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Contents

Executive Dean’s Introduction to the MTLRC 2012 Report 4
Mission & Some Future Directions 5
Membership of the MTLRC Advisory Board 6
Staff Contributing to Centre Activities 7
Current Research Projects 14
  Commonwealth-funded projects 14
  Other externally-funded projects 15
  Other projects 16
Retirement of Professor Philip Clarkson 18
Awards 2012 18
Publications 2012 19
  Books 19
  Book Chapters 19
  Book Chapter (Other) 20
  Refereed Journal Articles 20
  Other Journal Articles 21
  Editorial in a Refereed Journal Article 21
  Refereed Papers in Conference Proceedings 21
Theses Completed 24
Membership of Editorial Panels 24
PhD, EdD and Masters’ Students Supervised 25
Professional Development Conferences for Teachers and School Mathematics Leaders 27
External Committee Membership and Other Community Service 27
Executive Dean’s Introduction to the MTLRC 2012 Report

In my 10th and final year as Executive Dean of the Faculty of Education I am delighted to acknowledge the significant contributions of the Mathematics Teaching and Learning Research Centre (MTLRC), not just in 2012, but over its many years of operation. The Centre is in its 25th year of serving both the research and professional mathematics education communities.

The Centre has had various different names and structures over the years. In 2012, following the review of University Priority Research Centres, the Centre underwent a restructure and the position of Deputy Director was instituted. Associate Professor Vince Geiger was appointed to this position. Criteria for different levels of membership were revised, the Advisory Board reconstituted, and a new strategic plan developed to reflect current research priorities and the research accountability context.

Currently the Centre has 14 Higher Degree by Research students, and three research/administrative staff to support the Director, Deputy Director and other members. Its base is in Melbourne but it has a strong national approach with the Deputy Director located on the Brisbane campus, and members from all campuses.

The MTLRC research environment is highly productive, collegial, and supportive of senior and junior staff, with a strong team-based approach to research prioritised. This approach has been highly valued as developing research capacity of our early career researchers continues to be a key Faculty priority.

Another hallmark of the MTLRC’s work have been the large research projects which have given research and project opportunities to many staff and have had significant impact on mathematics teaching and learning in schools and teacher education. The Centre led the Early Numeracy Research Project (ENRP, in which 11 academic staff and 63 research assistants were involved), the Family and School Partnerships project (17 academics participated), the Australian School Innovation in Science, Technology and Mathematics (ASISTM) project (20 academics involved), and the recent Contemporary Teaching and Learning of Mathematics (CTLM) project (11 academics contributed).

The projects in which the Centre has been involved since 2003 have attracted over $9 million in external grant funding. Over the past ten years, Centre members have been involved in 7 ARC Discovery Grants and 12 ARC Linkage Grants. The Centre has just completed a five year research and professional development program with the Catholic Education Office, Melbourne. This project, Contemporary Teaching and Learning of Mathematics (CTLM), aimed to enhance teachers’ pedagogical content knowledge ($1.03 million). Productivity from these research projects has been very high, producing 358 scholarly research publications since 2003 as well as numerous publications and professional development opportunities for the profession.

Congratulations and thank you to the Centre staff and members who through their quality research and scholarship continue to make significant contributions to the University and to mathematics education at all levels of schooling, nationally and internationally. My special thanks to Professor Doug Clarke who has been Director of the Centre throughout my term as Dean. Through his directorship he has modelled a strong collaborative approach to research and great awareness and sensitivity to the needs of our partners in education. He is always most generous in supporting others. I wish the Centre and its members well in their pursuit to make a difference to mathematics teaching and learning through research and publications.

Professor Marie Emmitt
Executive Dean of Education

Mathematics Teaching and Learning Research Centre 2012 Annual Report
Mission and Some Future Directions

The Mathematics Teaching and Learning Research Centre (MTLRC) promotes quality research and a national perspective on mathematics teaching and learning. It has a commitment to access to quality learning for all. Using local, national and international linkages, members of the Centre are committed to addressing and raising the social and ethical dimensions of mathematics education, and providing advice to government, education systems and professional organisations on policy development.

The aims of the Mathematics Teaching and Learning Research Centre are to:

1. Promote and support a creative research agenda developed in partnership with key stakeholders in mathematics education at all levels, locally, nationally and internationally.
2. Conduct quality and high-impact research, research training and scholarship in mathematics education which is nationally and internationally recognised.
3. Disseminate key findings from the Centre's research.
4. Contribute to research-based practice in mathematics education.

As foreshadowed in last year's report, 2012 saw a number of initiatives being taken in response to the review of University Priority Research Centres, including the implementation of tighter governance procedures, the appointment of a Deputy Director (Associate Professor Vince Geiger), and Centre membership criteria being developed and applied.

I am pleased to report that six Higher Degrees and Research (HDR) students across four campuses supervised by members of the Centre completed their degrees in 2012. The Centre is giving greater emphasis to recruiting and supporting high quality HDR students, and the Centre members' meeting in Melbourne in December provided a wonderful opportunity for ACU mathematics education staff and HDR students from all around the country to meet and share their research interests over two days.

During 2012, the Director and Deputy Director visited most campuses, and worked with individual members on their research and publication plans. The university in general and the Centre in particular are supporting staff to increase the proportion of manuscripts submitted to high quality journals and books. This focus is beginning to bear fruit. At the time of writing (May 2013), Centre members had already been involved in 15 books and book chapters, and 13 refereed journal articles (published in 2013 or "in press"), of which 8 were in A or A* ERA 2010 journals.

The national focus of the Centre has been enhanced by the implementation of regular research seminars, held using videoconference, across all campuses. These have been very well received, as have the regular newsletters of Centre activities.

