



mathematics education in the margins

Proceedings of the 38th Annual Conference of the
Mathematics Education Research Group of Australasia

Edited by Margaret Marshman, Vince Geiger & Anne Bennison



Contents

Preface	3
MERGA38 Reviewers	4
KEYNOTES	
Preamble to the Annual Clements/Foyster Lecture	13
Mathematics Education as a Field of Research: Have We Become Too Comfortable?	14
<i>Tom Lowrie</i>	
Researching and Doing Professional Development Using a Shared Discursive Resource and an Analytic Tool	25
<i>Jill Adler</i>	
Exploring a Structure for Mathematics Lessons that Foster Problem Solving and Reasoning	41
<i>Peter Sullivan, Nadia Walker, Chris Borcek & Mick Rennie</i>	
Practical Implications Award	
Teacher Actions to Facilitate Early Algebraic Reasoning	58
<i>Jodie Hunter</i>	
Research Papers	
The challenge of supporting a beginning teacher to plan in primary mathematics	69
<i>Judy Bailey</i>	
Contemplating symbolic literacy of first year mathematics students	77
<i>Caroline Bardini, Robyn Pierce & Jill Vincent</i>	
Problematising Mathematics Education	85
<i>Andy Begg</i>	
Identity as an Embedder-of-Numeracy: Identifying ways to support teachers to embed numeracy across the curriculum	93
<i>Anne Bennison</i>	
Young Children’s Number Line Placements and Place-Value Understanding	101
<i>Brenda Bicknell & Jenny Young-Loveridge</i>	
The Role of Cultural Capital in Creating Equity for Pāsifika Learners in Mathematics	109
<i>Trevor Bills, Roberta Hunter</i>	
The importance of praxis in financial literacy education: An Indigenous perspective	117
<i>Levon Blue, Peter Grootenboer & Mark Brimble</i>	
Coming to do Mathematics in the Margins	125
<i>Raymond Brown & Trevor Redmond</i>	
“You play on them. They’re active.” Enhancing the mathematics learning of reluctant teenage students	133
<i>Nigel Calder & Anthony Campbell</i>	
CAS or Pen-and-paper: Factors that Influence Students’ Choices	141
<i>Scott Cameron & Lynda Ball</i>	

The Language Used to Articulate Content as an Aspect of Pedagogical Content Knowledge	149
<i>Helen Chick</i>	
Specialised Content Knowledge: Evidence of Pre-service teachers' Appraisal of Student Errors in Proportional Reasoning	157
<i>Mohan Chinnappan & Bruce White</i>	
Learning from Lessons: Studying the Construction of Teacher Knowledge Catalysed by Purposefully-designed Experimental Mathematics Lessons	165
<i>Doug Clarke, David Clarke, Anne Roche & Man Ching Esther Chan</i>	
Inclusive Practices in the Teaching of Mathematics: Supporting the Work of effective primary teachers	173
<i>Barbara Clarke & Rhonda Faragher</i>	
Supporting Students to Reason About the Relative Size of Proper and Improper Fractions	181
<i>Jose Luis Cortina & Jana Visnovska</i>	
Proportional Reasoning as Essential Numeracy	189
<i>Shelley Dole & Annette Hilton</i>	
A Case Study of the Pedagogical Tensions in Teacher's Questioning Practices When Implementing Reform-Based Mathematics Curriculum in China	197
<i>Lianchun Dong, Wee Tiong Seah & David Clarke</i>	
Improving the Effectiveness of Mathematics Teaching through Active Reflection	205
<i>Kerryn Driscoll</i>	
Promoting Teacher Growth through Lesson Study: A Culturally Embedded Approach	213
<i>Marlon Ebaegu</i>	
The Self-Efficacy of students with Borderline, Mild and Moderate Intellectual Disabilities and their Achievements in Mathematics	221
<i>Agbon Enoma & John Malone</i>	
Identifying Core Elements of Argument-Based Inquiry in Primary Mathematics Learning	229
<i>Jill Fielding-Wells</i>	
STEM Education: What Does Mathematics Have To Offer?	237
<i>Noleine Fitzallen</i>	
The Challenge for Non-first-language-English Academic Publishing in English Language Research Outlets	245
<i>Vince Geiger & Rudolf Straesser</i>	
The Impact of Let's Count on Children's Mathematics Learning	253
<i>Ann Gervasoni, Bob Perry & Linda Parish</i>	
Comparing the Development of Australian and German 7-Year-Old and 8-Year-Old's Counting and Whole Number Learning	261
<i>Ann Gervasoni & Andrea Peter-Koop</i>	
Learning at the Boundaries	269
<i>Merrilyn Goos</i>	
The Practice of 'Middle Leading' in Mathematics Education	277
<i>Peter Grootenboer, Christine Edwards-Groves & Karin Rönnerman</i>	
Teaching Computation in Primary School without Traditional Written Algorithms	285
<i>Judy Hartnett</i>	
Calculating for probability: "He koretake te rima" (Five is useless)	293
<i>Ngārewa Hāwera & Marilyn Taylor</i>	

