

2012 Adults Learning Mathematics – A Research Forum 19th International Conference (ALM19)

Synergy – working together to achieve more than the sum of the parts
Te Piringa – Mā pango, mā wheno, ka oti



**Tuesday 26 June to
Friday 29 June 2012**

Welcome / Whakataou

The ALM Annual Conferences are flagship events for our Association – not only because of the opportunity they afford for members, both current and new, the opportunity to showcase their work as researchers, practitioners, and policy makers in this important niche of mathematics education, but because for almost twenty years, they have been our 'family gatherings'.

Delegates who are already ALM members will, I am absolutely certain, warmly welcome into the ALM family those of you who are new to ALM conferences and we hope that this will be the first of many such occasions where will meet.

Organising an international conference is no small undertaking and demands much care and attention. I am most grateful to this year's organising committee and on behalf of ALM express my sincere appreciation to all those involved in working to make this event, ALM19, happen as a co-operative venture by the National Centre of Literacy and Numeracy for Adults (NCLANA) University of Waikato and AUT University. They have compiled a rich and stimulating programme of presentations from across the globe, delivered in one of the world's most beautiful and unique locations.

On behalf of ALM, Kia ora tatou – greetings to all. Enjoy!

Dr Chris Klinger
Chair, Adults Learning Mathematics

It is my great pleasure as Director of the National Centre of Literacy and Numeracy for Adults and a founder member of ALM, to welcome the ALM Conference to New Zealand.

This is the first time ALM has come to New Zealand and only the second time that the conference has been held in the Southern Hemisphere – may there be many more. I hope you will enjoy meeting others and sharing ideas in a convivial atmosphere here at AUT University.

If this is your first ALM conference, you should know that there is a tradition of singing songs and telling stories from our own parts of the world in our get-togethers after the workshops and paper presentation sessions – I hope you will join in and add to ALM's international repertoire.

If this is your first visit to New Zealand, I hope you will take some time to explore this beautiful and interesting country. If you live here, I hope you will take newcomers under your wing and make them as welcome as I have been since my arrival here in 2011.

Have a great conference!

Professor Diana Coben
Director, National Centre of Literacy and Numeracy for Adults, University of Waikato



TUESDAY 26 JUNE

| Time | Details | Venue |
|----------------|---|-----------------------|
| 12.00 – 4.00pm | Trustees' Meeting | Room WF309 |
| 3.00 – 5.00pm | Registration | WF Ground Floor Foyer |
| 5.00 – 7.00pm | Mihi Whakatau Welcome drinks and nibbles | WF Level 8 Lounge |

WEDNESDAY 27 JUNE Presentation Series 1-3

| Time | Details | Venue |
|-----------------|--|-------------------------------|
| 8.00 – 9.00am | Registration | WF Ground Floor Foyer |
| 9.00 – 10.30am | Welcome from Dr Sharon Harvey, Head of School, Language and Culture, Deputy Dean (Research and Postgraduate) Faculty of Culture and Society, AUT University and Dr Chris Klinger, Chair of Adults Learning Mathematics. Keynote Address (See page 4 for details) "Mathematical Tribes: Our Wars and Inter marriages" <i>Prof Bill Barton, Maths Education Unit, Department of Mathematics, Auckland University</i> | Room WF503 |
| 10.30 – 11.00am | Morning tea | WF Level 4 Foyer |
| 11.00 – 11.50am | Presentation Series 1 (See pages 6-7 for details) » Adult mathematics education research in the 21st century: A summary of indexed work from the United States. <i>Presenter: Dr Katherine Safford-Ramus</i> | Room WF410 |
| | » Authenticity, Building knowledge and skills and Competency development: The ABC of learning applied nursing mathematics. <i>Presenters: Prof Keith Weeks, Norman Woolley (in absentia) and Prof Diana Coben</i> | Room WF411 |
| | » Literacy, language and mathematics: Working together in achieving competence in numeracy. <i>Presenter: Dave Tout</i> | Room WF413 |
| | » Divergent mathematical pathways: Exploring the mathematical beliefs of young adults. <i>Presenter: Damon Whitten</i> | Room WF414 |
| 12.00 – 1.30pm | Lunch and networking | WA Building Conference Centre |
| 1.30 – 2.20pm | Presentation Series 2 (See pages 8-9 for details) » An emerging framework for an ethnography of adult mathematical and numeracy practice. <i>Presenter: Frank Smedley</i> | Room WF410 |
| | » Accelerating the development of teacher trainees' mathematical competence – gains and gaps. <i>Presenter: Prof Karoline Afamasaga- Fuata'i</i> | Room WF411 |
| | » Lucky colours of sunshine: Explaining the mathematics of chance gambling. <i>Presenter: Donald Smith</i> | Room WF413 |
| | » Working with the reading demands of the numeracy classroom – going beyond word bombs. <i>Presenter: Glen Bryant</i> | Room WF414 |



WEDNESDAY 27 JUNE Presentation Series 1-3

| Time | Details | Venue |
|------------------|---|---------------------|
| 2.30 – 3.20pm | Presentation Series 3 (See pages 10-11 for details) | |
| | » Selective ignorance and the adult numeracy conundrum. <i>Presenter: Dr Chris Klinger</i> | Room WF410 |
| | » "Maths is no longer the ogre I thought it was." Reflecting on the impact of teaching on prison students' learning and understanding of mathematics. <i>Presenters: Rachel Bulliff and Assoc Prof Jenny Young-Loveridge</i> | Room WF411 |
| | » "It's your money they're after!" Using advertising flyers to teach percentages. <i>Presenter: Anne Abbott</i> | Room WF413 |
| | » Linking statistical concepts to students' real life experiences – a research paper. <i>Presenter: Emmanuel Chinamasa</i> | Room WF414 |
| 3.30 – 4.00pm | Afternoon tea | WF Level 4 Foyer |
| 4.00 – 4.10pm | Poster Presentation (See page 11 for details) Mathematics and statistics teaching and learning community of practice. <i>Presenter: Dr Linda Galligan</i> | WF503 |
| 4.10 – 5.00 pm | Topic Group (See page 12 for details) The synergy between research and practice. <i>Facilitator: Dr Katherine Safford-Ramus</i> | |
| 6.00pm 6.30pm | ALM Conference Dinner – Four Seasons Restaurant Cash bar open Dinner served | WH Building Level 2 |

THURSDAY 28 JUNE Presentation Series 4-6

| Time | Details | Venue |
|-----------------|---|----------------------------------|
| 8.00 – 9.00am | Registration | WA Building Conference Centre |
| 9.00 – 9.50am | Topic Group Continued (See page 12 for details) The synergy between research and practice. <i>Facilitator: Dr Katherine Safford-Ramus.</i> | Room WF303 |
| 10.00 – 10.50am | Presentation Series 4 (See pages 12-13 for details) | |
| | » Helping university students appreciate "the inherent, innate and pervasive" nature of mathematics. <i>Presenter: Prof Keith McNaught</i> | Room WF402 |
| | » Connecting the dots: Using national resources to strengthen adult literacy and numeracy. <i>Presenter: Dr Gill Thomas</i> | Room WF403 |
| | » 'Synergising' mathematics support within a university setting. <i>Presenter: Lesley Wilkins</i> | Room WF410 |
| | » Developing maths eyes – A successful model for building confidence in mathematics in a community. <i>Presenter: Terry Maguire</i> | Room WF411 |
| 11.00 – 11.30am | Morning tea | WA Building Conference Centre |
| 11.30 – 12.30pm | Keynote Address (See page 4 for details) Numeracy in the Workplace <i>Paul Satherley and David Earle, Ministry of Education, New Zealand</i> | WA Building Lecture Theatre |
| 12.30 – 1.30pm | Lunch | WA Building Conference Centre |

THURSDAY 28 JUNE Presentation Series 4-6 continued

| Time | Details | Venue |
|------------------|--|----------------------------------|
| 1.30 – 2.20pm | Presentation Series 5 (See pages 14-15 for details) | |
| | » Building capacity in the adult numeracy workforce after IALS: Developments in professional development for adult numeracy in New Zealand and England. <i>Presenters: Prof Diana Coben, Dr Barbara Miller-Reilly, Niki McCartney</i> | Room WF402 |
| | » "Connecting the dots." Is there a link between student numeracy and literacy? <i>Presenter: Robyn Gandell</i> | Room WF403 |
| | » Mathematics for Health students. <i>Presenter: Adrienne Dearnley</i> | Room WF410 |
| | » Numeracy and informal banking: What does the Sou-Sou tell us about numerate behaviours? <i>Presenter: Dr Anestine Hector-Mason</i> | Room WF411 |
| 2.30 – 3.20pm | Presentation Series 6 (See pages 15-16 for details) | |
| | » Some reflections on adults' numeracy competence from international and national numeracy and mathematical literacy assessments. <i>Presenter: Dave Tout</i> | Room WF402 |
| | » How might schools contribute to the poor mathematics skills of adult New Zealanders? <i>Presenter: Assoc Prof Jenny Young-Loveridge</i> | Room WF403 |
| | » A progress report on an investigation into estimation and spatial sense as aspects of workplace numeracy: A case study of recycling and refuse collector/drivers within a situated learning model. <i>Presenter: Phil Kane</i> | Room WF410 |
| | » A workplace contextualisation of mathematics: Visible, distinguishable and meaningful mathematics in complex contexts. <i>Presenters: Terry Maguire, John Keogh, John O'Donoghue</i> | Room WF411 |
| 3.30 – 4.00pm | Afternoon tea | WF Level 4 Foyer |
| 4.00 – 5.00pm | Annual General Meeting | Room WF410 |
| 6.00pm 6.30pm | ALM19 and National Centre Symposium Combined Dinner Cash bar open Dinner served | WA Building Conference Centre |