Professor Philip Clarkson retired at the end of 2012. Phil was one of the team which first established the Centre in 1989, and always offered me great support in my role as Director. Although his day-to-day involvement will be greatly missed, he has been appointed Emeritus Professor of ACU, and has agreed to coordinate the seminar series mentioned above.

While the Centre has always had good relationships with key stakeholders in mathematics education (Catholic Education Offices, Departments of Education, and Associations of Independent Schools), we are particularly pleased with the recent
strengthened links with the Australian Council for Educational Research, largely facilitated by Ray Peck, a key member of our Advisory Board. We have already conducted reciprocal seminars, and a recent joint proposal for funding from a philanthropic group (Gandel Philanthropy) was successful. This project builds on the research of Dr Rhonda Faragher on children with Down Syndrome and mathematics.

In 2013, we look forward to continuing our overarching theme of “linking research and practice to make a difference in mathematics education”.

Professor Doug Clarke
Director, Mathematics Teaching and Learning Research Centre

Membership of the MTLRC Advisory Board

Dr Max Stephens
(Chair, University of Melbourne)

Emeritus Professor Alan Bishop (Monash University)
Ms Pam Betts (Chief Executive Officer, Catholic Education Office, Brisbane)
Professor Doug Clarke (Director, MTLRC)
Professor Marie Emmitt (Executive Dean, Faculty of Education, ACU)
Associate Professor Vince Geiger (Deputy Director, MTLRC)
Professor Merrilyn Goos (University of Queensland)
Professor Deb Keen (Associate Dean of Research, Faculty of Education, ACU)
Mr Will Morony (Chief Executive Officer, Australian Association of Mathematics Teachers)
Mr Ray Peck (Senior Research Fellow, Australian Council for Educational Research)
Ms Anne Roche (Research Fellow, MTLRC)
Mr Matthew Sexton (ACU Melbourne Campus, Representative of Higher Degree Research Students)
Ms Donna Shepherd (Finance Manager, Faculty of Education, ACU)
Dr Monica Wong (ACU Strathfield Campus, Representative of Early Career Researchers)
Staff Contributing to Centre Activities

Doug Clarke BSc(Hons), DipEd, MEdStudies, PhD
Director, MTLRC, ACU Melbourne

Professor Doug Clarke directs the Mathematics Teaching and Learning Research Centre. He was joint coordinator of the Australian Mathematics Curriculum and Teaching Program from 1985-1988, after which he joined the Institute of Catholic Education. Doug undertook doctoral studies in Wisconsin (USA) in 1991 and 1992, during which time he coordinated the development of teacher materials for the National Science Foundation funded middle school program, Mathematics in Context. In recent years, his professional interests have included teacher professional learning, problem solving and investigations, building number sense, and manageable and meaningful assessment. Doug was Director of the Early Numeracy Research Project, and he directed the Critical Friends component of the Commonwealth-funded Australian School Innovation in Science, Technology and Mathematics (ASISTM) Project from 2005 to 2009. He is currently working on two Australian Research Council grants in the areas of encouraging student persistence when working on challenging mathematics tasks, and needed support for mathematics teachers in implementing the new Australian Curriculum, respectively.

Vince Geiger BSc, DipEd, BEdSt, MEdSt, PhD
Deputy Director, MTLRC, ACU Brisbane

Associate Professor Vince Geiger is the Assistant Head of School (Research) in Brisbane. Prior to his current appointment, Vince worked as a teacher and in leadership positions within secondary schools. He has been President of the Australian Association of Mathematics Teachers, Chair of the National Education Forum and President of the Queensland Association of Mathematics Teachers. He is currently the Secretary of the Mathematics Education Research Group of Australasia. His involvement in mathematics education has extended to system wide curriculum development and the monitoring of the quality and comparability of assessment in schools within his home state of Queensland. Vince has received awards for both research and for university teaching. In 1995 he received the Mathematics Education Research Group of Australasia’s Practical Implications Award. He has also been awarded an ALTC Citation for Outstanding Contributions to Student Learning in 2009 for work related to off campus support for students during professional experience programs. Vince's current research interests include effective practice in numeracy teaching and learning, leadership in numeracy education, the role of technology in enhancing mathematics teaching and learning, and mathematical modelling and applications. He is now working on an Australian Research Council Discovery grant entitled Enhancing Numeracy Learning and Teaching Across the Curriculum with colleagues from UQ.
Jill Brown BSc(Ed), PGDipMaths&MathsEd, MEd
ACU Melbourne

Jill Brown’s research interests include teaching and learning in primary and secondary school mathematics; affordances of Technology-Rich Teaching and Learning Environments (TRTLE’s); transitions in mathematical modelling; mathematical reasoning and thinking in a problem solving environment; and teaching and learning of function at the secondary level. Jill’s current research falls under an ARC funded Linkage Project entitled Enhancing mathematics achievement and engagement by using technology to support real problem solving and lessons of high cognitive demand. The focus of this research project is the development of technology-supported tasks that sustain higher-order thinking and deep engagement with the context of real world tasks in secondary mathematics classrooms. The title of her PhD thesis is Perceiving and enacting the affordances of technology-rich teaching and learning environments (TRTLE’s) for student understanding of function. Jill is also involved in research exploring how teachers and students manage cognitive demand in extended real world tasks and exploring blockages experienced by students during the modelling cycle.

Philip Clarkson BSc, Dip Ed, BEd, MEd, PhD
ACU Melbourne

Emeritus Professor Philip Clarkson has extensive experience as a teacher educator and educational researcher, nationally and internationally, following a number of years teaching in schools. He has been held various executive roles including that of President for the Mathematics Education Research Group of Australasia. In 1990 he founded the research journal Mathematics Education Research Journal. His research interests in mathematics education have included the overlap between language learning and mathematics learning, values taught and learnt in mathematics classrooms leading to an exploration of students’ mathematical wellbeing, and the impact of globalisation on mathematics education. Each of these areas has in part been supported by ARC Discovery Grants. He also has interests in evaluation of systems, schools and programs.

