

Editorial

Mathematics teacher education research: the need for multiple perspectives

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This edition of Mathematics Teacher Education is the first edited by a new team: Dr Jodie Hunter (Massey University), Dr Robin Averill (Victoria University of Wellington) and Dr Fiona Ell (University of Auckland).

We would like to begin by expressing sincere appreciation for the work of the previous editorial team: Colleen Vale, Gaye Williams and Leicha Bragg. This team edited the journal for three years, and has brought the mathematics teacher education community quality research information from around the world during that time. Under their editorship the reputation of the journal has continued to strengthen, through the diverse range of quality articles highlighting many topical issues in mathematics teacher education. We are wiser and better informed for their efforts. We look forward to building on the work of previous teams to continue to strengthen the journal and its impact internationally.

MTED has a significant role in publishing and disseminating new knowledge that advances understanding in the crucial area of creating equitable mathematical educational outcomes through quality teaching and quality teacher education (both preparation and in-service). Our goal is for MTED to be the 'go to' place for teacher educators to understand the 'state of the art' in mathematics teacher education and for being informed about theories, practices, and policies that enhance outcomes for teachers and their learners. We are keen to continue with the great work of our predecessors in seeking and publishing articles on innovative methods and means of inquiry and that encourage robust and reflective thinking.

What mathematics teacher education is, how it is perceived, and topical issues differ as we look around the globe. In countries where student achievement results on international tests are high, mathematics teacher education is appreciated, perhaps even taken for granted; while in jurisdictions where students' mathematics results are of concern mathematics teacher education becomes a contested space with competing ideologies and policies pressing on those who develop teachers of mathematics. In such places mathematics teacher education is positioned as simultaneously the cause of poor mathematics teaching and the solution. "If pre-service and in-service mathematics teacher education had these features, this curriculum, these foci, these structures", the argument goes, "then we would have competent and confident teachers of mathematics". Those of us who work in places with falling student achievement results on international comparative tests, and increasing inequity in the outcomes of our education systems and the life chances of groups of learners, look to research and practice from around the world to help us grow and improve. We aim, during our time as editors of MTED, to provide our community with high quality research work from diverse places and perspectives that give insights about common issues and innovative solutions.

The seven articles in this edition of MTED illustrate the plurality and complexity of mathematics teacher education. Three look at the experiences of teacher candidates in teacher



preparation settings; one considers newly qualified teacher educators and three look at the development of teachers' capacity to teach mathematics. Two of these three teacher-focused articles look at professional learning communities structured around variants of Japanese lesson study. In these pieces we can see how an approach to mathematics teacher education might 'travel' the world, and how it is adapted to suit new contexts. The seven articles report on qualitative studies, which provide rich data and examples to help the reader understand participants' learning and development.

Lee uses structured teacher candidate reflections to explore what teacher candidates notice about teaching and learning mathematics when they are in different roles. The teacher candidates provided reflections on their own past learning as students, on their mentor teachers' practice and on their own teaching using a standard, open-ended format. Analysis highlighted that teacher candidates more often notice teacher factors than student-related factors. This is particularly noticeable when they take on the role of teacher. They tend to use the more positive aspects of the reflection framework (practices to expand and to alter) over the more negative ones (practices to lessen or to drop), especially when noticing aspects of their own teaching.

Focused on a different aspect of teacher preparation, An, Tillman, Zhang, Lesser & Tinajero report on the experiences of pre-service teachers who were asked to plan and implement a lesson that integrated mathematics and music in meaningful ways. Twenty-one pre-service teachers planned, taught and reflected on a mathematics and music lesson, and provided feedback to one another on their lesson plans. Grounded theory was used to analyse the resulting plans, reflections and commentaries, resulting in a complex picture of how mathematics and music were used together. The pre-service teachers chose different content areas in mathematics, and different types of musical activities, producing a diverse set of lessons. Challenges to integration are also presented and discussed.

Pre-service teachers' perceptions of the school mathematics teacher communities in which they are placed for practicum are the focus of the article by, Akkoç, Balkanlıoğlu & Yeşildere-İmre. In a qualitative study they interviewed, and collected journal writing from eight pre-service teachers during a seven-week observation-based practicum. Content analysis was performed using the terms engagement, alignment and imagination, which are Wenger's modes of belonging to a social learning system (Wenger, 2010). Taking a careful look at how an observation practicum might develop pre-service teachers' understanding of what it is to be a mathematics teacher reveals the power of legitimate peripheral participation and observation in shaping pre-service teachers expectations and identities.

Yow argues that comparing the experiences of novice mathematics teachers as they transition into the classroom from their preparation programmes with the experiences of new doctorally-qualified mathematics teacher educators as they transition into university teaching can give us insights into how these transitions might be improved. Using a literature review of newly-qualified classroom teachers and a national survey of 69 doctoral students who were beginning work as assistant professors of mathematics education, Yow explains how both transitions are 'border crossings' between cultures, and from learning how to do something to enacting it. Two themes emerge that are common for both groups: more authentic and relevant teaching experience is needed during the qualification period and mentoring support is essential as people make these key transitions.

The concept of 'pedagogical design capacity' (PDC) is explored by Amador. PDC describes teachers' ability to design and implement lessons using their knowledge and resources. Previous studies have looked at PDC in planning or in teaching, but this paper looks at teachers' PDC from design to implementation. Using a rich data set from four teachers, Amador constructs case studies that show the teachers using curriculum in different ways at different



times and in different lesson sequences. The four teachers emerge with quite different profiles with respect to their PDC and curriculum use. Standardised testing appears to be a key mediator in teachers' decision making about curriculum.

A case study of 16 teachers involved for two years in a professional learning community centred on Japanese-style lesson study is the topic of Gee & Whaley's article. The PLC was formed as a professional development initiative to improve teachers' knowledge of both mathematics content and pedagogy. Using videos where the teachers discussed a video extract from a lesson, teachers' journals and interviews with four selected teachers, Gee & Whaley's coding revealed that collaboration was highly valued by the teachers and that many, but not all, of the teachers reported changes to practice.

Lesseg's multi-layered case of a professional learning community of Year 7 teachers charts the teachers' development of practice through Math Studio, an adapted version of Japanese lesson study. Her focus is on how to develop teachers' ability to promote conjecture, generalisation, and justification in mathematics classrooms through school-embedded professional development. Using video, field notes, artefacts, teachers' plans and questionnaires, Lesseg builds a comprehensive case showing what helped the teachers learn. In particular she focuses on the role of the math coach and the associate principal whose participation in different ways shaped the learning of the teachers. Her commentary on this professional community helps us think about how effective learning communities might be constituted and what features might maximise teacher learning about promoting conjecture, generalisation and justification.

Looking across these seven articles we get a real sense of the breadth of our field, the many different pieces to which we might pay attention and the effort that is needed in order to make sustained change. During our time as editors we aim to provide findings in MTED that will inform our collective practice, stimulate thinking and inspire further cutting-edge research.

Ngā mihi nui
Fiona, Jodie and Robin