FRIDAY 29 JUNE Presentation Series 7

| Time | Details | Venue |
|-----------------|--|----------------------------------|
| 9.30 – 10.20am | Presentation Series 7 (See page 17 for details) | |
| | » Doing mathematics in the workplace: A brief review of recent literature. <i>Presenter: Dr Gail FitzSimons</i> | Room WF402 |
| | » Becoming competent confident and critically aware: Tracing academic numeracy development. <i>Presenter: Dr Linda Galligan</i> | Room WF403 |
| | » Some correspondences and disjunctions between school mathematics and the mathematical needs of apprentice tool makers. <i>Presenter: Kelvin Mills</i> | Room WF410 |
| 10.30 – 11.00am | Morning tea | WA Building Conference Centre |
| 11.00 – 11.50am | Keynote Address (See page 5 for details) The how and why of measuring success in adult literacy and numeracy: Opportunities and challenges. <i>Prof Diana Coben, Director of the National Centre of Literacy and Numeracy for Adults and Professor of Education at the University of Waikato, Emeritus Professor of King's College London</i> | WA Building Lecture Theatre |
| 12.10 – 1.00pm | Closing Session | Room WF303 |
| 1.00 – 2.00pm | Lunch | WA Building Conference Centre |
| 2.15 – 4.00pm | Trustees' Meeting | WF309 |

Keynote Speakers

MATHEMATICAL TRIBES: Our Wars and Intermarriages

The mathematics community is itself made up of many culturally distinct groups. How do we interact? How do we destroy each other? How could we improve our tribal behaviour?

The struggle for influence and resources involves us all, and, as in world affairs, often means we are fighting our friends, or at least undermining them.

Join me for a tour through our micro-politics, and an examination of our weapons of war, courting rituals, and funeral rites.

PROFESSOR BILL BARTON

Professor Bill Barton, Professor of Mathematics Education, Mathematics Department, Auckland University

Bill Barton has worked for many years in the field of ethnomathematics, with particular emphasis on mathematics and language. He is part of the Mathematics Education Unit in the Department of Mathematics at The University of Auckland, but is absent as often as in his office due to duties associated with ICMI and as Associate Dean International for the Faculty of Science. He lives with his wife, Pip, on Waiheke Island.

NUMERACY IN THE WORKPLACE

This presentation will discuss some findings from the 2006 Adult Literacy and Life Skills Survey (ALL) on the numeracy demands of New Zealand workplaces. It will aim to link to the synergy theme of the conference by looking at the intensity of combinations of numeracy and literacy demands for different occupation groups.

This data was collected six years ago, and technology in the workplace has moved on, so numeracy activities will be undertaken now within a more developed IT medium. However, these activities that the ALL survey asked about are likely to be still relevant in a range of work settings:

- » Measure or estimate the size or weight of objects
- » Calculate prices, costs or budgets
- » Count or read numbers to keep track of things
- » Manage time or prepare timetables
- » Give or follow directions or use maps or street directories
- » Use statistical data to reach conclusions.

The presentation will first look at these activities across the whole working population, then analyse by occupation groups, and by measured numeracy skill. Then it will focus on a simple analysis of the combinations of reading, writing and maths practices to provide an indicator of intensity and frequency of numeracy/literacy demands at work.

The presentation will conclude with a discussion of how these kinds of questions will be further developed in the Programme for International Assessment of Adult Competencies survey (PIAAC), which will be run in New Zealand in 2014.

PAUL SATHERLEY AND DAVID EARLE

Paul has worked in the Ministry of Education's Research Division since 2004, after working previously for Statistics New Zealand. He was the New Zealand project manager for the 2006 Adult Literacy and Life Skills Survey and authored some of the research reports of findings from 2008. He is currently working on the development phases of the Programme for International Assessment of Adult Competencies, which is the OECD's new survey of adult skills.

David is the Chief Research Analyst for the Ministry of Education. He has experience in evaluation, research and public policy. He is responsible for leading the Ministry of Education's work programme on monitoring literacy, language and numeracy provision in New Zealand. He has published several reports analysing results from the Adult Literacy and Life Skills (ALL) Survey 2006, on skills supply and demand, and outcomes of tertiary education.

THE HOW AND WHY OF MEASURING SUCCESS IN ADULT LITERACY AND NUMERACY: OPPORTUNITIES AND CHALLENGES

In this Keynote Address I shall look at the opportunities and challenges involved in measuring success in adult literacy and numeracy. How do we – should we – measure success, at the individual, the organisational and societal levels and why does it matter? At the individual level should success be measured in terms of academic outcomes (a qualification or an improved score on a standardised proficiency test) or non-academic outcomes, like getting a job, being able to budget on a limited income, helping a child with her homework, or having the confidence to address a meeting – and does it have to be either/or? What counts as success for the providing organization with respect to adult literacy and numeracy? At the societal level, national and international surveys measure the state of play and participating countries look for improvement in scores from one survey to the next and set this evidence against the effort made to improve standards, while looking for societal and economic benefits. Goal 2 of the United Nations' Millennium Development Goals, 'Achieve Universal Primary Education', has as one of its indicators the literacy rate of 15-24 year-olds. What impact do these measures have 'on the ground'? I shall discuss the how and why of measuring success and suggest ways forward to extend our understanding and improve the life chances of adults with poor literacy and numeracy.

PROFESSOR DIANA COBEN

Director, National Centre of Literacy and Numeracy for Adults, University of Waikato

Diana is Director of the National Centre of Literacy and Numeracy for Adults and a Professor in the Faculty of Education, University of Waikato, New Zealand. She is also Emeritus Professor at King's College London, where she was the world's first Professor of Adult Numeracy.

Diana has researched, undertaken consultancy, taught and published internationally in the fields of: adult numeracy education; the politics of adult education from an international comparative perspective; and the professional development of adult educators.

Her research on adult numeracy education spans policy, curriculum, professional development, numeracy for the workplace and adults' relationships to mathematics – their 'mathematics life histories'. She has a special interest in numeracy in safety-critical work situations and is a member of an interdisciplinary team researching numeracy for nursing (www.nursingnumeracy.info).

She is delighted to welcome ALM to New Zealand and to share her keynote address with colleagues from around the world and across New Zealand from ALM19, the National Centre Symposium and the Adult Literacy Practitioners' Association (ALPA).



ADULT MATHEMATICS EDUCATION RESEARCH IN THE 21ST CENTURY: A Summary of Indexed Work from the United States

Room: WF410

Research in adult mathematics education is spread across the publications of several disciplines – adult learning, mathematics education, educational theory – or lies hidden in doctoral dissertations. This paper will present the findings from a two-year study that identified journal articles and dissertations indexed by the major United States scholarly databases. Primary and secondary themes that emerged will be presented. Interesting findings or trends will be discussed although that analysis phase of the project is a work in progress.

Presenter: Dr Katherine Safford-Ramus

Katherine Safford-Ramus is a Professor of Mathematics at Saint Peter's College, the Jesuit College of New Jersey. She holds a Bachelor of Science in Mathematics, a Masters of Arts in Mathematics Education, and a doctorate in Mathematics Education. Dr Safford has been teaching mathematics at the tertiary level for 29 years. From October 2005 to October 2006, she served as the co-director of the Adult Numeracy Initiative, a project of the United States Office of Vocational and Adult Education, a division of the Department of Education. Dr Safford is the author of *Unlatching the Gate: Helping Adult Students Learn Mathematics*. Her research continues to focus on adults learning mathematics and, in particular, professional development of teachers as adult learners.

AUTHENTICITY, BUILDING KNOWLEDGE AND SKILLS AND COMPETENCY DEVELOPMENT: The ABC of Learning Applied Nursing Mathematics

Room: WF411

The focus of this video presentation is a 20-year programme of medication dosage calculation problem-solving (MDC-PS) education action research. We explore how key to learning applied mathematics in this patient safety critical domain is:

1. Defining a MDC-PS conceptual, calculation and technical measurement competence and error diagnosis model.
2. Supporting the building of applied mathematics skills via a constructivist based education model that informed the design of an interactive authentic environment. This web-based virtual environment has supported the learning of MDC-PS cognitive competence (knowledge) and functional competence (know-how and skills) by over 92,000 healthcare students and practitioners across three continents.