Ann Downton DipT, BEd, MEd, PhD
ACU Melbourne

Ann Downton is a Lecturer in Mathematics Education at Melbourne Campus. She is an experienced primary school teacher in both general classroom and also has worked as a part-time mathematics and science specialist. She recently completed her PhD relating to young children’s development of multiplicative thinking. Ann coordinated the Contemporary Teaching and Learning of Mathematics Project (CTLM), a project with the Catholic Education Office (Melbourne), which aimed to enhance teacher pedagogical content knowledge and student learning.
Dr Rhonda Faragher has taught mathematics across all levels – early childhood to tertiary. She has taught mathematics education courses at The University of Queensland, Flinders University of South Australia, James Cook University and now at Canberra Campus of the Australian Catholic University. Research interests have centred on helping all learners experience success with mathematics. This has included research involving senior secondary mathematics students who found graphics calculators hindered their learning. More recently her research has focused on numeracy development of students with intellectual disabilities, and those with Down syndrome in particular. She is an invited member of the Academy of the International Association for the Scientific Study of Intellectual Disability (IASSID). Academy members provide professional development opportunities to participants in developing countries.

Dr Ann Gervasoni is a Senior Lecturer in Mathematics Education at Ballarat Campus. Previously, Ann worked in primary schools for 13 years as a classroom teacher and administrator. She was a mathematics consultant with the Catholic Education Office in Melbourne, and has been a member of the Victorian Board of Studies Mathematics Key Learning Area Committee and the Council of the Mathematics Association of Victoria. Ann was a member of the research team for the Victorian-based Early Numeracy Research Project, and Research Director of the Bridging the Numeracy Gap in Low SES and Indigenous Communities Project funded by DWEER. While Ann’s research interests are varied, at present her research focuses on enhancing learning for children who are vulnerable in learning mathematics, and on the impact of tertiary education for adults participating in the Ballarat Clemente Program. Ann is involved in several community engagement projects. She coordinates the Ballarat Clemente Program and several Maths Clubs in low SES communities in Ballarat. Ann is also involved with the East Timor Friendship Schools group, East Timor, and with teachers in Catholic, State and Independent schools in regional areas of Victoria and Western Australia.

Associate Professor Marj Horne has been involved in Mathematics Education since beginning teaching in 1969 and has interests in Mathematics, Mathematics Education and Education more generally. Her research interests are varied, including work with home, school and community partnerships, research into early numeracy development, an interest in professional development and an interest in specific areas of mathematics learning such as geometry and algebra. Recent work has been on the development of algebra and structure. Her experience with quantitative data has meant that she has contributed to many research projects with analysis of data and advice on methodology, and she also has extensive experience with qualitative data.
Janeen Lamb BA, Dip Ed, Grad Dip Ed (Learning Support), PhD
ACU Brisbane

Dr Janeen Lamb is a Senior Lecturer in mathematics education and special needs across four courses at ACU. She is collaborating with Dr Vince Geiger (ACU), Professor Chris Branson (University of Waikato, NZ), Professor Robyn Jorgensen (Griffith University) and Brisbane Catholic Education on the Models of Leading Curriculum Change in Numeracy Project. Janeen is also researching the teaching of statistics in rural and remote high schools with high teacher turnover, with Dr Jana Visnovska (University of Queensland) and Education Queensland, and participating in the Faith Leadership of the Catholic School Principal Project with ACU colleagues. Previous projects include the Collaboration on Assessment Criteria and Standards Scheme Project the Changing to Learn and Learning to Change, and the Mental Computation Project with QUT.

Susan McDonald DipT, PGradDipProfEdStudies, BEd, EdD
ACU Brisbane

Dr Susan McDonald is a Lecturer in mathematics education and education psychology across the Bachelor of Education (Primary), Bachelor of Education (Early Childhood and Primary), Master of Teaching (Primary), Master of Education, Graduate Diploma of Education (Secondary), Associate Degree in Indigenous Studies, the Bachelor of Education (Primary – Indigenous Studies), and the Bachelor of Teaching/Bachelor of Arts. In addition to these roles, Susan supervises postgraduate research students and coordinates the Indigenous Education program on the McAuley campus. Susan is an Early Career researcher with interests including creative digital technologies in the early years, mathematics education in the tertiary years, and teacher identity in the prior-to-school setting.

Andrea McDonough BA, DipEd, MEd Studies, PhD
ACU Melbourne

Dr Andrea McDonough teaches mathematics education to undergraduate and postgraduate students at Australian Catholic University. Prior to this she taught at the primary level for ten years – both as a classroom teacher and a mathematics specialist. Andrea holds particular interests in the teaching and learning of measurement and the use of open-ended tasks, picture story books and games for effective learning of mathematics, and conducts professional development in these areas. Andrea has been involved in major professional learning and research projects including Early Numeracy Research Project (ENRP) and, more recently, the Contemporary Teaching and Learning of Mathematics (CTLM) project. Andrea’s research interests include the teaching and learning of measurement, and the value of partnerships in preservice teacher and early career teacher development. In 2012, Andrea continued her collaboration with a colleague from Monash University in research of young children’s learning of mass measurement and with an ACU colleague in a study of benefits of partnerships for preservice teachers.
Chrissy Monteleone is a primary school educator with experience in classroom teaching, leading learning within a school context, as a consultant for an educational system, and lecturing pre-service teachers. Her area of expertise is mainly in the area of the pedagogy of mathematics and also includes gifted education, eLearning and early learning. With experience in working with individual teachers, pre-service teachers, leaders of schools and systems, support staff and parents, Chrissy brings a realistic approach to what can be achieved in classrooms and schools for individual student success. Chrissy is currently undertaking doctoral studies focusing on early learners in a primary school context, mainly learners in their first year of formal school. The research will endeavour to find ways in which mainstream classroom teachers can identify children that display high mathematical capability.

