab has trained in excess of 300 teachers from primary schools, high schools and TAFE. Other highlights include 3D printing & CAD workshops at the Wollongong Science Centre, UOW Learning Labs, Early Learning Labs and Little Learning Labs. In November, 2015 Modfab trained indigenous elders from remote Arnhem Land Communities to recycle plastic milk bottles into 3D filament and also how to use 3D printing & CAD as part of a school attendance program called "Plastic

Fantastic.” Currently Modfab is collaborating with the Australian Design Centre to deliver 3D Printing & CAD training to schools, teachers and the public as part of the “Shapeshifters Exhibition” currently touring regional galleries around Australia.

\* Please note: This talk is limited to 22 people. Please register at the registration desk upon arrival. Only registered participants will be allowed entry to this talk. Meet at The Terrace Restaurant in the foyer to be escorted to the computer laboratory. There is a flight of stairs to access the lab. If you have registered and require the use of a lift, please make yourself known to Sue while you register.

### Integrating Mathematics, English and gardening in order to support Stage 3 students to become environmental change agents in their school: How hard could it be?

**PETER ANDERSON**

University of Wollongong

**ROOM: 203**

Audience: Primary

#### Abstract

In recognition of the plight of the environment and the potential of children to be environmental actors and change agents, the Australian Curriculum challenges teachers to provide students with opportunities and skills to lead environmental initiatives in their schools and communities. In turn, universities are offering pre-service teachers opportunities to hone their skills as environmental educators.

This presentation provides an overview of a collaborative project between 2nd Year students from the B.Primary Education degree at the University of Wollongong (UOW) and Stage 3 students from Coniston Public School (CPS). The UOW students were tasked to support the CPS students to lead environmental change in their school through the integration of Mathematics, English and gardening. The presentation also contains a practical session in which participants have an opportunity to engage in some of the Mathematics activities used by our UOW students to inspire their students to bring about environmental change in their school.

#### Biography

Peter Andersen is a lecturer in HSIE, Sustainability Education and Professional Development in the School of Education at the University of Wollongong. He is also the Academic Director of the B.Maths/Science Education programs at the University of Wollongong. His passion is how to empower children to become environmental change agents in their schools, communities and homes.

### Integrating STEM into the Stage 4 curriculum

**ANDREW FACER**

Bowral High School

**ROOM: 101**

Audience: Secondary

#### Abstract

This presentation explores ideas on how STEM can be integrated into Stage 4 Science, Mathematics, and Technology KLAs. It discusses some examples of projects that could be used including the construction of vehicles not reliant upon fossil fuels, the development of biofuels and construction of submersible vehicles. Film is explored as a media to convey students work and allow for communication with the wider school community. During this presentation we will also explore options that promote STEM integration allowing all faculty staff involved to contribute to weekly STEM lessons for students. Problems, challenges and some solutions are offered to common problems in developing an integrated STEM program.

#### Biography

Andrew graduated from the University of Wollongong in 2008 with a Bachelor of Science Education. He accepted a permanent teaching position at Condobolin High School in the middle 2008 and was involved in the redevelopment of faculty programs to incorporate inquiry and problem based learning. In 2012 Andrew transferred to Bowral High School and continued to implement inquiry learning. During 2015 he worked with UTS to deliver the inspiring teacher program aimed at increasing student engagement and skills through inquiry programs. Further, he led change at Bowral High school through the introduction of the integrating STEM program where a unit of work was developed and delivered to a STEM class involving Mathematics, Science and TAS staff members.

# Establishing a Sustainable Primary STEM Learning Community at Tahmoor Public School

**MARC NOAKES**

Tahmoor Public School

**ROOM: 302**

Audience: Primary

## Abstract

Trends in educational research suggest that many primary teachers are reluctant to teach science and technology because they are unfamiliar with the new syllabus, are deficit in science content understanding, and have had a negative prior experience learning science. Further, many pre-service and early career teachers lack confidence in teaching science due to the technical nature of the subject content, lack of subject-specific pedagogical content knowledge and low level of support. Research also suggests that situated (in-school) professional development, that extends over a number of years, is the most effective way to build capacity for whole school and sustainable long-term science and technology programs.