Presenters: Professor Keith Weeks and Norman Woolley (in absentia) with Professor Diana Coben.

Keith is Professor of Healthcare Numeracy and Education at the University of Glamorgan. He has over 30 years experience in clinical nursing and nursing education practice. He is a Science and Education graduate and his PhD focused on the design and evaluation of authentic computer-based environments for facilitating the learning and diagnostic assessment of medication dosage calculation skills. His post-doctorate research and development programme within this domain has focused on both extending this work and acting as Research and Design Director of Authentic World Ltd. He directs and supervises a range of PhD studentships and teaches Masters level research and biological sciences applied to nursing and advanced healthcare practice.

Norman Woolley is Head of Learning & Teaching at the University of Glamorgan UK and CEO of Authentic World Ltd.

Please refer to page 5 for information about Professor Diana Coben.

LITERACY, LANGUAGE AND MATHEMATICS: Working Together in Achieving Competence in Numeracy

Room: WF413

This presentation and hands-on workshop will look at the connections between literacy, language and mathematics in the construct of numeracy or mathematical literacy. The presentation will consider a range of literacy and language based factors and issues related to the teaching and learning of (adult) numeracy. This relates to fundamental questions such as:

- » What is numeracy (or quantitative or mathematical literacy)?
- » What is the relationship between numeracy and mathematics?
- » How do numeracy and mathematics connect to language and literacy?
- » How do language and literacy impact on numeracy and mathematics teaching and learning?

The workshop will consider these questions based on experience in the teaching of adults in adult numeracy, alongside the perspective of a number of different research, assessment and curriculum frameworks, both international and Australian. The implications for the teaching of numeracy and mathematics will be discussed and a number of teaching strategies and activities will be demonstrated that support and encourage students to incorporate aspects of literacy and language in their learning of numeracy and mathematics.

Presenter: Dave Tout

Dave is a Senior Research Fellow, Australian Council for Educational Research (ACER). He has over 30 years experience working in the youth and adult numeracy and mathematics education sectors. He has had wide experience not only in teaching and training, but also in working at a state, national and international level in research, curriculum, assessment and materials development. In Australia he is particularly renowned for his hands-on workshops, which not only make maths fun, but also demonstrate how a range of maths issues and topics can be addressed. Dave joined ACER in 2008 and has worked on national and international assessment projects including PISA and PIAAC.

DIVERGENT MATHEMATICAL PATHWAYS: Exploring The Mathematical Beliefs of Young Adults

Room: WF414

Evidence suggests that young adult learners who have developed negative beliefs about mathematics during unsuccessful school years are at risk of negative beliefs perpetuating the same cycles of failure within the tertiary sector. What are the detrimental beliefs young adults hold and how do these beliefs influence their engagement with numeracy provision?

This presentation reviews a research project that explored the mathematical beliefs and attitudes of six young adults in New Zealand who describe themselves as 'mathematical failures'. The research identified a range of general and mathematical beliefs that tended to promote passive learning approaches and poor responses to failure. The findings raise several issues regarding numeracy provision within the tertiary sector and shed light on why some learners pursue mathematics while others shun it.

Presenter: Damon Whitten

Damon Whitten has a rich background in the fields of numeracy, language and literacy. This background includes extensive experience supporting adult learners with mathematical learning difficulties who have experienced failure in the compulsory sector. Damon also provides support for tutors, including professional development for embedding literacy and numeracy, facilitating workplace needs analysis and conducting research into adult numeracy. Damon is pursuing doctoral study with a focus on understanding and reversing cycles of numeracy failure within the tertiary sector.



AN EMERGING FRAMEWORK FOR AN ETHNOGRAPHY OF ADULT MATHEMATICAL AND NUMERACY PRACTICES

Room: WF410

This paper presents a potential ethnographical framework for examining in-situ adult mathematical practices. It results from a meta-analysis of over 400 articles and reports published on adult mathematics and numeracy practices in the workplace, everyday life, and assorted other situations where numeracy is present (for example, sports events). The framework is also informed by a combination of my own academic sociolinguistic and mathematical backgrounds. Consequently, it draws on a synergy of insights from sociomathematics, ethnomathematics, social practices theory, and the history of mathematics. The work of Saville-Troike (Saville-Troike, S. (1989). *The ethnography of communication: An introduction* (2nd ed.). Oxford, UK: Basil Blackwell) is also applied to mathematical contexts.

The large discrepancy between New Zealand adults' numeracy scores in the recent Adult Literacy and Life Skills (ALL) survey and adults' self-perceived numeracy ability is something that demands closer attention. It is envisioned that this ethnographic framework may assist in excavating mathematical practices at multiple levels (semiotic, material, discursive and diverse others), and thus provide a way forward to offering some explanation for this incongruence. It is also intentional that such a framework may lead to pedagogical insights on the teaching and learning of mathematics for adults. The paper acknowledges the need for excavating in-situ (often invisible) mathematical practices in addition to embedding numeracy skills.

Presenter: Frank Smedley

Frank Smedley is a senior lecturer at AUT University, Auckland, New Zealand, and teaches the numeracy component in the online Masters in Adult Literacy and Numeracy Education. Because Frank's degrees are in sociolinguistics and mathematics, he has interests in the intersection of discourse and mathematics, particularly as it is applied to adult numeracy learning. Frank has a background of secondary school teaching in mathematics.

ACCELERATING THE DEVELOPMENT OF TEACHER TRAINEES' MATHEMATICAL COMPETENCE – GAINS AND GAPS

Room: WF411

This paper reports the impact of three teaching blocks of mathematics content and pedagogic courses on teacher trainees' mathematical competence (MC) as they participated in an Accelerated Diploma in Education Program (ADEP). The teacher trainees were already working as teacher assistants in Samoan primary schools. The diagnostic tests, based on content typically taught at primary and early secondary levels, repeatedly measured trainees' MC over the course of the three teaching blocks (TBs). The first diagnostic test (MDT1) was administered after the first TB, the second (MDT2) and third diagnostic tests (MDT3) before and at the end, respectively, of the second TB twelve months later (see Afamasaga-Fuata'i, 2011). Four months following the second TB, the third TB was conducted with the fourth and fifth diagnostic tests (MDT4 and MDT5) administered prior and at the end. This paper presents only data from MDT4 and MDT5. Data from all five diagnostic tests were analysed using the Rasch Measurement Model to calibrate teacher trainees' ability measures over time. Provided in the paper are some implications for teaching mathematics in the classrooms and preparation of competent teachers of primary mathematics.

Presenter: Professor Karoline Afamasaga-Fuata'i

Karoline Afamasaga-Fuata'i is the Founding Professor of Mathematics and Mathematics Education at the National University of Samoa (NUS) since 2004. Prior to her current appointment, she had been Associate Professor at the University of New England (UNE) for five years. Before her UNE appointment, Karoline was the Dean of the Science Faculty and Founding Senior Lecturer Mathematics at NUS for twelve years. Collectively with over twenty years of international and national university teaching, curriculum development and research experiences, Karoline is passionate about researching innovative and authentic ways in which mathematics students at all levels and their teachers make sense of mathematical ideas and strategies. Her research interests span across all educational levels from working with primary students up to and including university mathematics students and lecturers. Karoline is a graduate of Cornell University in the USA where she did her Master and PhD degrees. She also graduated from the University of the South Pacific with a BSc degree and Graduate Certificate of Education.

LUCKY COLOURS OF SUNSHINE: Explaining the Mathematics of Chance Gambling

Room: WF413

The supportive environment of ALM has seen me develop these ideas over some years, now to a level of quality content I am happy to share more widely. Potential gamblers need to know why they are going to lose their money long term. This interactive game and accompanying analysis, reveals the key mathematics – of randomness, game structure and distribution of results, which account for the outcomes of commercial chance gambling. Graphs are constructed from participants' data showing the changing distribution of results over increasing play. Discussion of gambling illusions takes place while the game is played. In addition to teaching materials, participants will gain transmissible experiential and theoretical knowledge of why chance gambling is unprofitable in the long run.

Presenter: Donald Smith

Donald began researching relationships between Mathematical understanding and gambling, after a stint of adult numeracy teaching, and joining ALM. In childhood he played roulette and cards at home in Sunshine, Australia. He studied philosophy and social theory in the University of Melbourne, where he chaired the University Union. He has run an acoustic music venue, and a gallery. His broader interests include human freedom, social organisation, and regard for other species. He is annoyed by the cloying creep of 'quality' authoritarianism. He occasionally teaches sociology of education, and enjoys visiting Aotearoa/New Zealand.

WORKING WITH THE READING DEMANDS OF THE NUMERACY CLASSROOM – GOING BEYOND WORD BOMBS

Room: WF414

The skill of reading with understanding is essential in any adult mathematics classroom where context is used to promote learner engagement. A wide range of contexts may be used which increase the literacy demands for the learners. The development of mathematical concepts and skills, for example, are promoted through investigations and problem solving. The New Zealand Assessment Tool also uses context to evaluate mathematical competency. Here learners may need to engage with up to thirty different contexts in the process of displaying their mathematical knowledge.