Anne Roche is an experienced primary school teacher and has been working with preservice students and more recently postgraduate students. She has worked as a Research Assistant in the Mathematics Teaching and Learning Research Centre since 2000, and was involved as part of the interview team with the Early Numeracy Research Project from 1999 to 2002. She currently manages the MTLRC office. She completed her Master of Education specialising in Early Numeracy. Her main research has involved the understanding and assessing of student thinking about decimals and fractions and teachers’ pedagogical content knowledge. She coordinated the development of online materials for the Victorian Department of Education and Early Childhood Development, drawing upon the research on fractions and decimals of the Centre. She is currently working on an ARC project focusing on encouraging students to persist when working on challenging mathematics tasks.

Dr Anne Scott is a senior lecturer in the School of Education at the Melbourne campus. Anne commenced her career as a primary teacher and she continues to have strong links with primary classrooms. Because Anne values the work of primary teachers who are expected to teach both literacy and numeracy effectively her focus of research not only identifies key similarities and differences between these disciplines but also investigates the effective uses of Information Communication Technologies (ICT) for learning them. During the Study of Classroom Change within the Contemporary Teaching and Learning of Mathematics Project (CTLM), a Self-Analysis Professional Portfolio (SAPP) was developed to guide classroom teachers through a process of goal-setting, data collection, critical analysis and self-reflection on one aspect of their teaching of mathematics. Using the SAPP, Anne has assisted teachers to refine their teaching by capturing and reflecting on video snippets of their classroom practice. As a follow on study, Anne together with Professor Clarkson, have developed protocols for empowering teachers to undertake school-based inquiry projects and develop professional learning communities.
Matt Sexton BA, BTeach, MEd
ACU Melbourne

Matt was a primary school teacher for 13 years having taught across all year levels, as well as holding school leadership positions. Matt worked for the Catholic Education Office Melbourne (CEOM) in 2008 and 2009, in the role of School Adviser, Mathematics. Since joining ACU (Melbourne Campus) in 2010, Matt has lectured preservice teachers (undergraduate and postgraduate) in mathematics education, facilitated professional learning for classroom teachers involved in the CTLM project, established the University Partnerships for Teaching and Learning of Mathematics (UPTLM) project with Andrea McDonough, and commenced a doctorate. Matt's doctoral dissertation, which employs a cultural-historical activity theory perspective, concerns the leadership of mathematics professional learning for classroom teachers in primary school settings. His study focuses on identifying and explaining the activity systems of School Mathematics Leaders (numeracy coordinators) who design and facilitate professional learning when involvement in a school mathematics improvement project has ceased.

Gloria Stillman BSc, DipEd, MEd St, BAppSc(Maths & Comp), PhD
ACU Ballarat

Associate Professor Gloria Stillman currently teaches primary mathematics education at Aquinas Campus of ACU. She is a highly experienced tertiary lecturer in both primary and secondary mathematics education. With Merrilyn Goos of the University of Queensland and Colleen Vale of Victoria University she co-authored the tertiary textbook for secondary mathematics education: Teaching Secondary School Mathematics: Research and practice for the 21st century. Her latest book is an edited volume on the teaching and researching of mathematical modelling. She is the author of many papers and book chapters on the teaching and assessing of mathematical modelling and applications. She is President and Secretary of the international executive of ICTMA (the International Community of Teachers of Mathematical Modelling and Applications) and Vice President (Research) of the Mathematics Education Research Group of Australasia. She is a member of the editorial board of ZDM – the International Journal on Mathematics Education and a co-editor of Australian Senior Mathematics Journal, and co-editor with Gabriele Kaiser of the Springer book series, International Perspectives on the Teaching and Learning of Mathematical Modelling.

Paul White BA (Hons.), DipEd, MA (Hons) PhD
ACU Sydney

Associate Professor Paul White was the Head of School of Education, NSW from 2010 to 2012. He has taught mathematics and mathematics education at ACU for 25 years. Before taking up his appointment as a lecturer in mathematics and mathematics education in 1986, he taught high school mathematics in Western Sydney, Canada and in a rural community in New South Wales. Paul's research activities in mathematics education have centered on student concept development in calculus, angles and multiplicative thinking. Currently he is working on how to use NAPLAN to improve understanding in mathematics, and ways to engage Year 9 and 10 students in a second chance algebra program to boost their options for higher level mathematics in senior school.
Dr Karina Wilkie has taught for 20 years across the full range of year levels from Preparatory to Year 12. She has been a Numeracy coordinator in two schools, taught as a primary numeracy specialist, and has written literacy and numeracy curriculum for a number of schools. She taught mathematics at A-level in England, where she lived for three years. She has undertaken consultancy to develop Prep to Year 10 mathematics programs and provides professional learning for primary and secondary teachers. Karina completed her PhD at the University of Melbourne in 2011. She has recently taught undergraduate and postgraduate pre-service teachers in mathematics education. She was involved in the Contemporary Teaching and Learning of Mathematics (CTLM) research project. She is currently researching the teaching and learning of algebra in the middle years of schooling.

Sue Wilson is a lecturer at the Canberra campus, across four courses. Her teaching experiences have included teaching Mathematics and Science in secondary schools, training as a Maths Task Centre consultant, working as a Sales Director training educational consultants, and teaching in Mathematics and Science education at tertiary level. Sue's research interests include bibliotherapy and mathematics anxiety in preservice teachers, problem solving and investigations, catering for gifted students in mathematics and science, and education for sustainability. Sue is the Deputy Hub Cap and Science Coordinator of SiMERR ACT, the ACT Coordinator of the Interest and Recruitment in Science (IRIS) study, and the Coordinator of the ACT Education for Sustainability in Pre-service Teacher Education project.