Over the past 3 years, Tahmoor Public School, a semi-rural school in the Wollondilly School Network, has developed an initiative aimed at increasing student, staff and community engagement in STEM through Project-based inquiry, and building capacity for a sustainable Primary STEM PLC. The program is informed by current science research and science education research and, as such, remains responsive to change. Staff have been actively engaged in the design and delivery of a new, integrated STEM program through situated professional development using a hands-on approach. The new Science and Technology program provides learning experiences contextualised to the school's local area to facilitate student's ability to make links with their every-day lives and local experience, knowledge and understanding. A Project-based inquiry model incorporates contemporary primary science pedagogy and has been adopted throughout the school. This model provides a vehicle for the delivery of science lessons that are differentiated across all learning stages and all classes in the school from K to 6.

## Biography

Having a passion for science and learning, Dr Noakes earned his PhD in Molecular Genetics with the CSIRO. His postdoctoral research at Washington State University focused on the evolution of salmonid genomes through gene mapping, automated gene sequencing, and polymorphism detection. Upon returning to Australia he undertook postgraduate studies in education and gained employment as a high school science and mathematics teacher, developing a working understanding of the 7-10 science curriculum, HSC Biology, HSC Earth and Environmental Science and HSC Senior Science syllabi. Dr Noakes is a BOSTES endorsed professional development provider in the field of Primary STEM and has also written material for Primary Connections. He currently serves as the Compliance Portfolio Director for the Science Teachers Association of NSW, where he is also a member of the council.

As the Director of Accent on Achievement, Dr Noakes works as a Primary STEM Specialist. He is also employed as a sessional academic in postgraduate Primary Science and Technology Education at the University of Wollongong and Western Sydney University. Through his work, Dr Noakes helps primary schools to build capacity for sustainable and high quality Primary STEM through situated professional development, mentoring, collaborative teaching, curriculum leadership and network support. Dr Noakes coordinates a Primary STEM Teacher Network and is currently developing partnerships with the Illawarra Regional Science Hub and the Macarthur Regional Science Hub.

Mobile: 0422 067888

Website: [www.accentonachievement.com.au](http://www.accentonachievement.com.au)

Email: [marc@accentonachievement.com.au](mailto:marc@accentonachievement.com.au)

# Transitioning to STEM from mainstream

**ANDREW TANN**

Picton High School

**ROOM: 102**

Audience: Secondary

## Abstract

This talk will present how Picton High School has implemented its STEM program in place of mainstream Science, Mathematics and Technology classes. It will look at the trials, errors and review of the program, other implementation scenarios and highlights many of the key points when implementing STEM in your school.

## Biography

Andrew Tann is a Science/Chemistry Teacher from Picton High School and has been teaching for 7 years. Andrew is an honorary associate of the Faculty of Science UTS and Science Champion delegate for his work on the Inspiring Science Teaching program.

He is passionate about Science and STEM education especially encouraging girls into the field. Andrew has worked with the UTS Collabor8 program encouraging girls to become involved in STEM.

As a self-proclaimed tinkerer/maker he is using his spare time to learn a new skill or create resources for use in the Science classroom.

## Parallel Session 3 - 2.00-2.40

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### Coding, Robots and Mathematics in the Primary School

**KERRIE FAULKNER**

Mathematics Educator, University of Wollongong

**ROOM: 302**

Audience: Primary

#### Abstract

From ES1 to Stage 3, Coding and Robotics can be used to engage students in Mathematics through a problem solving approach. This session will give participants a taste of the activities and resources available to do so, including Bee Bots, Scratch and Tynker.

#### Biography

As well as lecturing at the University of Wollongong in Primary and Secondary Mathematics, Kerrie Faulkner has worked for the NSW DET since 1981, moving from primary teaching to secondary Mathematics in 1985. Her experience has included comprehensive high schools, a senior college, a central school and 3 years as a consultant in Computer Education. Currently, Kerrie works with the Corrimal Community of Schools, coordinating numeracy activities at Corrimal HS and supporting stage 2 and 3 teachers in their Mathematics teaching at four local primary schools.