The relationship between literacy and mathematical development is evident in working with mathematical texts and worksheets. Reading with understanding is a challenge for many learners and may inhibit their grasp of the subject and their ability to answer word problems. Literacy is more than understanding the vocabulary of mathematics and the context in which it is presented.

In this presentation, ways of assisting the learner to meet the heightened literacy demands are explored going beyond the use of vocabulary lists and word bombs. Some current classroom materials are viewed with a literacy lens and the reading demands identified.

Presenter: Glen Bryant

Glen is a mathematics lecturer in the Foundation Studies Department at Unitec, Institute of Technology in Auckland, New Zealand, where she is the leader of the maths team. She has been involved with mathematics education for over 30 years at both secondary and tertiary levels. With the advent of the numeracy focus in the adult sector she has explored new approaches to traditional mathematics teaching and she has also been involved in delivering the 'teaching numeracy' part of the NCALNE (National Certificate in Adult Literacy and Numeracy Education) qualification.



SELECTIVE IGNORANCE AND THE ADULT NUMERACY CONUNDRUM

Room: WF410

Mathematics is widely held in high regard within the community and there is a considerable body of research emphasising the value of mathematics (particularly functional numeracy in adults) as a social good that can build bridges and empower adults in ways that enhance independence and promote critical citizenship. Nonetheless, math-averse attitudes and behaviours are prevalent in the adult populations of most western nations, with poor adult numeracy skills and overt adult innumeracy continuing as a perpetual and intractable problem despite decades of investment in training programmes and initiatives to improve functional numeracy skills for life and work – this is the 'adult numeracy conundrum'. Whereas the customary response by educators is to explore and articulate the costs and dysfunctions of innumeracy, ask who or what can be blamed, and devise new means by which it might be overcome, this paper approaches the matter from a very different perspective to consider the psychological and social functions of innumeracy as selective ignorance. It is argued that, notwithstanding the obvious opportunities for gain by exploitation of innumerate individuals, the persistence of this form of ignorance signals the presence of underlying factors that offer sufficient pay-off to induce self-perpetuating innumerate behaviours.

Presenter: Dr Chris Klinger

Chris Klinger is a senior lecturer at the University of South Australia, where he is Director of the UniSA International Relations programme. His research interests are focused on math-anxiety, the attitudes of adult learners towards mathematics, and their math self-efficacy beliefs. He is co-author of *Essential Skills for Science and Technology* (2nd Edition, Oxford University Press, 2011), a compilation of the academic skills required for the study of any science-based course at the tertiary level, and author of *Bootstrapping Reality from the Limitations of Logic* (VDM Verlag, 2010), which details a radically different process approach to fundamental physics. Chris has been Chair of the ALM Board of Trustees since 2008.

"MATHS IS NO LONGER THE OGRE I THOUGHT IT WAS." REFLECTING ON THE IMPACT OF TEACHING ON PRISON STUDENTS' LEARNING AND UNDERSTANDING OF MATHEMATICS

Room: WF411

This paper summarises the findings from a small numeracy teaching pilot conducted with adult prisoners in 2011. The learners had identified that they had struggled throughout their lives with numeracy, as a result of their negative experiences with mathematics in school. Their aversion to mathematics had severely limited their career options and progression, and impacted on their self-confidence.

The focus of the pilot was to firstly dismantle such negative barriers to learning, then create a positive and constructive learning environment in which to provide teaching for understanding of mathematical concepts and principles. The findings demonstrate the value of using problem-solving activities, manipulatives and relational understanding to develop learners' capacity to understand and think about mathematics, and ultimately enjoy using mathematics in their work and lives.

Presenters: Rachel Bulliff and Associate Professor Jenny Young-Loveridge

Rachel has a professional background in adult education training and facilitation, having worked for a multi-national training organisation in both Australia and New Zealand. She joined Corrections Inmate Employment (CIE) in 2006, co-ordinating a number of resources, activities and events to promote prisoner employment training. Rachel participated in the pilot cohort of CIE Instructors and training staff who undertook the National Certificate in Adult Literacy and Numeracy Education (NCALNE) (Vocational) in 2009. Since that time, Rachel has co-ordinated four subsequent cohorts of CIE Instructors who have undertaken the NCALNE training.

As CIE's National Prisoner Training Co-ordinator, Rachel has been instrumental in establishing CIE's Instructors and learners on the Literacy and Numeracy for Adults Assessment Tool, monitoring assessment results, setting up a bank of literacy and numeracy resources and conducting sector training reviews. Most recently, Rachel has been involved in developing a project to pilot online learning for youth prisoners.

Jenny is an Associate Professor at the Faculty of Education, University of Waikato, New Zealand. She has been researching the development of mathematical thinking for almost 30 years. She was involved in the early development of the Learning Progressions in Adult Numeracy by the New Zealand Tertiary Education Commission (TEC). Her most recent research involved the assessment of students entering Initial Teacher Education (Primary). She is particularly interested in additive and multiplicative thinking in learners of all ages.

"IT'S YOUR MONEY THEY'RE AFTER!" USING ADVERTISING FLYERS TO TEACH PERCENTAGES

Room: WF413

Every day we get advertising material into our mail boxes. How do students evaluate this "junk-mail"? When they read it do they understand how the percentage discounts and the percentage of the actual price they will pay are related? Can they calculate what the normal price would be if they are given the percentage discount for an item and the sale price? If money is put into savings, how is the interest rate and \$ amount of the interest affected by their tax rate and the risk of losing their investment?

This presentation shows that students can use "junk mail" to learn how to calculate percentage increase and decrease, to calculate interest on hire purchase as opposed to getting interest on savings, and to calculate the original price of an item from the sale price and the discount percent of an item.

Presenter: Anne Abbott

Anne trained as a primary/secondary teacher in England at a Training College affiliated to Cambridge University. She did her mathematics degree as an extramural student through Massey University, New Zealand, finishing in 1988.

Anne has worked with foundation students at Whitireia, a New Zealand Polytechnic, since 1989. She devised the mathematics curriculum and has written all the student study material, concentrating on context based learning.

LINKING STATISTICAL CONCEPTS TO STUDENTS' REAL LIFE EXPERIENCES – A RESEARCH PAPER

Room: WF414

The purpose of this study was to explore methods of linking statistics concepts to adult students' real life experiences. It was motivated by the observation that the majority of statistics teachers in Zimbabwe never worked in industry, farms and different sectors of the economy from which their students drew experiences. In addition, statistics textbooks used were authored by foreigners using British, Indian or American examples to illustrate statistics concepts. Data were collected by a lecturers' questionnaire soliciting for strategies and an analysis of students' focus group discussions presentations and individual assignments. The study found that lecturers can link statistics concepts to adult students' real life experiences by: reading annual reports from different organizations to find what activities they are involved in and how they use statistics to present their data; extracting contextual experiences from students' focus group discussion written presentations; and structuring local examples for different statistics concepts using students' suggested contexts.

Presenter: Emmanuel Chinamasa

Emmanuel Chinamasa is a senior lecturer for research methods and statistics at Chinhoyi University in Zimbabwe. His research interests are in adults learning mathematics, specifically statistical concepts and their application in real life. He intends to do a doctoral degree in adult learners' mathematics errors for corrective instruction.

Poster Presentation Wednesday 27 June 4.00 – 4.10pm

POSTER PRESENTATION: MATHEMATICS AND STATISTICS TEACHING AND LEARNING COMMUNITY OF PRACTICE

Room: WF503

A Community of Practice (CoP) is a collection of people that share a common passion and meet regularly to talk about it and try to learn how to improve their practice. In Australian universities, Communities of Practice are becoming popular. At the University of Southern Queensland a new Community of Practice was formed in 2011. It is a gathering of lecturers who have a keen interest in the practice of teaching and learning in mathematics and statistics. This poster outlines the objectives of CoPs in general, and the aims of this CoP, called Mathematics and Statistics Teaching and Learning (MaST). The poster will also outline the progress so far and future directions.

Presenter: Dr Linda Galligan

Linda is the Department of Mathematics and Computing's Academic Liaison Officer and Senior Lecturer and Mathematics Co-ordinator. She teaches mainly first year statistics and mathematics. She also has strong links with schools to provide programmes and activities for students and teachers. Her research includes comparing mathematical word problems in English and Chinese and code switching in Chinese/English when they solve mathematics problems. In 2011 she completed a PhD in developing a model of embedding academic numeracy in university programmes, using nursing as a case study.

Topic Group Wednesday 27 June 4.10 – 5.00pm and Thursday 28 June 9.00 – 9.50am

TOPIC GROUP: The Synergy Between Research and Practice

Room: WF503

Topic Group A was formed at ALM4 to serve as a discussion group where researchers and practitioners could chat about the interplay of their roles and co-dependency of their work. The theme of those discussions has ranged widely over the intervening years but the underlying questions are always:

- » What defines our field of “adults”, “mathematics”, and “education”?
- » What research is being conducted in the field?
- » How can ALM support the enhancement of practice through research results?