Dr Monica Wong worked in IT for 20 years and has recently undertaken a career move into education. On completing her MTeach (secondary) she has worked in both primary and high schools. She completed her PhD at the University of Sydney in 2009 in the area of educational assessment and rational number. Currently, Monica is working on a project with a local high school to develop and implement a community based mathematics program involving teachers, students and parents. Monica is an executive member of the Primary Association of Mathematics, the primary arm of the Mathematical Association of New South Wales.

Dr Vince Wright is an Associate Professor in mathematics education. Vince's background is in teaching and curriculum development in New Zealand. He has over twenty years' experience working with inservice teachers, writing classroom materials and developing professional development materials. He was principal writer for the Figure It Out series used extensively in primary and secondary schools and a key contributor to the nzmaths website. Vince coordinated the writing of the revised New Zealand Curriculum for mathematics (2007) and wrote the New Zealand Standards for mathematics in 2010. Vince's research interests are in multiplicative thinking and proportional reasoning, algebraic thinking, conceptual development and theories of transfer, and in teacher pedagogical-content knowledge.
Current Research Projects

COMMONWEALTH-FUNDED PROJECTS

Peopling Educational Policy: Realising the New Australian English and Mathematics Curricula (Australian Research Council Linkage Grant) $654 022 (2011-2013)
The new Australian Curriculum initiative provides an important opportunity for improvement in the teaching of English and mathematics. This research is studying the impact of the Australian Curriculum (AC) initiative in English and mathematics. The immediate focus of the project is on the resources and professional learning opportunities needed to support teachers in the implementation of these new curricula. More generally, the focus is on system and teacher learning and processes needed to support improvement in practice in the context of the new curriculum. (Doug Clarke and Anne Roche with colleagues from Monash University, Newcastle University, Sydney University, University of Melbourne, University of Technology Sydney, the New South Wales Education Department, Catholic Education Office Melbourne, and Victorian Curriculum and Assessment Authority)

Investigating the Relationship Between Teacher Expectations, Student Persistence and the Learning of Mathematics (Australian Research Council Discovery Grant) $274 603 (2011-2013)
This research is investigating a major factor restricting student opportunities to learn mathematics. We are exploring what is needed to encourage students to embrace challenges and to persist even when tasks are difficult. We are also examining what is needed to support teachers in developing the strategies needed to pose challenging tasks and to encourage students to engage with those tasks. The outcome will be enhanced mathematics learning and improved self confidence in students. (Doug Clarke and Anne Roche with colleagues from Monash University)

Enhancing Numeracy Learning and Teaching Across the Curriculum (Australian Research Council Discovery Grant) $210 000 (2012-2014)
This project aims to initiate a paradigm shift in the teaching and learning of numeracy by implementing, evaluating, and refining a rich model of numeracy across the curriculum (Goos, 2007). The project addresses three strategic areas: curriculum, teacher development, and student learning. Specifically, it aims to analyse the numeracy learning demands of all subjects in the F-10 Australian curriculum (currently mathematics, English, science, history); investigate the extent to which engagement with a rich model of numeracy leads to changes in teachers’ personal conceptions of numeracy and confidence in numeracy teaching in mathematics and other curriculum areas; identify and document changes in teachers’ curriculum planning and pedagogical approaches for developing numeracy within mathematics and other curriculum areas; and investigate the extent to which students’ numeracy learning is enhanced through engagement with the numeracy model. (Vince Geiger with Merrilyn Goos and Shelley Dole, University of Queensland, and Helen Forgasz, Monash University)
OTHER EXTERNALLY-FUNDED PROJECTS

In a number of the projects discussed below, the research involves collaboration with other universities. However, the stated amount of funds in each case represents the amounts received by Australian Catholic University.

Contemporary Teaching and Learning of Mathematics $1,029,000 (2008-2012)

This project provided research and professional learning support to approximately 30 Catholic primary schools in the Melbourne Archdiocese each year. The project aimed to enhance teacher pedagogical content knowledge (PCK) and thereby student mathematical learning. Data were collected on student understanding through one-to-one interviews by ACU final-year students, and on teacher growth in PCK and other aspects of professional growth through questionnaires, journals and classroom observations. A study of classroom change was also undertaken within the overall project. (Doug Clarke directed the project, Ann Downton was Project Coordinator, while Jill Brown, Philip Clarkson, Marj Horne, Andrea McDonough, Anne Roche, Anne Scott, Matt Sexton, Karina Wilkie, Vince Wright, Louise Hamilton, and Rose Knight also had key roles)

Evaluating the P-4 Intervention Program (Catholic Education Office Melbourne) $80,000 (2009-2012)

The Catholic Education Office Melbourne has for a number of years contracted Professor Bob Wright of Southern Cross University to undertake a program of teacher education to produce teachers with specialist skills to work with mathematic underperforming students in grades Prep through 4. This project evaluated this program. The results showed that teachers certainly learnt the skills necessary to engage the students in one-on-one or small group teaching sessions, and the knowledge needed for intervening positively in the students’ mathematical development. Evidence was collected that showed the students not only increased their mathematical abilities both in the intervention sessions but also in their normal classrooms. Measures of student affect also showed a decided improvement. Most schools in which the program has run have also engaged more deeply with mathematics teaching overall, including in the senior years. (Philip Clarkson)

Let’s Count Pilot $66,000 (2011-2012)