Students' Relationships with Mathematics: Affect and Identity	301
<i>Naomi Ingram</i>	
Using Alternative Multiplication Algorithms to 'Offload' Cognition	309
<i>Dan Jazby & Cath Pearn</i>	
Successful Mathematics Lessons in Remote Communities: A Case Study of Balargo	317
<i>Robyn Jorgensen</i>	
Differentiated Success: Combining Theories to Explain Learning	325
<i>Robyn Jorgensen & Kevin Larkin</i>	
The Mathematics Instructional Leader: What a Difference Crucial Conversations Make.....	333
<i>Janeen Lamb, Carmel Diezmann & Jillian Fox</i>	
The Search for Fidelity in Geometry Apps: An Exercise in Futility?	341
<i>Kevin Larkin</i>	
Pre-service teachers and numeracy in and beyond the classroom.....	349
<i>Gilah C Leder, Helen J Forgasz, Natalie Kalkhoven & Vince Geiger</i>	
Gender Differences in Mathematics Attitudes in Coeducational and Single Sex Secondary Education	357
<i>Kester Lee & Judy Anderson</i>	
Developing a Theoretical Framework to Assess Taiwanese Primary Students' Geometric Argumentation	365
<i>Tsu-Nan Lee</i>	
Starting a Conversation about Open Data in Mathematics Education Research.....	373
<i>Tracy Logan</i>	
A Snapshot of Young Children's Mathematical Competencies: Results from the Longitudinal Study of Australian Children.....	381
<i>Amy MacDonald & Colin Carmichael</i>	
Examining PCK in a Senior Secondary Mathematics Lesson.....	389
<i>Nicole Maher, Tracey Muir & Helen Chick</i>	
Teacher's Scaffolding over the Year to Develop Norms of Mathematical Inquiry in a Primary Classroom	397
<i>Katie Makar, Arthur Bakker & Dani Ben-Zvi</i>	
Middle Years Students Influencing Local Policy	405
<i>Margaret Marshman</i>	
Early Years Teachers' Perspectives on Teaching through Multiple Metaphors and Multimodality	413
<i>Paula Mildenhall</i>	
Young Indigenous Students' Engagement with Growing Pattern Tasks: A Semiotic Perspective.....	421
<i>Jodie Miller</i>	
Professional Knowledge Required when Teaching Mathematics for Numeracy in the Multiplicative Domain.....	429
<i>Judith Mills</i>	
Determining a Student's Optimal Learning Zone in Light of the Swiss Cheese Model	437
<i>Patricia Morley & Simone Zmood</i>	
Student and Parent Perspectives on Flipping the Mathematics Classroom	445
<i>Tracey Muir</i>	