The topic group meets for two sessions and is intended to be a conversation that serves the needs of the participants. Anticipating that there will be many new attendees this year, the organiser will present a brief summary of themes from previous years and then invite the group to determine the discussion path they would like to follow at ALM19, keeping the theme of “synergy between parts” when the “parts” are research and practice.

Facilitator: Dr Katherine Safford-Ramus

Please see page 6 for information about Dr Katherine Safford-Ramus

Presentation Series 4 Thursday 28 June 10.00 – 10.50am

HELPING UNIVERSITY STUDENTS APPRECIATE “THE INHERENT, INNATE AND PERVASIVE” NATURE OF MATHEMATICS

Room: WF402

As a response to staff concerns about entrants’ literacy and numeracy, the faculty of Health Sciences at the University of Notre Dame Australia (UNDA) Fremantle campus, worked with academic support staff from the University’s Academic Enabling and Support Centre (AESC) to develop a Post Entrance Numeracy Assessment (PENA). The PENA was designed to parallel and complement the University’s PELA (Post Entrance Literacy Assessment). The PENA led to the articulation and discussion with regard to concerns about the range of mathematics courses offered in Western Australia. This led to staff discussion on the need for curriculum mapping between secondary schools and the tertiary sector, and ensuring that consultative mechanisms already in place were effective. The PENA testing and subsequent student counselling from staff indicated that significant numbers of Health Science entrants lacked an appreciation that mathematics would be inherent, innate and pervasive in many of their units. Whilst the level of mathematics necessary varies between Health Science courses (eg, it is higher for Biomedical Science than Outdoor Recreation programmes), mathematical knowledge, skills and understandings are pivotal to study success. The removal of prerequisites from university courses, and the issues around students seeking to maximise their ATAR (Australian Tertiary Admission Rank) score, warrant further discussion.

Presenter: Professor Keith McNaught

Professor Keith McNaught is Director of the Academic Enabling and Support Centre, on the Fremantle campus of the University of Notre Dame Australia. He has taught in primary, secondary and tertiary education for 30 years, and held various school leadership roles as both a Deputy Principal and Principal. His professional work, and doctoral studies, focused on the use of reflective writing as a treatment for mathematics anxiety in adult learners.

CONNECTING THE DOTS:

Using National Resources to Strengthen Adult Literacy and Numeracy

Room: WF403

The Learning Progressions, the Assessment Tool and Pathways Awarua form part of the educational infrastructure developed by the New Zealand Tertiary Education Commission (TEC) to support adult learners to strengthen their literacy and numeracy skills. Together the resources help answer three key questions for effective learning: What do I need to learn? How am I doing? Where to next?

This paper examines the development, implementation and impact of these national resources on the literacy and numeracy teaching and learning of New Zealand adults.

Presenter: Dr Gill Thomas

Gill is managing director of Maths Technology Ltd, a company that undertakes research and consultancy in adult numeracy, mathematics and teacher education. She has worked on a number of the TEC literacy and numeracy initiatives including The Literacy and Numeracy for Adults Learning Progressions, and the Assessment Tool. Currently she is project leader for the development of Pathways Awarua, an online interactive learning system. Gill maintains her involvement in school sector mathematics through the company’s key contract to develop and maintain the Ministry of Education’s mathematics website and as a knowledge leader for the Progress and Consistency Tool.

'SYNERGISING' MATHEMATICS SUPPORT WITHIN A UNIVERSITY SETTING

Room: WF410

Mathematics is a part of everyday life. Moreover, it plays a large part in careers such as teaching, commerce, engineering and nursing. It is essential, therefore, that all university graduates are able to apply mathematics confidently and successfully in their chosen vocations.

Students enter university with a variety of mathematical backgrounds. Some are not adequately prepared for the mathematics involved in their preferred, non-specialist mathematics courses. Many bring emotional conflicts about mathematics which affect their ability to learn.

The University of Wollongong recently created a new position and appointed a Mathematics Support Lecturer within its Learning Development team whose role is to provide assistance to students who find the mathematics involved in their courses "challenging" (there had been no such position for many years). This presentation looks at the development of this role with emphasis on the requirement of mathematics to "synergise" with other courses, contexts and competencies within university studies. It looks at the broad cultural contexts of students seeking support and the issues – often affective and motivational – faced by students who seek support at this level.

Presenter: Lesley Wilkins

Lesley Wilkins is the Mathematics Lecturer in Learning Development at the University of Wollongong, Australia, where she supports students who find maths "challenging" but need it for their (non-specialist maths) university studies. Lesley has taught Mathematics in secondary schools, post-secondary and tertiary institutes in Australia and overseas. Her previous position was at a tertiary college for Indigenous Australians in the Northern Territory. Lesley is interested in maths anxiety.

DEVELOPING MATHS EYES – A SUCCESSFUL MODEL FOR BUILDING CONFIDENCE IN MATHEMATICS IN A COMMUNITY

Room: WF411

This paper describes an innovative and novel approach to sowing the seeds of the recognition of the importance of mathematics competence in real life situations. Traditional methods of mathematics teaching and learning have resulted in a maturing population who do not appreciate the mathematics they use in their everyday lives. These 'everyday' mathematics skills often involve the use of complicated mathematical ideas and techniques. However, many people often consider the mathematics they can do as 'common sense' and the tasks they can't do as 'mathematics' (Coben 2000).

The paper describes a successful community initiative 'Looking at Tallaght with Maths Eyes'. The initiative aimed to:

- » Develop the maths eyes of the Tallaght community: (Every member of the community has maths eyes – they just need to be opened).
- » Help the Tallaght community to make the link between mathematics and the real world. (A key focus was to encourage the community to use Maths Eyes when they think about their water usage and water conservation).
- » Build people's confidence in their use of maths in their life.
- » Empower people and build their confidence in their own maths knowledge and skills. (Empowered parents are more confident in supporting their children's learning; more confident citizens can make more informed evaluations of the information that bombards them every day and have a better understanding of the impact of their actions and decisions in their life, work and leisure).
- » Build a positive image of maths.

The paper outlines the different approaches that were used to encourage participation from a range of stakeholders. These included a community wide 'curiosity' campaign; the development and piloting of a resource pack for educators called 'Developing Maths Eyes; An Innovative Approach to Building a Positive image of Mathematics' (2011); primary schools showcase; adult learners showcase; exhibitions; the development of maths trails for the local parks and an audio maths 'I-walk' for Tallaght. In addition it describes how the initiative has since been developed and is being rolled out nationally.

Presenter: Terry Maguire

Terry Maguire is currently the Head of Lifelong Learning at the Institute of Technology Tallaght, Dublin Ireland. Her research interest includes identifying good models of professional development for tutors of adult mathematics; uncovering the hidden mathematics of the workplace and contributing to setting up a coherent framework for adult mathematics in Ireland.

BUILDING CAPACITY IN THE ADULT NUMERACY WORKFORCE AFTER IALS: DEVELOPMENTS IN PROFESSIONAL DEVELOPMENT FOR ADULT NUMERACY IN NEW ZEALAND AND ENGLAND

Room: WF402

In this paper we continue our ongoing international comparative study of adult numeracy in New Zealand and England. We shall compare developments in adult numeracy education in New Zealand and England – policy, infrastructure and practice, in particular professional development – since the International Adult Literacy Survey (IALS) in the mid-1990s.

Presenters: Professor Diana Coben, Dr Barbara Miller-Reilly, Niki McCartney

Please see page 5 for information about Professor Diana Coben.

Barbara Miller-Reilly is a Research Fellow in the Mathematics Education Unit in the Department of Mathematics at the University of Auckland. Her research over the last two decades has largely focused on understanding good teaching of mathematics to adults – an evidence-based approach to effective mathematics teaching. Barbara's special teaching expertise has been teaching mature students who fear mathematics.

Niki McCartney, Associate Director, National Centre of Literacy and Numeracy for Adults, is particularly interested in the relationship between numeracy and literacy and the impact of numeracy improvement on literacy development. She is very interested in lessons learned and shared between tertiary organisations and workplaces specifically with regard to embedded literacy and numeracy organisation-wide implementation.

"CONNECTING THE DOTS." IS THERE A LINK BETWEEN STUDENT NUMERACY AND LITERACY?

Room: WF403

During the last decade, in New Zealand and internationally, resources and systems have been implemented to enhance tertiary students' literacy and numeracy development. In New Zealand, the Assessment Tool (AT) was developed to provide teachers with diagnostic information about tertiary students' current knowledge and skills in reading, writing and numeracy, with the Tertiary Education Commission requiring use of the AT in some courses.

Little research is available, however, on the synergy of adult numeracy and literacy or the pedagogical consequences of this interaction. Does neglecting numeracy also put students' literacy at risk?