This research investigated the impact of a new early mathematics program designed by The Smith Family and the researchers to assist parents and other family members to help their young children (aged 3-5 years) play with, investigate and learn powerful mathematical ideas in ways that develop positive dispositions to learning as well as mathematical knowledge and skills. It includes professional learning for Early Childhood educators, who assist the parents and other family members in providing the opportunities for the children to engage with the mathematics in their everyday lives, talk about it, document it, and extend it in ways that are relevant to them. (Ann Gervasoni, with Professor Bob Perry, CSU)
**Make It Count: Numeracy, Mathematics and Indigenous Learners (Australian Association of Mathematics Teachers) $34,000 (2010-2012)**

This research project was designed to evaluate student experiences in mathematics/numeracy within a larger initiative, *Make it count: Numeracy, mathematics and Indigenous learners*, which was being conducted by the Australian Association of Mathematics Teachers and funded by the Australian government. The main focus of the *Make it Count* project was the improvement of mathematics and numeracy outcomes for Indigenous students. Specifically, the project was concerned with Indigenous student experiences and aims to evaluate development in Indigenous students’ attitudes to, and confidence with, mathematics/numeracy at school through the duration of the *Make it Count* national numeracy project. (Vince Geiger with Professor Merrilyn Goos, University of Queensland)

**Developing a Research-Based Framework for Mental Computation (Australian Association of Mathematics Teachers) $20,000 (2012-2013)**

As part of a project involving the development of research-based resources for teachers in the Top Drawer Teachers project, this project drew upon research in the area of mental computation to create video clips, teaching insights (including common student misconceptions) and assessment tools. (Vince Wright, Ann Downton, & Doug Clarke)

**Mapping the Mathematics and Fraction and Decimals Online Interviews to Australian Curriculum: Mathematics (Victorian Department of Education and Early Childhood Services) $12,000 (2012)**

The Early Numeracy Interview and the Fractions and Decimals Interview were developed by a team of researchers at ACU over several years. These interviews have been used by many teachers in Australia and overseas. With the emergence of the *Australian Curriculum: Mathematics*, there was a need to match the underpinning research content of the interviews to the new curriculum. This project involved such a mapping. (Ann Downton, Anne Roche, & Doug Clarke)

**Revision of Achievement Standards for AusVELS Mathematics F-10 (Victorian Curriculum and Assessment Authority) Grant $9,091 (2012)**

As part of the development of the Australian Curriculum: Mathematics, Achievement Standards were nominated for each year level. The Victorian Curriculum and Assessment Authority sought to make these standards more coherent, more appropriately linked to technology, and more research-based. The research team revised these standards with these aims in mind. (Marj Horne, Vince Wright, & Doug Clarke)

**Associate Professor Gloria Stillman and Jill Brown with the Victorian Minister for Education, the Hon. Martin Dixon.**

**Models of Leading Curriculum Change in Numeracy (Brisbane Catholic Education IRIS Grant) $5,000 (2011-2012)**

This study investigated promoting and inhibiting practical actions and processes taken by leaders within different levels of schooling and school systems. The study was situated within three North Region schools of Brisbane Catholic Education that were in the process of implementing curriculum change in the teaching and learning of numeracy. This investigation drew its theoretical underpinnings from the BCE Leadership Framework and the Goos (2007) Numeracy Model. One of the anticipated outcomes of this research is the development of a new, rich model for leading curriculum change in numeracy to be used in a larger scale project on completion of this pilot study. (Janeen Lamb and Vince Geiger with Professor Chris Branson, University of Waikato, NZ and Professor Robyn Jorgensen, Griffith University)

**OTHER PROJECTS**

**Mathematical Wellbeing (2008-2013)**

Many students are often categorised as not being motivated to do mathematics and generally having negative attitudes to mathematics. But it is not always so. Some students are well motivated, show much confidence in their approach and generally like doing mathematics. Understandably more often than not research has been more interested in the negative. In this project, we develop a construct as an extension of our previous work on values of mathematics that allows teachers and students to envisage how students will behave when they are have a sense of wellbeing when engaged with mathematics. (Philip Clarkson and Alan Bishop and Wee Tiong Seah, Monash University)
University Partnerships for Teaching and Learning Mathematics (UPTLM) project (2010-2012)

This project was developed at the beginning of 2010 and it sought to research ways that preservice teacher capacity could be developed for effective mathematics teaching. In particular, this capacity building is researched within school-university partnerships between ACU preservice teachers, ACU mathematics education lecturers and CTLM school communities. Recent findings reveal that preservice teachers engage in becoming teachers of mathematics by inquiring into their teaching practices whilst being inducted into the mathematics teaching profession. (Matt Sexton and Andrea McDonough)

Supporting the Learning of Professional Teaching Communities in Remote Regions with High Teacher Turnover (2011-2013)

The primary aim of this study was to investigate how groups of mathematics teachers can be supported to form lasting, collaborative professional teaching communities that focus on improvement of mathematics teaching and learning, and especially, how this can be accomplished in regions with high teacher turnover. Understanding the processes of induction of new members to an established professional teaching community and the means that support and hinder the newcomers’ learning is of key importance. Gaining insight into the institutional context of the teachers’ school is critical for understanding the teachers’ learning in the professional development program and in their classrooms. This pilot project is currently funded by the University of Queensland, Education Queensland and the Queensland Association of Mathematics Teachers. (Janeen Lamb in collaboration with Dr Jana Visnovska, University of Queensland)

Interest and Recruitment in Science (IRIS) Study (SiMERR National Centre for Science Mathematics Education in Regional and Rural Australia) (2011-2012)

IRIS is a large-scale international study of student recruitment, retention and gender equity in university science, technology, engineering and mathematics (STEM) courses. The study addresses the challenge that too few young people, and few women in particular, are choosing STEM career paths. IRIS was developed by a consortium of European universities and initially funded by the European Commission 7th Framework Program. The national IRIS report will provide universities with important insights into the motivations of their STEM students, the efficacy of recruitment initiatives and strategies for student retention. (Sue Wilson with Terry Lyons and Frances Quinn, UNE, Jan West and Peter Hubber, Deakin, John Kenny, UTAS, Len Sparrow, Curtin and Neil Anderson, JCU)


This project involved a design experiment regarding Year 1 and 2 children’s concepts of Mass measurement. The methodology, including the collection of quantitative and qualitative data, allowed us to examine the complexity of the classroom including the tasks and problems the children were asked to solve, the discourse, the participation in the classroom and the materials with which the children were engaged. (Andrea McDonough with Jill Cheeseman (Monash University) and Sarah Ferguson (Clairvaux Primary School).