### Digging into Minecraft

**DAVID JACQUES**

Corrimal High School/University of Wollongong

**ROOM: 203**

Audience: Primary and Secondary

#### Abstract

When Markus Persson released the alpha version of Minecraft in May 2009 he had no idea what was about to be unleashed. The simplistic game with terrible graphics has become revolutionary. Its 'sandbox' design has kept kids entertained for countless hours all around the world. Schools are starting to incorporate Minecraft into their teaching. Why would they do this? What benefits are they finding from using this software? In this discussion I will be giving you a small taste into the world that is Minecraft and showing you some of the endless possibilities for education.

#### Biography

I am currently a Mathematics teacher at Corrimal High School and have almost reached my 10 years of teaching milestone. I hold a Bachelor of Mathematics, Diploma in Education (Mathematics) and a Masters in Educational Leadership from the University of Wollongong. For the past three years I have worked at the University of Wollongong as a tutor for a 3rd year Maths Education subject. I have also presented at the Universities Learning Labs program for gifted primary school students for the last two years and at a Summer session conference on Teaching Students with Difficulties in Mathematics - 'Learning Difficulties in Mathematics - Nature or Nurture?' - Jan 18th 2013. I have presented at two MANSW conferences: Speed share: Making Maths engaging - 2012 and Riding the way of change: Exploring the NSW Syllabus for the Australian Curriculum - 'Developing fluency in mathematics' - May 18th 2013.

# STEM<sub>ed</sub>: An Integrated Program for Year 7-8 Science, Mathematics and (Mandatory) Technology

**MIKE NIGHTINGALE**

Deputy Principal, Mount Annan Christian College

**ROOM: 101**

Audience: Secondary

## Abstract

STEM<sub>ed</sub> takes a project-driven approach to Science, Mathematics and (Mandatory) Technology in Years 7-8. It incorporates a full teaching and learning program across three Key Learning Areas. This workshop will describe the benefits and challenges experienced since the introduction of STEM<sub>ed</sub> as a pilot program in 2014-15, followed by its implementation for all Year 7-8 classes in 2016. Participants will receive a sample Scope and Sequence and sample projects to help them develop similar programs in their own school.

## Biography

Mike is the Deputy Principal of Mount Annan Christian College. As a mathematics teacher for more than 20 years, he became frustrated by the decline in engagement and achievement being experienced in many schools - including his own. In 2013, he and two colleagues took up the challenge to change how STEM is taught. STEM<sub>ed</sub> is just one of their hare-brained schemes designed to make school less boring.

# Using a collaborative, thinking space for maths and science problems

**CAZ SANDISON AND WENDY NIELSEN**

School of Mathematics & Applied Statistics and School of Education, University of Wollongong

**ROOM: 301**

Audience: Primary and Secondary

## Abstract

This session is a 'taster' where attendees will work on a problem-solving activity in small groups using 'vertical non-permanent surfaces' to get a sense of the power of the whiteboard room as an engaging strategy for teaching and learning in mathematics and science classrooms.

## Biography

### Caz Sandison

Caz Sandison is an Associate Professor in mathematics and the Head of Students in engineering at the University of Wollongong. An award winning lecturer, she has a keen interest in mathematics education, spending lots of time with students and working out more effective ways of teaching and assessing—while thinking about Topological Groups in her spare time. Caz is presently leading a project at UOW looking at how to better recruit, train and retain maths and science teachers through collaboration between discipline experts (mathematicians and scientists) and educationalist experts.

### Wendy Nielsen

Dr Wendy Nielsen is a Senior Lecturer in the School of Education at UOW. She is a science educator whose current research centres on student-generated digital media, where learners develop an explanation of a science concept for others. In the process of developing a digital explanation, rich learning results from the many decisions that are made in producing the media product. Wendy has other research interests in environmental education, teacher professional learning, supervising teacher knowledge and using technology in teaching and learning.