Our research study examines connections between students' numeracy and literacy (skills and knowledge), using the AT data collected for Foundation Studies: Whitinga students for 2011 to 2012. This presentation will report the preliminary findings, and discuss consequences for the teaching and learning of adult numeracy.

Presenter: Robyn Gandell

Robyn Gandell is a lecturer in mathematics and physics in a foundation studies programme at Unitec, a New Zealand tertiary institute. Her teaching involves use of group work and investigative activities in the mathematics classroom, more recently implementing Model Eliciting Activities. Previous occupations include physiotherapy, dance, parenting, pre-school education and secondary school teaching. Currently studying towards a masters degree in mathematics education, with particular interest in identity and discourses in and around mathematics teaching and learning, she is also researching links between students' literacy and numeracy.

MATHEMATICS FOR HEALTH STUDENTS

Room: WF410

Part of my role at Otago Polytechnic, Dunedin, New Zealand, is to teach students in our Certificate in Health course the mathematics they will need in order to be able to dispense drugs to patients – without sending them into toxic shock. The mathematics involved is surprisingly difficult as it requires a lot of fractional and proportional thinking as well as rock solid place value understanding. Perfect for foundation level learners! In addition, some of the students are enrolled as distance learning students. Certificate in Health students typically hope to progress to a degree in Nursing, Midwifery or Veterinary Nursing.

My workshop will showcase the resources I use to deliver this course to students – Moodle, Adobe Connect, Visualizer, animated Powerpoints and activities. I am a committed visual learner and my approach reflects this. I will bring all my materials with me and am happy to share.

Presenter: Adrienne Dearnley

Adrienne teaches at foundation level at Otago Polytechnic, Dunedin, New Zealand. She has a BA(Hons) in Mathematics from Victoria University, Wellington, New Zealand, and had a career in software development before switching to teaching mathematics.

Presentation Series 5 continued

NUMERACY AND INFORMAL BANKING:

What Does The Sou-Sou Tell Us About Numerate Behaviours?

Room: WF411

Sou-sou (or su-su) is an important way of saving money in many African and Caribbean countries through the revolving exchange of a fixed amount of money between close friends or family members for a specified length of time. As a social activity, the conduct of sou-sou requires strong communal ties built on trust. Over the years, while the attempt to showcase sou-sou as an important micro-financial activity in many developing nations has resulted in some research and literature on the topic, very little connection has been made between sou-sou (which involves numerate behaviours) and numeracy. Dr Hector-Mason will open a window of inquiry in the relationship between sou-sou and numeracy and present information and materials that will support a rich discussion about sou-sou as a form of ethnomathematics.

Presenter: Dr Anestine Hector-Mason

Anestine Hector-Mason, PhD, is a Senior Research Analyst at American Institutes for Research (AIR), Washington DC, and plays a key role on all projects at AIR that require strong leadership and expertise in adult teaching and learning, qualitative research design, methodology, theory, and technical reporting. Among her other duties at AIR, she serves in several leadership roles on projects funded by the U.S. Department of Education, the U.S. Department of Defense, and other private organizations. Dr Hector-Mason has over 17 years of direct teaching and research experience with English language learners (ELL) at the elementary school through college levels, and in the field of adult education. She also serves as an Editor of the Adults Learning Mathematics (ALM) International Peer-Reviewed Journal. In addition to earning a PhD in Rhetoric and Linguistics, Dr Hector-Mason has earned a Masters of Science Degree in Education and a Masters of Arts Degree in Teaching Writing. She holds a bachelors degree from Clark University in Worcester, Massachusetts.

Presentation Series 6 Thursday 28 June 2.30 – 3.20pm

SOME REFLECTIONS ON ADULTS' NUMERACY COMPETENCE FROM INTERNATIONAL AND NATIONAL NUMERACY AND MATHEMATICAL LITERACY ASSESSMENTS

Room: WF402

Based on the frameworks, item development and the results of adults' and young people's performance in a number of international and national numeracy and mathematical literacy assessments, this presentation will highlight a number of issues related to the teaching and learning of numeracy (or mathematical literacy). The assessments and frameworks to be used as the basis for the presentation include the Adult Literacy and Lifeskills Survey (ALL); the Program for International Student Assessment (PISA), and the New Zealand Adult Literacy and Numeracy Assessment Tool. The presenter has worked on all three assessments.

Issues to be addressed include the similarities and differences between the assessment frameworks and their associated test items; and some reflections on what some of the results to date tell us about how performance compares between the school-based assessment of 15 year olds in PISA and the two adult assessments – the household assessment of adults' numeracy skills in ALL and the assessment of adult learners in the New Zealand Adult Literacy and Numeracy Assessment Tool. Note that in the trial of the New Zealand Adult Literacy and Numeracy Assessment Tool a number of ALL numeracy items were used to map the test against the NZ curriculum framework.

Presenter: Dave Tout

Please see page 7 for information about Dave Tout.

HOW MIGHT SCHOOLS CONTRIBUTE TO THE POOR MATHEMATICS SKILLS OF ADULT NEW ZEALANDERS?

Room: WF403

The Adult Literacy and Lifeskills (ALL) survey has shown that more than half of the New Zealand adults aged 16 to 65 did not have the required numeracy skills to meet the needs of everyday life or the so-called "knowledge economy." This paper examines evidence from several sources, including assessments of mathematics conceptual understanding of university students entering and leaving initial teacher education (ITE) Primary, practising primary teachers, and children who are reaching the end of their primary school. Data also includes attitudes towards mathematics by ITE students, teachers, and primary school children. Overall, the evidence suggests that there is a systemic problem, with substantial proportions of ITE students entering teacher training with negative attitudes towards mathematics coupled with weak understanding of key mathematics concepts. Many leave university without rectification of their misconceptions, or improvement in their attitudes, and become practising teachers of mathematics. Many primary school children develop major misconceptions in mathematics that may never be rectified. In secondary schools, data show negative attitudes towards mathematics prevail, and low levels of achievement continue to be of concern. This cycle tends to be repeated and provides a challenge for all mathematics educators, including those working with adults.

Presenter: Associate Professor Jenny Young-Loveridge

Please see page 10 for information about Jenny Young-Loveridge.

A PROGRESS REPORT ON AN INVESTIGATION INTO ESTIMATION AND SPATIAL SENSE AS ASPECTS OF WORKPLACE NUMERACY: A Case Study of Recycling and Refuse Collector/Drivers Within a Situated Learning Model

Room: WF410

Estimation and spatial sense are important elements of workplace numeracy. Though the former is encountered in school number sense curricula, the latter might be accounted for in part through school geometry.

This study draws on the perspective of numeracy as social practice (Lerman, 2006; Presmeg, 2007; Wedege, 2004). This has been assisted by examining the situated work practices of urban recycling and refuse collectors. While observing the numeracy-related events within these collection operators' daily work, and by interviewing them about their work-related numeracy practices, I will show that estimation and spatial sense are essential to the roles of the collection operators, and most probably for many other occupations.

How their capabilities contribute to the many critical decisions made during the operators' working days and how these are learned informally and formally in their practices, will be presented. Eventually, the investigation will inform decisions as to whether spatial sense and estimating should be developed within future learning programmes in numeracy training for learners of any age.

Presenter: Phil Kane

Phil taught mathematics in area and secondary schools in New Zealand in the early – mid 1980s. Following some years working in industry he became a mathematics lecturer on a polytechnic bridging programme. More recently he has been involved in numeracy education with tutors completing the New Zealand National Certificate in Numeracy and Literacy Education, and general education mathematics with primary teachers on their University degree studies. He has also been part of the Numeracy Developers' Teams with the Ministry of Education, then the Tertiary Education Commission, and most recently the National Centre of Literacy and Numeracy for Adults, University of Waikato. Experiences with foundation level mathematics learners, alongside the learning histories that adults bring with them as they return to study, leads Phil's interest in how adults learn and apply the many aspects of numeracy in their workplaces.

A WORKPLACE CONTEXTUALISATION OF MATHEMATICS: Visible, Distinguishable and Meaningful Mathematics in Complex Contexts

Room: WF411

Contrary to commonly accepted wisdom, mathematics knowledge, skills and competence that underpins low-skilled / low-paid jobs, may be distinguishable and visible when viewed through a particular lens. That they may occur at low levels of complicatedness, in terms of curriculum, is hardly epiphanic. That they serve the worker in multiple, complex contexts is often overlooked, hindering recognition of the depth of prior learning, for want of a suitable framework. It may be that mathematics, contextualised for the workplace, is more readily recognised when accompanied by its attendant properties.

The methodology designed to overcome the difficulties of conducting workplace-mathematics research has been detailed elsewhere. This paper reports on:

- » How the synthesis of the findings of a workplace mathematics survey and the analysis of case studies, exposed the complexity of the workplace-contexts in which, often uncomplicated, mathematics tools and concepts are used, and
- » The evidence-based Complexity Protocol developed to capture, more completely, the context in which mathematics is used in work.