Learning Trajectories as a Feature of Pedagogical Content Knowledge (2011-2012)

The project focused on establishing the extent to which a teacher accesses hypothetical learning trajectories to inform their instructional decisions. The data came from audio recordings of a classroom over a two-week period, interviews with ten individual students, recordings of planning meetings and reflections with the class teacher, and work samples. Analysis of the data continues. (Vince Wright)
Retirement of Professor Philip Clarkson

Professor Philip Clarkson taught in secondary schools for seven years before moving into tertiary education. In the 1980s, Phil was director of a research centre at the Papua New Guinea University of Technology for nearly 5 years. As well as undertaking research, he was the chief examiner of Years 11 and 12 mathematics subjects and ran an annual research conference. Phil subsequently returned to PNG a number of times for various projects including the evaluation of the 4.5 million dollar AusAID PASTEP program that rejuvenated the pre-service teaching courses in PNG. Phil has published widely on various aspects of education with a particular focus on the overlap between language learning and mathematics learning, values taught and learned in mathematics classrooms, and the impact of globalisation on mathematics education. He convened many study groups and working groups at various international conferences including PME and ICME. He is a foundation member of the Mathematics Education Research Group of Australasia, and has also held four different executive positions within this organisation, including President (2003-2005). As President, Phil is remembered for his wisdom and kindness, his extensive and nuanced knowledge of MERGA and its history, and his support for young members attending conferences. Phil is well known for his contributions as an editor for a range of high quality international journals in mathematics education. He founded the Mathematics Education Research Journal and continues as an active member on the editorial boards for a number of research and professional journals. Phil was the Foundation Chair of the Faculty Research Committee. For over 10 years he coordinated the research programs on his local campus and the Faculty. He also successfully supervised many research students including online students who have known Phil as the man supporting them through their journey while sitting in the corner office on the 4th floor of St Patrick’s campus. Phil has enjoyed a highly successful and wonderfully varied career and although he intends to continue to contribute to the research effort of the MTLRC, we wish him well in his retirement.

Awards 2012

ACU graduate Annie Mitchell received the MERGA Early Career Award at the Mathematics Education Research Group of Australasia Annual Conference in Singapore in July, 2012.
Publications 2012

BOOKS


BOOK CHAPTERS


BOOK CHAPTER (OTHER)


REFEREED JOURNAL ARTICLES


OTHER JOURNAL ARTICLES


EDITORIAL IN A REFEREED JOURNAL ARTICLE


REFEREED PAPERS IN CONFERENCE PROCEEDINGS


Doug Clarke with Professor Mary Kay Stein, University of Pittsburgh, during her visit to the Mathematics Teaching and Learning Research Centre.

Gloria Stillman presented a Regular Lecture at ICME 2012

The high quality research conducted by members of the MTLRC was also recognised at the International Congress of Mathematics Education (ICME) where Gloria Stillman (Ballarat Campus) presented a regular lecture. Only academics whose work is of the highest international calibre are offered regular lectures at ICME. Gloria’s lecture, entitled “Applications and modelling research in secondary classrooms: What have we learnt?” was well received by a large audience.
Theses Completed

Charly Muke (PhD)
Title: The role of language and traditional mathematics in the developing mathematics curriculum for Papua New Guinea.

Rick Owens (Masters)
Title: Exploring the effects on students and teachers of using written calculation methods based on number sense.

Membership of Editorial Panels


PhD, EdD and Masters’ Students Supervised by MTLRC Members

Irene Anderson
Title: The impact of ICT on student learning outcomes
Supervisors: Philip Clarkson & Donna Gronn

Helen Butler
Title: Teaching for wellbeing: Stories of the complex interactions influencing educators understanding and engagement with student wellbeing
Supervisors: Judith Chapman, Sue McNamara & Marj Horne

Donna Castelli
Title: Great to excellent: Continuing school improvement through structured feedback to teachers using specific criteria
Supervisors: Susan McDonald

Mitchell Coates
Title: Helping teachers utilise effective models of teaching for children who are diagnosed with Autism Spectrum Disorder
Supervisors: Janeen Lamb & Deb Keen

Francis Cohen
Title: The effectiveness of constructivism as a theory of learning that best underpins the teaching of primary school mathematics to achieve results within a standardised based framework of assessment
Supervisors: Roger Vallance & Paul White

Di Cullen
Title: Pre-service teacher education in the postmodern state
Supervisors: Philip Clarkson & Ron Toomey

Nicole DeVries
Title: The effect of feedback on student achievement
Supervisors: Susan McDonald

Carmelo Di Stefano
Title: The role and value of experiential learning
Supervisors: Philip Clarkson & Melita Jones

Ann Downton
Title: Young children’s development of multiplicative thinking: Making the transition from models to symbols in learning multiplication and division
Supervisors: Peter Sullivan (La Trobe University) & Andrea McDonough

Michael Easey
Title: The role of school culture in the formation of students’ attitudes towards the study of mathematics
Supervisors: Elizabeth Warren & Vince Geiger