# Students thinking, exploring and making: STEM at The Canobolas Rural Technology High School.

**MATT SCOTT**

The Canobolas Rural Technology High School

**ROOM: 102**

Audience: Primary and Secondary

## Abstract

Following action research projects in STEM for ACARA and the NSW Department of Education, STEM was identified as a curriculum area that could benefit the students of the Canobolas Rural Technology High School. A change to the school structure was endorsed by the school's curriculum committee and now STEM is a mandatory subject for all students in Year 7 and 8. Our work in the STEM space has seen Canobolas endorsed as one of 8 STEM Action Schools within the NSW Department of Education.

STEM content is aligned with the school's Stage 4 Science scope and sequence, using project based learning to build upon the skills and knowledge developed in Science classes. Mathematics content is taken from the Stage 4 scope and science and applied where opportunities present for authentic learning experiences. This content is delivered using the Technology (Mandatory) design process to prototype solutions to problem based tasks. Units of work are developed by the STEM team, and delivered by individual teachers from the team. Staff professionally develops each other to build capacity for delivering all aspects of the STEM units.

STEM is delivered in the school's STEM Centre that features three unique learning spaces:

- the thinkerspace: a 21st century flexible learning space for collaborating and applying critical thinking to problem solving tasks.
- the explorerspace: this is where the knowledge is stored, in traditional books and also electronically using iPads and computers.
- the makerspace: a crafting area where students can prototype and test their ideas, traditionally by hand or by using advanced manufacturing skills like computer aided design and 3D printing.

This presentation will cover the STEM evolution at Canobolas from inception to date, and map a future for STEM at the school that will keep student thinking, exploring and making for years to come.

## Biography

Matt Scott, B. ED (Secondary TAS) is Head Teacher STEM at the Canobolas Rural Technology High School in Orange, NSW. In this role, he is responsible for the development of STEM curriculum for Stage 4 and 5 and the management of the STEM Centre at Canobolas. Matt has been teaching Stage 6 Design and Technology for several years. His interests include educational technologies like 3D printing, laser cutting, coding and micro development computers like Arduino. His philosophy for technology education includes integrating advanced manufacturing into class programs to enhance student engagement and to promote STEM.



# Invited Speaker

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## Peter Thompson

### **DON'T PANIC STEM CURRICULUM SUPPORT**

*Title: Practical applications of project approaches to integrated and collaborative learning*

#### Abstract

This discussion is about the historical and research background to Project Based Learning. Defining STEM education in a school context and a recipe for success in developing deep studies to integrate learning from many disciplines. STEM is discussed as the "pillars" and as an integrator of learning. Drawing on the work of Ramaley, J. the first to use the STEM acronym in 2001 and Sanders, M of Virginia Tech who promotes 'Integrative STEM'.

Future schooling and curriculum change are discussed in a context of societal change as a result of digital disruption. Reference is made to Price Waterhouse Coopers report *A Smart Move*, Deloitte's work for the Australian Computer Society, Australia's Digital Pulse, Council for Economic Development Australia (CEDA) report "Australia's Future Workforce" and the OECD work around digital technologies and schools.

Finally, a simple 'recipe' is provided for the development of focussed projects integrating BOSTES outcomes.

#### Biography

Peter was formally head teacher, Technology at Bossley Park High School, South Western Sydney. He has previously been a Supervisor of HSC Marking for Design and Technology, Automotive Technology and ElectroTechnology. Examination committees in Design and Technology, Industrial Technology and Engineering Studies.

Peter has presented at state, national and international conferences regarding Design, Technology and Engineering education, digital disruption and project based learning in Australia.

He has recently retired as Inspector, Technology Education for BOSTES and established the Don't Panic consultancy with Ruth.