Authority and Agency in Young Children’s Early Number Work: A Functional Linguistic Perspective.....	453
<i>Carol Murphy</i>	
Examples in the Teaching of Mathematics: Teachers’ Perceptions	461
<i>Lay Keow Ng & Jaguthsing Dindyal</i>	
How Inquiry Pedagogy Enables Teachers to Facilitate Growth Mindsets in Mathematics Classrooms	469
<i>Mia O’Brien, Katie Makar, Jill Fielding-Wells & Jude Hillman</i>	
Challenging the Mindset of Sammy: A Case Study of a Grade 3 Mathematically Highly Capable Student.....	477
<i>Linda Parish</i>	
Facebook as a Learning Space: An Analysis from a Community of Practice Perspective	485
<i>Sitti Maesuri Patahuddin & Tracy Logan</i>	
Strategies for Solving Fraction Tasks and Their Link to Algebraic Thinking	493
<i>Catherine Pearn & Max Stephens</i>	
Mentoring to Alleviate Anxiety in Pre-Service primary mathematics Teachers: an orientation towards improvement rather than evaluation	501
<i>Timothy Perkins</i>	
Spatial Visualisation and Cognitive Style: How Do Gender Differences Play Out?	508
<i>Ajay Ramful & Tom Lowrie</i>	
The Practice of Teacher Aides in Tasmanian Primary Mathematics Classrooms.....	516
<i>Robyn Reaburn</i>	
Qualitative Facets of Prospective Elementary Teachers’ Diagnostic Proceeding: Collecting and Interpreting in One-on-one Interviews	524
<i>Simone Reinhold</i>	
Describing the nature and effect of teacher interactions with students during seat work on challenging tasks	532
<i>Anne Roche & Doug Clarke</i>	
Teachers’ talk about Robotics: Where is the Mathematics?.....	540
<i>Annie Savard & Kate Highfield</i>	
Teaching Statistics in Middle School Mathematics classrooms: Making Links with Mathematics but Avoiding Statistical Reasoning	547
<i>Annie Savard & Dominic Manuel</i>	
Context counts: The potential of realistic problems to expose and extend social and mathematical understandings	555
<i>Carly Sawatzki</i>	
Theorising about Mathematics Teachers’ Professional Knowledge: The Content, Form, Nature, and Course of Teachers’ Knowledge.....	563
<i>Thorsten Scheiner</i>	
Understanding Geometric Ideas: Pre-service Primary Teachers’ Knowledge as a Basis for Teaching	571
<i>Rebecca Seah</i>	
Mathematical Language Development and Talk Types in Computer Supported Collaborative Learning Environments	579
<i>Duncan Symons & Robyn Pierce</i>	
The Individual Basic Facts Assessment Tool.....	587
<i>Sandi Tait-McCutcheon & Michael Drake</i>	

Affording and Constraining Local Moral Orders in Teacher-Led Ability-Based Mathematics Groups	595
<i>Sandi Tait-McCutcheon, Joanna Higgins, Mary Jane Shuker & Judith Loveridge</i>	
Exploring relationship between scientific reasoning skills and mathematics problem solving ...	603
<i>Nor'ain Mohd Tajudin & Mohan Chinnappan</i>	
Developing Adaptive Expertise with Pasifika Learners in an Inquiry Classroom	611
<i>Zain Thompson & Jodie Hunter</i>	
Getting out of Bed: Students' Beliefs	619
<i>Jane Watson & Rosemary Callingham</i>	
Improving Student Motivation and Engagement in Mathematics Through One-to-one Interactions	627
<i>Jennifer Way, Amelia Reece, Janette Bobis, Judy Anderson & Andrew Martin</i>	
A Cross-cultural Comparison of Parental Expectations for the Mathematics Achievement of their Secondary School Students	635
<i>Daya Weerasinghe & Debra Panizzon</i>	
"I was in year 5 and I failed maths": Identifying the Range and Causes of Maths Anxiety in first year Pre-service Teachers	643
<i>Sue Wilson</i>	
Enhancing Mathematics (STEM) Teacher Education in Regional Australia: Pedagogical Interactions and Affect	651
<i>Geoff Woolcott & Tony Yeigh</i>	
Mathematics, Programming, and STEM	659
<i>Andy Yeh & Vinesh Chandra</i>	

RESEARCH PRESENTATION ABSTRACTS

Laying the Foundation for Proportional Reasoning	668
<i>Ann Downton</i>	
The Development and Evaluation of an Individualised Learning Tool for Mathematics students with Intellectual Disability: IMPELS	668
<i>Agbon Enoma & John Malone</i>	
Capturing Mathematical Learning in an Inquiry Context: There are Some Things Not Easily Measured	669
<i>Kym Fry</i>	
Teacher Professional Growth through using a Critical Mass Mentoring System: Effective Whole School Teacher Professional Development	669
<i>Judy Hartnett & Jim Midgley</i>	
Anatomy of a Mathscast	670
<i>Carola Hobohm & Linda Galligan</i>	
An Exploration of Strategies That Teachers Use When Teaching Beginning Algebra	670
<i>Christina Lee & Christine Ormond</i>	
Factors Influencing Social Process of Statistics Learning within an IT Environment	671
<i>Ken W. Li & Marilyn Goos</i>	
Identifying categories of Pre-service Teachers' Mathematical Content Knowledge	671
<i>Sharyn Livy</i>	