This paper argues that a Workplace Contextualisation of Mathematics, capable of reporting the level of complicatedness of mathematics in the workplace, and taking account of the range of sophistication of the situations in which it is used, enables mathematics visibility in the workplace and all that that implies.

Presenters: Terry Maguire, John Keogh and John O'Donoghue

Please see page 13 for information about Terry Maguire.

John Keogh is a PhD candidate, based in the Institute of Technology Tallaght, Dublin, and working under the supervision of Terry Maguire and John O'Donoghue. After a career in the shipping industry spanning 30 years, John embraced a long yearned-for opportunity to study at third level on a distance-learning basis. Having completed a degree in ICT, the opportunity arose to combine his love of mathematics with his experience of the workplace. John is now writing up his research thesis entitled 'Looking at the Workplace through Mathematical Eyes'.

Professor John O'Donoghue is Director of The National Centre for Excellence in Mathematics and Science Teaching and Learning (NCE-MSTL) at the University of Limerick, Ireland, where he also undertakes research and supervises research students. The Centre's mission is to transform teaching and learning in science and mathematics in Ireland by: conducting best practice research into teaching and learning in maths and science; collaborating and sharing information with all universities and institutes of technology; and providing advice to the sector.

DOING MATHEMATICS IN THE WORKPLACE: A Brief Review of Recent Literature

Room: WF402

For school students, many of their mathematics teachers, and most adults in general, mathematics is encapsulated in, even defined by, the institution of school mathematics with its arbitrary selection and recontextualisation of aspects of the discipline. Not surprisingly, most people fail to recognise the connections with their everyday and professional lives beyond formal education – even the most highly paid medical and dental specialists. The world of work has, throughout history, incorporated mathematical thinking and communication into its tools, symbols, and organisational practices, as part of the production of goods and services. However, for the most part, the main objective is to get the job done as efficiently as possible to satisfy a range of stakeholders, be they customers (external, internal, upstream, downstream), employers, shareholders, patients, audiences, and so forth. One obvious consequence is that mathematics tends to become invisible in the technologies of production, including workplace discourses. This review will provide a synthesis of workplace research over the last decade with a view to answering the question of what is known about this 'world of work' in relation to mathematics. What is it that people actually do? And how do they learn there?

Presenter: Dr Gail FitzSimons

Gail was a teacher of mathematics, statistics, and numeracy subjects to adult students in community, industry, and institutional settings in Australia for 20 years, followed by a PhD and post-doctoral fellowship; she is now "retired". She is currently Book Reviews Editor for *Educational Studies in Mathematics*, and researcher for a Swedish project, as well as being on several editorial boards and scientific committees.

BECOMING COMPETENT, CONFIDENT AND CRITICALLY AWARE: Tracing Academic Numeracy Development

Room: WF403

This paper describes the mathematical journey of a mature-aged nursing student as she struggles to become more academically numerate. Within the paper, academic numeracy is defined around three features: competence, confidence and critical awareness of both the context of mathematics and students' own relationship with mathematics. It then uses this definition to describe a course for 1st year nursing students to develop their mathematics skills needed for their degree. A conceptual framework, based on Valsiner's Human Development Theory, is used to trace students' developing understanding of academic numeracy. Finally the paper describes one student, Sally, as she struggles to become more numerate.

Presenter: Dr Linda Galligan

Please see page 11 for information about Linda Galligan.

SOME CORRESPONDENCES AND DISJUNCTIONS BETWEEN SCHOOL MATHEMATICS AND THE MATHEMATICAL NEEDS OF APPRENTICE TOOL MAKERS

Room: WF410

This paper examines the mathematical requirements of toolmaking (a branch of mechanical engineering requiring sophisticated skills in numeracy applied to fine measurements).

Correspondences and disjunctions are found between toolmaking mathematical requirements and the school mathematics curriculum, as evidenced in the New Zealand Curriculum, the Numeracy Development Project and the National Certificate of Educational Achievement.

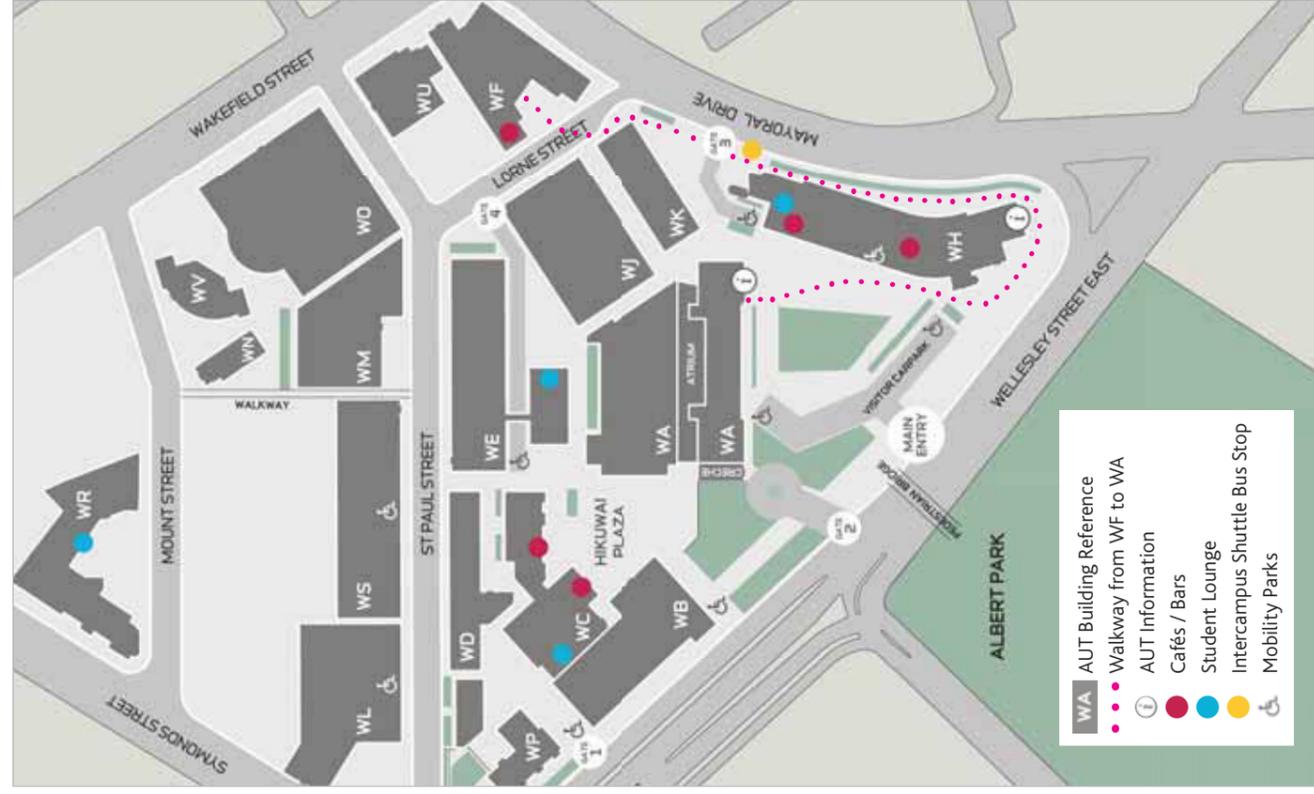
This is discussed in conjunction with interviews with toolmakers and toolmaking educators on what mathematics they use most in practice and how they use it.

While the curricula were found to correspond reasonably well, some important disjunctions were found between school assessment and the thorough knowledge required in the workplace.

Presenter: Kelvin Mills

Kelvin has taught mathematics and physics since 1972, mainly in New Zealand schools, but also briefly in the UK. Early retirement has allowed him to pursue a lifetime interest in how mathematics is used in the workplace. This has led to further academic study. He intends to use the next few years helping young people realise their potential in using mathematics in their workplaces. Kelvin also has interests in history, languages and theology.





| Time | Adults Learning Mathematics (ALM19) |
|----------------|---|
| 12.00 – 4.00pm | Trustees' Meeting Room WF309 |
| 3.00 – 5.00pm | Registration WF Ground Floor Foyer |
| 5.00 – 7.00pm | Mihi Whakatau followed by Welcome drinks and nibbles WF Level 8 Lounge |