Sarah Ferguson
Title: Like a bridge: Scaffolding as a means of assisting low-attaining students in mathematics during cognitively challenging tasks
Supervisors: Doug Clarke & Andrea McDonough

Erin Gallagher
Title: Doing things differently: Introducing blended learning modes into a senior secondary mathematics context
Supervisors: Rhonda Faragher & Catherine McLaughlin

Jan Harte
Title: Linguistic challenges for teaching mathematics
Supervisors: Paul White & Marie Quinn

Deborah Hodges-Langford
Title: Teacher learning and its influence on professional practice
Supervisors: Denis McLaughlin & Janeen Lamb

Sue Jury
Title: The inconsistent academic achievement across schools in local clusters (Wainvioni mata)
Supervisors: Denis McLaughlin & Janeen Lamb

Susan Maher
Title: A study of strategies for supporting student persistence when working on challenging tasks
Supervisors: Doug Clarke & Marj Horne

Tom Mboya Okaya
Title: School board governance in urban low socio-economic settings: A case study of primary schools in Kiberia in Kenya
Supervisors: Marj Horne & Madeleine Laming
Karen McLean  
*Title:* A story of early years educators’ experiences of technology and literacy in early years learning environments  
*Supervisors:* Sue McNamara & Ann Gervasoni

Jodie Miller  
*Title:* Young Indigenous students’ experiences in mathematics: An exploration in pattern generalisation  
*Supervisors:* Elizabeth Warren & Vince Geiger

Chrissy Monteleone  
*Title:* Identifying children that display high mathematical capability in the early years  
*Supervisors:* Paul White

Charly Muke  
*Title:* The role of language and traditional mathematics in the developing mathematics curriculum for Papua New Guinea  
*Supervisors:* Philip Clarkson & Andrea McDonough

Therese Nolan  
*Title:* An explanatory study of subject selection between academic and vocational education subjects at Year 10 level  
*Supervisors:* Judith Mulholland & Janeen Lamb

Rick Owens  
*Title:* Exploring the effects on students and teachers of using written calculation methods based on number sense  
*Supervisors:* Rhonda Faragher & Doug Clarke

Linda Parish  
*Title:* Defining, identifying and catering for mathematical giftedness in the early years of schooling  
*Supervisors:* Ann Gervasoni & Gloria Stillman

Matt Sexton  
*Title:* The work of school mathematics leaders who support classroom teachers through professional learning following participation in a school mathematics improvement project: An activity theory perspective  
*Supervisors:* Andrea McDonough & Suzy Edwards

Theresa Shellshear  
*Title:* Parent’s role in developing early mathematics concepts: The nature of this role for parents of children with Down syndrome. (Parents Supporting Numeracy Development of their Children with Down Syndrome)  
*Supervisors:* Rhonda Faragher & Carolyn Broadbent

Kate Simpson  
*Title:* Enhancing the communication skills of young children with autism and severe communication impairments through the use of information and communication technologies and music  
*Supervisors:* Deb Keen & Janeen Lamb

Colin Stoodley  
*Title:* Church planting in Australia: How training and coaching affects the leadership of church planting in Australia  
*Supervisors:* Vince Geiger & Judith Mulholland

Garry Thomas  
*Title:* Investigating deep thinking in the mathematics classroom  
*Supervisors:* Philip Clarkson & Jill Brown

Vicki Thorpe  
*Title:* Exploring how learning development data is understood by teachers as a means for improving student learning in two Brisbane Catholic primary schools  
*Supervisors:* Janeen Lamb & Deborah Robertson

Rod Turner  
*Title:* The language of mathematics  
*Supervisors:* Philip Clarkson & Doug Clarke

Toni Waters  
*Title:* How do teachers negotiate and implement NAPLAN in their schools?  
*Supervisors:* Janelle Young & Sue McDonald

Sue Wilson  
*Title:* Bibliotherapy as a tool to address poor self-concept in mathematics in pre-service teachers  
*Supervisors:* Paul White & Philip Clarkson
Professional Development Conferences for Teachers and School Mathematics Leaders

The Mathematics Teaching and Learning Research Centre offers two annual conferences each year:

- **Annual Primary Teachers’ Mathematics Conference.** This conference was held the last Saturday in May and attracted 173 participants in 2012.

- **Annual Primary and Secondary Teachers’ Mathematics Conference.** This conference was held on the first Wednesday in December and had 347 registrations in 2012.

External Committee Membership and Other Community Service

Downton, A. Member, Mathematical Association of Victoria, Annual Conference Committee.

Faragher, R. Vice President, Down Syndrome Special Interest Research Group, International Association for the Scientific Study of Intellectual and Developmental Disability (IASSIDD).


Geiger, V. Member, Learning Area Reference Committee Mathematics, Queensland Studies Authority.

Geiger, V. Secretary, Mathematics Education Research Group of Australasia (MERGA).

Horne, M. Vice President, Mathematical Association of Victoria.

Lamb, J. Treasurer, Mathematics Education Research Group of Australasia (MERGA).

Monteleone, C. Executive Committee, Primary Association for Mathematics, MANSW.

Stillman, G. Vice President (Research), Mathematics Education Research Group of Australasia (MERGA).

White, P. Member, Sydney Archdiocesan Numeracy Committee.

White, P. Member, Diocese of Broken Bay Numeracy Advisory Committee.

White, P. NSW Ministerial Advisory Group on Literacy and Numeracy Meeting.

Wilson, S. Board Member, Australian Professional Teachers Association (APTA).

Wilson, S. Vice President, Council of ACT Education Associations (COACTEA).

Wilson, S. Vice-President, Council, Canberra Mathematical Association (CMA).

Wong, M. Executive Committee, Primary Association for Mathematics, MANSW.