

## *Editorial*

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### Continuing Challenges in the New Millennium

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In the first volume of *Mathematics Education Research Journal*, Sullivan pointed out that "mathematics educators and curriculum developers need to acknowledge the difficulty of translating theory into classroom practices which are feasible, and to identify mechanisms for overcoming inhibiting factors" (1989, p. 1). At the same time constructivism officially found its way into teacher education in Australia through the Discipline Review of Teacher Education in Mathematics and Science (Speedy, 1989). Since that time, mathematics teacher education and professional development in Australasia has seen the rise and eventual questioning of "constructivist" approaches to teaching mathematics (Klein, 1999, p. 84). Papers in the first volume of *MTED* explored issues related to these "constructivist" approaches and offered alternative perspectives on mathematics teacher education and research.

In this second volume of *MTED* a number of papers continue to examine, or rely on, "constructivist" approaches in teacher education. Sandra Frid, for example, explores her personal journey as a mathematics educator who enthusiastically embraced constructivism only to experience the frustration of seeing little impact on the classroom practices of her students or former students. There is however, much variety in the papers in this volume with a number focussing on pre-service teachers at the primary and/or secondary level while there are papers on research with classroom teachers dealing with pedagogical practices and attitudes and beliefs. In addition, two papers address the use of technology in teacher education and one considers curriculum issues in early childhood mathematics teacher education.

Tracey Smith reports on a three-phase action research project conducted in a primary school context. The first two phases sought to identify pedagogical practices of primary school teachers that promoted students' mathematical thinking while the third phase lead to the development of a framework for promoting thinking and understanding in mathematics classrooms. This framework is seen as helping to bridge the gap between theory and practice in mathematics education with implications for both pre-service and practicing teachers.

Two other papers focussing on pre-service teacher education are those by Sandra Frid and Joanne Goodell. Both papers emphasise reflection on practice within teacher education programs and the outcomes of such reflection on the practices of pre-service teachers while undertaking field experience teaching mathematics.

Sandra Frid is concerned with the lack of impact on classroom mathematics teaching of many mathematics teacher education programs that have been based on constructivist principles. By examining the beliefs of primary pre-service teachers she sought to explore the discrepancies between their learning that reflected constructivist views about teaching and learning mathematics and the practices seen amongst students on practicum. She discusses the dilemmas and challenges that arise for mathematics teacher educators in adopting constructivism as a pedagogical framework.

In a large-scale study of primary teachers' beliefs relating to the subject of mathematics, mathematics teaching and assessing mathematics, Nisbet and Warren confirmed many of the theoretical constructs derived from the literature. Their paper explores some of the issues arising from the nature of these teachers' beliefs and the implications for professional development activities and future research.

Joanne Goodell's paper examines a pre-service program for secondary teachers in a North American context. The focus is on learning to teach mathematics for understanding with an emphasis on students being reflective practitioners both in relation to activities undertaken on campus and to their field experience which was an integral part of their methods course. She emphasises the importance of partnerships between the student and school and university personnel in the development of reflective practitioners.

A support mechanism in the form of a web-based resource is the focus of the paper by Anthony Herrington, Jan Herrington and Arshad Omari. This resource was developed for pre-service mathematics teachers on school practicum. The paper highlights some of the key features of the website and shows the potential for such technology in the development of links between the university, pre-service teachers and schools.

Technology of a different kind was used in the study reported by Jan Herrington, Anthony Herrington and Len Sparrow. Pre-service teachers used a multimedia program on assessment strategies within a methods unit of their course that was then followed up while they were undertaking professional practice in schools. Data show encouraging results for transfer from the university classroom to the school classroom but the authors raise a list of issues which still need to be addressed in order to test the lasting effectiveness of this approach to learning about assessment in mathematics.

A different kind of partnership is developed by Maggie Haynes in her paper on a dual curricular approach to teacher education at Auckland College of Education in which early childhood pre-service teachers explore the linkages between the early childhood curriculum, *Te Whaariki*, and the *Mathematics in the New Zealand Curriculum*. She explores possible sources of tension between the two curricula for the pre-service teachers and how these are addressed in the teacher education program at Auckland College of Education.

One area that has created difficulty for students and teachers worldwide is the understanding of decimals. Sue Helme and Kaye Stacey report on an intervention study which introduced teachers and students to a collection of classroom

resources including a new resource - Linear Arithmetic Blocks - designed to enhance children's understanding of decimal numbers and to reduce their misconceptions about decimals. Although the data are from only one school, the results appear to demonstrate the positive impact of a small amount of targeted teaching on learning outcomes. Of particular concern were the low participation rate of schools and teachers in the intervention and the lack of use by teachers of diagnostic data on individual children. The paper does not explore this model of professional development or claim that this approach is preferable to large-scale projects that offer greater opportunity for trialling and reflection but rather attempts to ascertain what is possible to achieve by classroom teachers with minimal support.

Bachelor of Teaching pre-service secondary mathematics teachers' use of intuition and/or formal mathematics in solving a famous sampling problem are investigated in the paper by Jane Watson. The relationships of solution strategy to students' background in formal mathematics and to gender are also examined. Implications for teaching statistics at both the secondary and pre-service teacher education levels are discussed briefly.

The papers in this volume not only reflect a wide variety of concerns with regard to mathematics teacher education but also present a number of frameworks, mechanisms and implications for beginning to translate theory into practice. While pre-existing beliefs of pre-service and classroom teachers continue to be impediments to change it seems that reflection on practice is crucial to the change process. Partnerships between university lecturers, teachers and pre-service teachers also appear to assist. From a pedagogical perspective it is evident that students still experience many difficulties with statistics and decimals. From the research in these areas implications are drawn for improving learning outcomes. With governments talking about establishing online universities it is encouraging and challenging to learn of further developments in the use of the World Wide Web and multimedia in mathematics teacher education and development.

## References

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