KEYNOTE PRESENTATIONS

All keynote speakers/workshop leaders have strong conviction in the importance and value of communicating maths science to teachers and children. Each Keynote Presentation is linked to discussion groups led by Australian researchers and educators.

Getting Students Engaged in Computer Science Education

TIM BELL, Professor of Computer Science, University of Canterbury, Christchurch, NZ

Hoorah for success! The Computer Science Unplugged project, has been used around the world to engage primary school aged children; and more recently has been deployed in high schools, meeting the challenges for delivering advanced ideas to students at every level. Tim will review and contrast curricula from around the world, including New Zealand, the UK and the US. We conclude by considering what the key elements for success are, and how to identify approaches that will and won't engage students. Tim will demonstrate and engage you with some Computer Science Unplugged activities.

Increasing Mathematical Content and Pedagogical Knowledge of Teachers, and Creating Teacher-Leadership Circles

JUDITH MONTGOMERY, Director of the Monterey Bay Area Mathematics Project (MBAMP),

http://mbamp.ucsc.edu/staff/

Department of Mathematics, University of California, Santa-Cruz

The guiding principal of MBAMP is: When teachers deepen their understanding of fundamental mathematics, become more fluent in mathematics, and strengthen their ability to think mathematically, they communicate mathematics more effectively to their students. Teachers will have high expectations for students, who will respond with improved learning. Judith will describe the activities that develop conceptual understanding and high levels of mathematical skill. MBAMP serves over 200 teachers a year, and includes districts of high poverty minority students (mostly Hispanic). Judith will show Math Games mapped to the California Math standards which she presented at the American School in Rotterdam Holland. She will show us how we can form Teacher Leadership Circles.

A Brief Tour of Some Modern Mathematics, Including Unsolved Problems

MICHAEL FELLOWS, Australian Professorial Fellow, Professor of Computer Science, Charles Darwin University

FRANCES ROSAMOND, Professor of Computer Science, Charles Darwin University

This session demonstrates activities that show some important modern mathematics, including problems as yet having no solution, and how we conduct a workshop for sharing them with young children. The activities such as the Sorting Network are so self-contained that children understand what to do with very little instruction, even in places where we do not speak the language, such as India or Norway. Together we will do some of the activities, which are from the "Computer Science Unplugged! Project." We will describe how we present the workshop, show how some are related to subjects other than math, and give some reactions from children, teachers and parents.

Insights about Mathematics in Schools, and from the Tamil Nadu Science Forum

RAMASWAMY RAMANUJAM (JAM), Professor of Computer Science, The Institute of Mathematical Sciences, Chennai, India

http://www.imsc.res.in/users/jam

We present an argument that doing mathematics in school is important, and that we shift focus from content to processes such as such as selecting between or devising new representations, looking for invariances, observing extreme cases and typical ones to come up with conjectures, looking actively for counterexamples, estimating quantities, approximating terms, simplifying or generalizing problems to make them easier to address, and so on. This will help the goal of engaging every child in the mathematics classroom with a sense of success. School mathematics usually concentrates on using mathematics rather than producing mathematics of any kind at all. Roughly, this is analogous to urging children to "practise your notes" because you cannot even appreciate music properly without doing so. But, it is hard (or boring) to do so unless one wants to become a musician. A curriculum that aims at producing a certain level of mathematical competence (say in adding fractions, or calculus) by the time the student exits the system is often tower-shaped, each layer of competence built on preceding ones. On the other hand, mathematics as a mode of intellectual enquiry might well be given an architecture that's broader, "closer to the ground". Indeed, such curricular choices may be seen in the way some countries have gone about in shaping their curricula. Examples of activities from the Tamil Nadu Science Forum will be given.

21st Century Competencies with First Nations children in Alberta, Canada using Multi-Sensory Math Activities

GERI LORWAY, Mathematics Consultant and President of "Thinking 101", a consulting and coaching organization that provides professional development support for 9 Districts in Alberta, Canada.

Making teaching and learning meaningful, relevant and fulfilling by focusing on engaging the brain emotionally, socially and intellectually. Geri works with learners of all ages, with a special passion for mathematics and science as venues for engaging the mind in thinking, visioning and imagining possibilities. So many minds, so little time. The 21st century demands self reflective, intellectually passionate critical thinkers..... what are our classrooms doing to create them? Geri discusses the disconnect between "school math" and the mathematics of the world around that our students need to understand and appreciate. Geri shows multi sensory experiences which engage all learners immediately in wanting to know mathematics in new ways. The material stimulates rich and meaningful intellectual connections and conversations with teachers and parents.