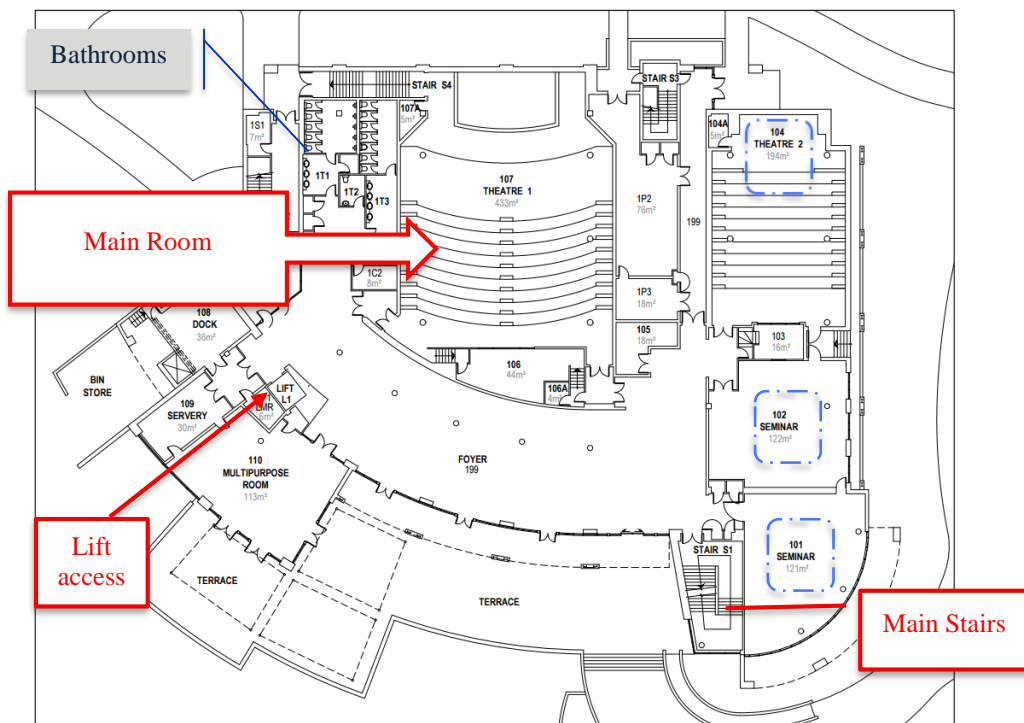


Figure 1. Main Floor (Level 1)