Language and Mathematics: Exploring a New Model to Teach in Bi/Multilingual Mathematics Classroom	672
<i>Charly Muke</i>	
Exploring the Influence of Early Numeracy Understanding Prior to School on Mathematics Achievement at the End of Grade 2.....	673
<i>Andrea Peter-Koop & Sebastian Kollhoff</i>	
An Irish Response to an International Concern: Challenges to Mathematics Teaching	673
<i>Lisa O’Keeffe, Olivia Fitzmaurice & Patrick Johnson</i>	
An Analysis of Modelling Process based on McLuhan’s Media Theory: Focus on Constructions by Media in Cases of Using Geoboard.....	674
<i>Hiro Ozasa</i>	
The Knowledge Dimension of Revised Bloom’s Taxonomy for Integration	674
<i>Farzad Radmehr, Robin Averill & Michael Drake</i>	
Developing an analysing tool for dynamic mathematics-related student interaction regarding affect, cognition and participation	675
<i>Laura Tuohilampi</i>	
Thinking Strategies Used by 7th-Grade Students in Solving Number Sense Problems	675
<i>Palanisamy Veloo & Parmjit Singh</i>	

ROUND TABLE DISCUSSION ABSTRACTS

Working Across Disciplinary Boundaries in Pre-service Teacher Education.....	677
<i>Merrilyn Goos, Judy Anderson, Jo Balatti, Kim Beswick, Tricia Forrester & Jenni Way</i>	
Promoting Positive Emotional Engagement in Mathematics of Prospective Primary Teachers..	678
<i>Joanna Higgins & Janette Bobis</i>	
Senior Secondary Students’ Pre-calculus and Calculus Understanding.....	679
<i>Michael Jennings & Peter Adams</i>	
Investigating Mathematical Inquiry.....	680
<i>Katie Makar, Jill Fielding-Wells, Kym Fry, Sue Allmond & Jude Hillman</i>	

SHORT COMMUNICATION ABSTRACTS

A Problem Solving Lesson: Pre-service Teachers Initiation to Lesson Study	682
<i>Jaguthsing Dindyal</i>	
Teachers’ Beliefs about Knowledge of Content and Students and its Effect on their Practice....	682
<i>Vesife Hatisaru</i>	
Exploring Students’ Views on using iPads in Mathematics.....	683
<i>Janelle Hill</i>	
Mapping school students’ aspirations for STEM careers.....	683
<i>Kathryn Holmes, Adam Lloyd, Jenny Gore & Max Smith</i>	
Breaking down Barriers.....	684
<i>Peter Howley</i>	
Building upon the Language Model of Mathematics	684
<i>Harry Kanasa & Kevin Larkin</i>	
The Australian Mathematics Competition: What’s the Score?	685
<i>Andrew Kepert & Mike Clapper</i>	

A Focus Question Approach to the Teaching of Mathematics.....	685
<i>John Ley</i>	
Promoting the Development of Foundation Content Knowledge in all Primary Pre-service Teachers.....	686
<i>Chris Linsell, Naomi Ingram & Megan Anakin</i>	
Paternal influence on school students' aspirations for STEM careers	686
<i>Adam Lloyd, Jenny Gore & Max Smith</i>	
Understanding Mathematics: Teacher Knowledge, Task Design and Evaluating Students' Mathematical Reasoning	687
<i>Christine Mae, Janette Bobis & Jenni Way</i>	
The Pattern and Structure of the Australian Curriculum—Mathematics	687
<i>Catherine McCluskey, Joanne Mulligan & Michael Mitchelmore</i>	
Mathematical Thinking in a Context of 'General Thinking': Implications for Mathematics Education.....	688
<i>Corinne Miller, Geoff Woolcott & Christos Markopoulos</i>	
Conceptual Connectivity in Mathematics.....	688
<i>Joanne Mulligan & Geoff Woolcott</i>	
Primary-Middle Pre-Service Teachers reported use of the Mathematics Textbook	689
<i>Lisa O'Keeffe</i>	
Examining a Students' Resource for Reconstructing the Limit Concept at Need: A Structural Abstraction Perspective	689
<i>Thorsten Scheiner & Márcia M. F. Pinto</i>	
Pre-service Teachers' Views on Mathematics Homework Practices	690
<i>Sven Trenholm & Mohan Chinnappan</i>	
Teaching out-of-field: Meanings, representations and silences	690
<i>Colleen Vale, Linda Hobbs, Christopher Speldewinde & Zahra Parvanehnezhadshirazian</i>	
Promoting Financial Literacy in Pre-service Teacher Education through On-line Modules	691
<i>Leigh Wood, Joanne Mulligan, Carmel Coady, Michael Cavanagh & Damian Bridge</i>	