Math and Computer Science Outreach at UVic: Initiatives and Research Results

Ulrike Stege, Associate Professor, Director of Undergraduate Studies, Department of Computer Science, University of Victoria, Victoria BC, Canada.

We survey the K-12 Math and Computer Science experiences for youth in British Columbia (BC), Canada, and discuss outreach initiatives and research projects in Computer Science, Mathematics and Education for a student population of youth, grades K-12, including projects targeting aboriginal minorities in BC. In particular we present new "unplugged" activities developed by our SPARCS (Solving Problems with Algorithms, Robots and Computer Science) group.

Creativity is about taking existing ideas into new places

JONATHAN MILNE and ALICE WILSON MILNE, Owners/Founders/Directors of The Learning Connexion (TLC), New Zealand. TLC is the largest art institute in New Zealand, with students coming from all parts of the world.

TLC is an art school that is more than an art school. It is, quite purposefully, a school for creators, no matter what road they take in life. Since 1988, TLC has helped thousands of people discover the art and creativity that is in each of us. This session offers stunning examples and surprising lessons as a roadmap for anyone ready to explore new territories of the imagination, whether in work, play or life. Everyone will join in the learning spiral that begins with an idea, moves on to action, feedback and then feed forward.

Some of the workshop, discussion, round-table leaders

MARK CLAPSON and NARALLE ANDERSON, Bohnock, NSW. For more than thirty years, Mark and Narelle have taught Aboriginal children in many capacities. Mark was a high-school math teacher. Narelle teaches in an Aboriginal classroom at Taree Elementary School, and is Assistant Principal. They host groups of children on their property in Bohnock for summer holiday learning experiences.

TERRY DUNBAR, Charles Darwin Univ Associate Professor and Interim Director ACIKE, the Australian Centre for Indigenous Knowledges.. Terry has a love of mathematics. She is indigenous herself, and knows from the inside the challenges.

VLADIMIR (Vlad) ESTIVILL-CASTRO, Professor of Computer Science, Griffith University. Estivill-Castro organized mathematical sciences mentoring activities for Aboriginal students at Univ Newcastle. He is director of internationally award-winning Robo-Cup teams, and he has developed math activities for blind children. His science research area includes machine learning, knowledge discovery and data mining, computational geometry and algorithms.

http://www.griffith.edu.au/engineering-information-technology/school-information-communication-technology/staff/professor-vladimir-estivill-castro

STEPHEN THORNTON, Professor of Mathematics Education, Charles Darwin University

Steve's research interests are in mathematics education. In particular he is interested in the epistemological underpinnings of school mathematics curriculum, and how the way in which we produce and value knowledge influences the content and pedagogy of school mathematics. He is also interested in a number of related issues, including numeracy across the curriculum and the intersections of language and mathematics. He is involved in school-based research projects that focus on language and epistemology, in particular their impact on mathematics outcomes for indigenous students.

Stephen taught school mathematics for many years in PNG and South Australia. He later took up a position with the Australian Mathematics Trust in Canberra focusing on teacher development, and then in teacher education at the University of Canberra. He is now based in Darwin where he teachers and researches in mathematics education at Charles Darwin University. He is a past President of the Australian Association of Mathematics Teachers and maintains close links with teachers and researchers throughout Australia and internationally.

BLANCA MANCILLA, Department of Computer Science, University of New South Wales. Mancilla gives workshops in schools to interest children in computing and mathematics. She and her husband have home-schooled their two daughters. Mancilla's research area is Cartesian Programming (PKA Intensional Programming), in which any entity is assumed to be a multidimensional array of arbitrary dimensionality and extend, evaluated when needed based on a context of evaluation: a set of (dimension, value) pairs. http://mancilla.web.cse.unsw.edu.au/

DR. IAN ROBERTS, Senior Lecturer, Mathematics, Charles Darwin University. Ian's researh area includes discrete mathematics including Extremal Set Theory, combinatorics of finite sets, hypergraphs, and combinatorial designs. Ian is very involved with maths teachers in NT, and has organized many maths summer camps and other activities for teachers and children.

Mr JOHN SHANAHAN, President of the Science Teachers Association of the Northern Territory, teacher, and NT Department of Education and Training.

Dr. PETER SHAW, Senior Lecturer, IT and Electrical Engineering, Charles Darwin UniversityPeter's research interests are Parameterized/multivariate (FPT) algorithms and algorithmic methods with applications in bioinformatics, econometrics and analysis of social networking. He also investigates clustering and pattern searching using FPT techniques, some of which relates to infectious disease control using mobile phone technology and cryptographic techniques. Peter is very interested in communicating mathematical research to children.