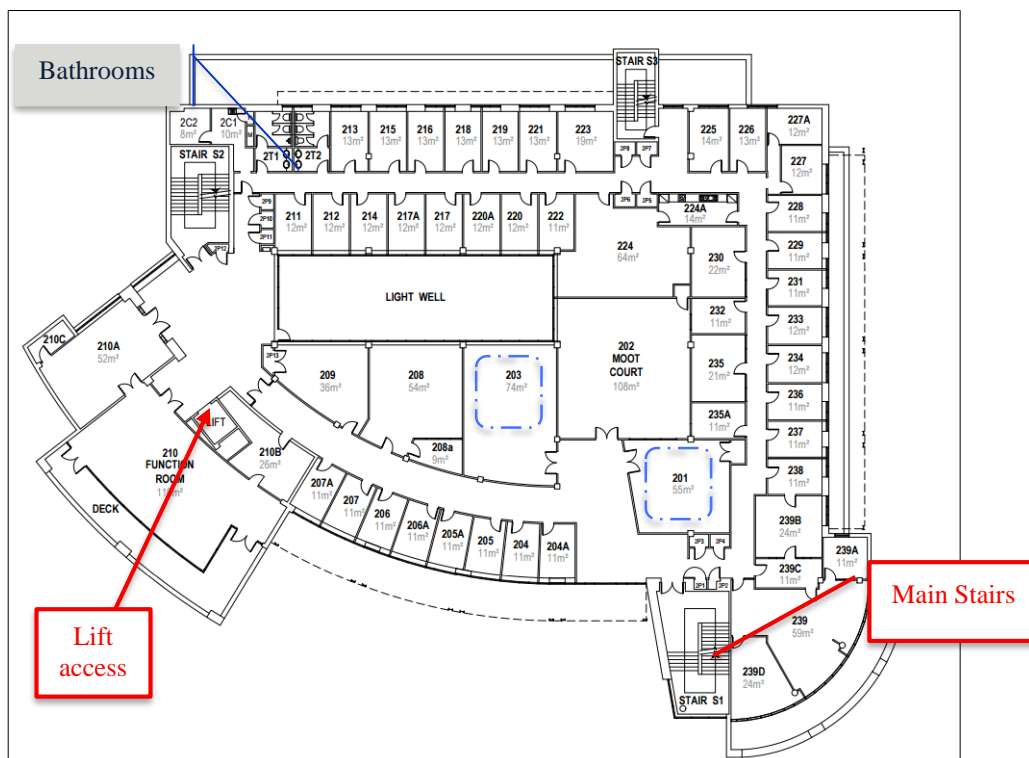


Figure 2. Level 2

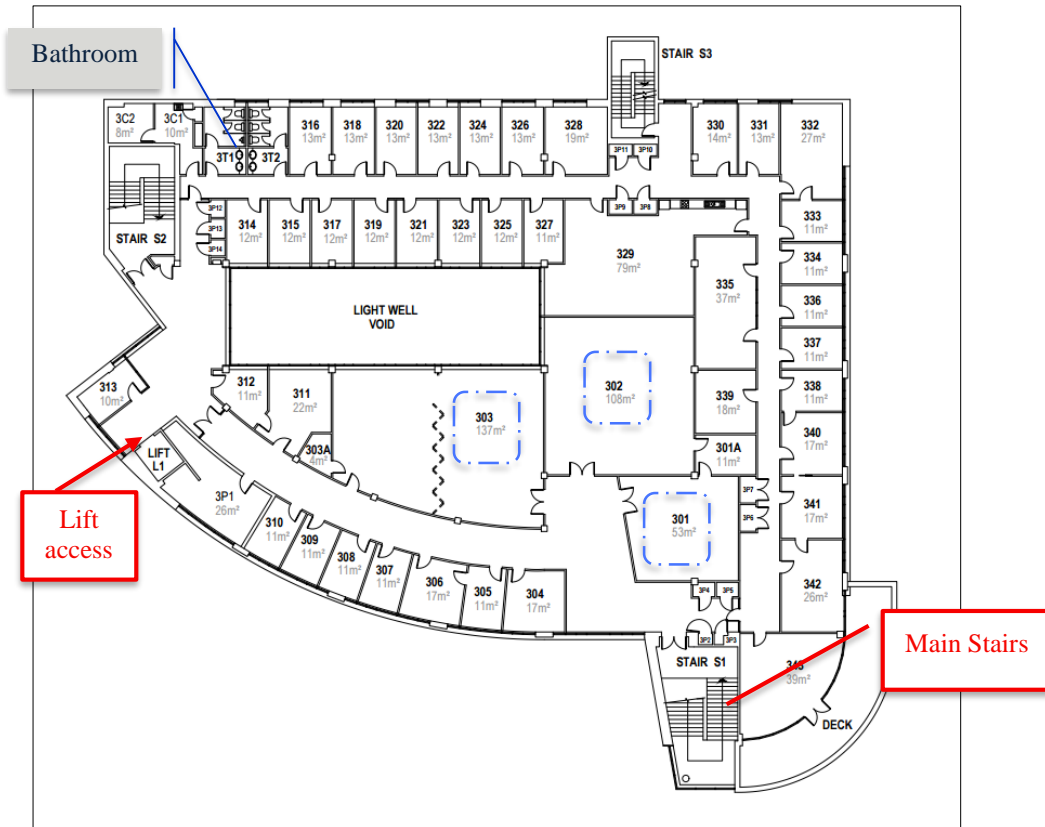


Figure 3. Level 3



# Room timetables

## MAIN FLOOR (LEVEL 1)

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### *Main Room - Room: 107*

9:00 - 9:15	Welcome	(Page 6)
9:15 - 10:45	Dr Karl	(Page 7)
11.30 - 12.10	Vatché Ansourian	(Page 8)
2:45 - 3:25	Peter Thompson	(Page 17)

### *Room: 101*

12.15 - 12.55	Andrew Facer	(Page 11)
2:00 - 2:40	Mike Nightingale	(Page 15)

### *Room: 102*

12.15 - 12.55	Andrew Tann	(Page 13)
2:00 - 2:40	Matt Scott	(Page 16)

### *Room 104*

11.30 - 12.10	Destiny Paris	(Page 8)
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## LEVEL 2