WEDNESDAY 27 JUNE

| Time | Adults Learning Mathematics (ALM19) |
|------------------|--|
| 8.00 – 9.00am | Registration WF Ground Floor Foyer |
| 9.00 – 10.30am | Welcome from Dr Sharon Harvey, Head of School, Language and Culture, Deputy Dean (Research and Postgraduate) Faculty of Culture and Society, AUT University and Dr Chris Klinger, Chair of Adults Learning Mathematics. Keynote Address (See page 4 for details) "Mathematical Tribes: Our Wars and Inter marriages" <i>Prof Bill Barton, Maths Education Unit, Department of Mathematics, Auckland University</i> |
| 10.30 – 11.00am | Morning tea WF Level 4 Foyer |
| 11.00 – 11.50am | Presentation Series 1 (See pages 6-7 for details) » Adult mathematics education research in the 21st century: A summary of indexed work from the United States. » Authenticity, Building knowledge and skills and Competency development: The ABC of learning applied nursing mathematics. » Literacy, language and mathematics: Working together in achieving competence in numeracy. » Divergent mathematical pathways: Exploring the mathematical beliefs of young adults. Lunch and networking Room WF410 Room WF411 Room WF413 Room WF414 WA Building Conference Centre |
| 1.30 – 2.20pm | Presentation Series 2 (See pages 8-9 for details) » An emerging framework for an ethnography of adult mathematical and numeracy practice. » Accelerating the development of teacher trainees' mathematical competence – gains and gaps. » Lucky colours of sunshine: Explaining the mathematics of chance gambling. » Working with the reading demands of the numeracy classroom – going beyond word bombs. Presentation Series 3 (See pages 10-11 for details) » Selective ignorance and the adult numeracy conundrum. » "Maths is no longer the ogre I thought it was." Reflecting on the impact of teaching on prison students' learning and understanding of mathematics. » "It's your money they're after!" Using advertising flyers to teach percentages. » Linking statistical concepts to students' real life experiences – a research paper. Afternoon tea Room WF410 Room WF411 Room WF413 Room WF414 WF Level 4 Foyer WF503 |
| 2.30 – 3.20pm | Poster Presentation : Mathematics and statistics teaching and learning community of practice. Topic Group : The synergy between research and practice. (See pages 11-12 for details) ALM Conference Dinner – Four Seasons Restaurant Cash bar open Dinner served WH Building Level 2 |
| 3.30 – 4.00pm | Afternoon tea |
| 4.00 – 5.00pm | Poster Presentation : Mathematics and statistics teaching and learning community of practice. Topic Group : The synergy between research and practice. (See pages 11-12 for details) ALM Conference Dinner – Four Seasons Restaurant Cash bar open Dinner served WH Building Level 2 |
| 6.00pm 6.30pm | |

THURSDAY 28 JUNE

| Time | National Centre Symposium and Workplace Hui | Adults Learning Mathematics (ALM19) |
|-----------------|---|---|
| 8.00 – 9.00am | Registration | WA Building Conference Centre |
| 9.00 – 10.00am | Mihi Whakatau Address: Hon. Steven Joyce, Minister for Tertiary Education | Room WF303 |
| 10.00 – 11.00am | Keynote Address (pre-recorded video) (See page 5 for details) Practice to Work: Literacy, Culture and the Workplace. <i>Prof Stephen Reder, Professor of Applied Linguistics at Portland State University</i> | WA Building Lecture Theatre |
| 11.00 – 11.30am | Morning tea | WA Building Lecture Theatre |
| 11.30 – 12.20pm | Workshop Series 1 (See pages 6-7 for details) » Māori Caucous Māori leadership in literacy and numeracy work. » Catering for adults with dyslexia in my course. » The Four S's – Spammers, Spelling, Sums and 'S'sessment: A brief history of the birth and adolescence of "Spammerman". Workplace Hui (See page 7 for details) » "Is sustainable literacy and numeracy provision possible?" Lunch | Room WF402 Room WF403 Room WF410 Room WF411 WA Building Conference Centre |
| 1.30 – 2.20pm | Workshop Series 2 (See pages 7-8 for details) » Utilising Māori and Pacific pedagogies in literacy learning. A project by Unitec Institute of Technology Te Whare Wānanga o Wairaka. » Technology synergies (and other big words) for more literate and numerate New Zealanders. » The challenges and outcomes from implementing an embedded literacy and numeracy programme in a prisoner vocational training environment. Workplace Hui (See page 8 for details) » Challenge the statistics! | WA Building Conference Centre WA Building Lecture Theatre Room WF402 Room WF403 Room WF410 Room WF411 WA Building Conference Centre |



THURSDAY 28 JUNE continued

| Time | National Centre Symposium and Workplace Hui | Adults Learning Mathematics (ALM19) |
|------------------|---|--|
| 2:30 – 3:20pm | Workshop Series 3 (See pages 9- 10 for details) » Studying adult literacy and numeracy for teaching practice as Māori educator – reflections and potential research. » Measurement estimation and using mini white boards. » Digital contraband – looking at some ways to smuggle literacy using digital technology. » But what's in it for me! Transforming student perception of and participation in literacy and numeracy. Workplace Hui (See page 10 for details) » Extending oral skills in the workplace. | Presentation Series 6 (See pages 15- 16 for details) » Some reflections on adults' numeracy competence from international and national numeracy and mathematical literacy assessments. » How might schools contribute to the poor mathematics skills of adult New Zealanders? » A progress report on an investigation into estimation and spatial sense as aspects of workplace numeracy: A case study of recycling and refuse collector/drivers within a situated learning model. » A workplace contextualisation of mathematics: Visible, distinguishable and meaningful mathematics in complex contexts. |
| 3:30 – 4:00pm | Afternoon tea | Afternoon tea |
| 4:00 – 5:15pm | Symposium Session (See page 10 for details) Invited speakers tell us what they have been doing with respect to adult literacy and numeracy. » Bridging education and industry. » Embedding literacy and numeracy into ITO training materials. » Dyslexia Decoded: What it is, what it isn't, and what you can do about it. » NZ Police: Addressing the Literacy and Numeracy Challenge » Literacy and numeracy in Auckland – New opportunities. » Working in partnership to improve literacy and numeracy. » Supporting the Assessment Tool – Key themes in 2012. Workplace Hui (See page 10 for details) » Action enquiry in workplace practice. | Annual General Meeting |
| 6:00pm 6:30pm | ALM19 and National Centre Symposium Combined Dinner. Cash bar open Dinner served | WF Level 3 and Level 4 Foyers |
| | | WF303 |
| | | WA Building Lecture Theatre |
| | | Room WF310 |
| | | Room WF311 |
| | | Room WF313 |
| | | Room WF314 |
| | | Room WF303 |
| | | Room WF410 |
| | | Room WF411 |
| | | WF Level 4 Foyer |
| | | WA Building Conference Centre |

FRIDAY 29 JUNE

| Time | National Centre Symposium and Workplace Hui | Adults Learning Mathematics (ALM19) |
|----------------|---|---|
| 8:30 – 9:30am | Registration | |
| 9:30 – 10:20am | Workshop Series 4 (See pages 11-12 for details) » He iti pouanamu: Māori philosophical and pedagogical teaching and learning practices and how they can inform workplace literacy and numeracy programmes that value workers, develop skills and strengthen business. » Evaluation of the Learning REPs programme. » Responding to Assessment Tool results in a Level 3 Cookery programme. » Tertiary Education Commission (TEC) expectations of the use of the Assessment Tool. | Presentation Series 7 (See page 17 for details) » Doing mathematics in the workplace: A brief review of recent literature. » Becoming competent confident and critically aware: Tracing academic numeracy development. » Some correspondences and disjunctions between school mathematics and the mathematical needs of apprentice tool makers. |
| | | Room WF402 |
| | | Room WF403 |
| | | Room WF410 |

FRIDAY 29 JUNE continued

| Time | National Centre Symposium and Workplace Hui | Adults Learning Mathematics (ALM19) |
|-----------------|---|-------------------------------------|
| 10:30 – 11:00am | Morning tea | |
| 11:00 – 11:50am | Keynote Address (See page 5 for details) The how and why of measuring success in adult literacy and numeracy: Opportunities and challenges. <i>Prof Diana Cohen, Director of the National Centre of Literacy and Numeracy for Adults and Professor of Education at the University of Waikato, Emeritus Professor of King's College London</i> | |
| 12:10 – 1:00pm | Workshop Series 5 (See pages 13-14 for details) » Ranga – a pedagogical model for Māori adult learners. » Workplace literacy and numeracy programme – Experiences from an employer and provider partnership. » The Midlands Health Literacy Project: Findings from research and implications for practice. » Are we headed in the right direction? From professional development to professional learning. | Closing Session |
| | | Room WF310 |
| | | Room WF311 |
| | | Room WF313 |
| | | Room WF314 |
| 1:00 – 2:00pm | Lunch | |
| 2:00 – 2:50pm | Symposium Address Understanding learner gain from adult literacy and numeracy provision. <i>David Earle and Chris Lane, Ministry of Education</i> | 2.15 – 4:00pm Trustees' Meeting |
| 3:00 – 3:50pm | Workshop Series 6 (See pages 15-16 for details) » Me, Myself, I. » How about literacy classes for literacy learners and ESOL classes for ESOL learners? » Walboost: An intensive academic literacy up-skilling programme for tertiary students. » Deciwire: A cheap method of modelling decimals using drinking straws, washers and curtain wire. | |
| | | Room WF310 |
| | | Room WF311 |
| | | Room WF313 |
| | | Room WF314 |
| 4:00 – 4:30pm | Grab a cuppa and come to the closing session. | |
| | | WA Building Conference Centre |
| | | WF309 |