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### *Room: 203*

12.45 - 12.55	Peter Anderson	(Page 11)
2:00 - 2:40	David Jacques	(Page 14)

## LEVEL 3

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### *Room 301*

2.00 - 2.40	Caz Sandison & Wendy Nielsen	(Page 15)
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### *Room 302*

12.15 - 12.55	Marc Noakes	(Page 12)
2:00 - 2:40	Kerrie Faulkner	(Page 14)

If you have registered for the presentation by Heike from Modfab (Page 9), please meet in the foyer next to The Terrace (south end) to be escorted to the lab. This session is **strictly limited** and only registered participants will be allowed to enter the room.

# Program

## 2016 STEM Teacher Conference: Cross Pollinating the Curriculum

Saturday 6th August 2016

**Registration:** 8:30-8.55

9:00 - 9:15	<b>Welcome</b> <i>Associate Professor Caz Sandison and Dr Tricia Forrester</i> Project leaders, IMSITE Project, University of Wollongong				
9:15 - 10:45	<b>Keynote Address</b> <i>Dr Karl Kruszelnicki AM</i>				
<b>Morning Tea:</b> 10:45 -11:25					
<b>Parallel Session 1</b>					
11:30 - 12.10	<i>Science across the curriculum (S)</i> <b><u>Vatché Ansourian</u></b> Science 7-12 Advisor Department of Education Room 107	<i>HOT STEM – A Holistic Approach to STEM Education (P&amp;S)</i> <b><u>Destiny Paris</u></b> Schools Liaison Coordinator, University of Wollongong Room 104	<i>Upskilling STEM Skills: 3D Printing &amp; CAD (P &amp; S)</i> <b><u>Heike Roberts</u></b> Director of Education Projects, Modfab/ Western Sydney University Room *		
<b>Parallel Session 2</b>					
12.15- 12.55	<i>Integrating Mathematics, English and gardening in order to support Stage 3 students to become environmental change agents in their school: how hard could it be? (P)</i> <b><u>Peter Anderson</u></b> University of Wollongong Room 203	<i>Integrating STEM into the Stage 4 curriculum (S)</i> <b><u>Andrew Facer</u></b> Bowral High School Room101	<i>Establishing a Sustainable Primary STEM Learning Community at Tahmoor Public School (P)</i> <b><u>Marc Noakes</u></b> Tahmoor Public School Room 302	<i>Transitioning to STEM from mainstream (S)</i> <b><u>Andrew Tann</u></b> Picton High School Room 102	
<b>Lunch:</b> 1:00 -2:00					
<b>Parallel Session 3</b>					
2:00 - 2:40	<i>STEM_ed: An integrated program for Year 7-8 Science, Mathematics and (Mandatory) Technology (S)</i> <b><u>Mike Nightingale</u></b> Deputy Principal, Mount Annan Christian College Room 101	<i>Using a collaborative, thinking space for maths and science problems (P&amp;S)</i> <b><u>Caz Sandison &amp; Wendy Nielsen</u></b> Mathematics Lecturer & Science Education Lecturer University of Wollongong Room 301	<i>Digging into Minecraft (P&amp;S)</i> <b><u>David Jacques</u></b> Mathematics Teacher, Corrimal High School/ University of Wollongong Room 203	<i>Students thinking, exploring and making: STEM at The Canobolas Rural Technology High School (S)</i> <b><u>Matt Scott</u></b> Head Teacher STEM (TAS), The Canobolas Rural Technology High School Room 102	<i>Coding, robots and Mathematics in the primary school (P)</i> <b><u>Kerrie Faulkner</u></b> Mathematics Educator, University of Wollongong Room 302
2:45- 3:25	<b>Invited Speaker</b> <i>Practical applications of project approaches to integrated and collaborative learning</i> <b><u>Peter Thompson</u></b> Don't Panic STEM curriculum support (recently retired BOSTES Inspector, Technology Education)				
<b>Close:</b> 3.25-3.30					

P: Suitable for Primary teachers

S: Suitable for Secondary teachers

\* If you have signed up for this talk before registration, please meet in the foyer next to The Terrace restaurant to be escorted