

Research in Mathematics Education in Australasia 2004-2007

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SENSE PUBLISHERS
ROTTERDAM / TAIPEI

A C.I.P. record for this book is available from the Library of Congress.

ISBN 978-90-8790-499-9 (paperback)
ISBN 978-90-8790-500-2 (hardback)
ISBN 978-90-8790-501-9 (ebook)

Published by: Sense Publishers,
P.O. Box 21858, 3001 AW Rotterdam, The Netherlands
<http://www.sensepublishers.com>

Printed on acid-free paper

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INTRODUCTION: REVIEW OF MATHEMATICS EDUCATION RESEARCH IN AUSTRALASIA 2004-2007

HISTORICAL CONTEXT

The series of four-yearly reviews of research in mathematics education in Australasia produced by the Mathematics Education Research Group of Australasia (MERGA) had its beginning in 1984, when the then MERGA Executive commissioned the publication of *Summary of research in mathematics education in Australia* (Briggs, 1984) to coincide with Australia's hosting of the 5th quadrennial International Congress on Mathematical Education (ICME).

Over the years, the visionary idea which culminated in the publication of the first review took on a life of its own, renewing itself every four years. In 1992, the scope of the research reviewed extended beyond Australia to encompass all of Australasia; this reflected the expanding membership of MERGA. In 2008, the present review of Australasian research is, for the first time, published by an international academic publisher – SENSE – enabling the recognised, outstanding mathematics education research from Australasia to reach a broader international audience.

The series of MERGA four-yearly reviews has been unique in the sense that it has allowed Australasian mathematics education researchers to take stock of Australasian research in the field over the preceding four years. This provides an intellectual and academic breather from the hustle and bustle of the regime of regularly-published journal articles and papers for annual conferences, including MERGA. This is by no means inward-looking. In fact, in celebrating what has been researched in Australasia and by Australasians, work conducted by colleagues in an international context, either through collaborative research efforts or through their physical presence out of Australasia, is also documented in the review series.

The dates of publication and the editors of the MERGA series of four-yearly reviews to date are summarised in Table 1. With the publication of this, the seventh four-yearly review, the commitment of the series to promote and publicise Australasian mathematics education research is affirmed. To clarify to authors what should be included in their chapters, the following definition of what comprises Australasian mathematics education research was provided:

The editors have defined “Australasian research” as research conducted in Australasia, about the Australasian context, or by Australasians. Australasia

comprises: Australia, New Zealand, PNG, and the Pacific Islands closely allied to Australia and/or New Zealand. Australasian research published in Australasia and in international publications should be included in the review.

Table 1. MERGA 4-yearly reviews: dates of publication and editors

Year of publication	Editors		
1984	Jack Briggs		
1988	Dudley Blane	Gilah Leder	
1992	Bill Atweh	Jane Watson	
1996	Bill Atweh	Kay Owens	Peter Sullivan
2000	Kay Owens	Judy Mousley	
2004	Bob Perry	Glenda Anthony	Carmel Diezmann

Some of the themes included in the MERGA four-yearly reviews have been repeated over successive volumes (e.g., gender and mathematics has appeared in every review since 1984), while others have been introduced or disappeared over the years. The themes found in the various reviews reflect the ways in which mathematics education research has developed and matured in Australasia, and the foci of research interest during particular four-yearly time periods.

CHAPTER IDENTIFICATION PROCESS AND STRUCTURE OF THE BOOK

An open request was sent to members of MERGA inviting expressions of interest to contribute chapters in which a theme or area of the research literature was reviewed. Broad sections were identified including: a focus on teachers as learners; teachers' contemporary practices; what is learnt and how (K-12); non-cognitive dimensions of learning; special learners; and history, policy, and curriculum. Team contributions were encouraged. The purpose of the review is to showcase the research efforts of MERGA members and there is a sense in which the process of soliciting chapters itself reflects the research emphases and priorities of the community. One of the challenges of reviewing the complex body of work that comprises 'mathematics education research' is the necessary categorisation or division that must take place, that is, how do you *slice the pie*? While there was an effort to be comprehensive, this was counter-balanced by the preferences set by the authors through the themes put forward, and the subsequent chapters submitted.

Prospective authors were asked to submit an abstract describing the area of interest and samples of the literature to be reviewed. Once the submissions were received the editors determined potential overlaps and gaps. In some cases a revised chapter with joint authorship was suggested, or a slight refocus to provide a more coherent and comprehensive presentation across all chapters.

While the present review of Australasian mathematics education research includes a number of chapters with similar themes to those found in the most recent MERGA four-yearly review (Perry, Anthony, & Diezmann, 2004 – see

Diezmann, Anthony, & Perry in this volume for more detail on the content of that review), prospective authors did not put forward suggestions for separate chapters with traditional mathematics content. This, in part, reflects a shift in both research funding opportunities and emphases on levels of education, such as early childhood, and subsequently on the learning of specific mathematics content within these contexts. Thus, in this review, the research on content is predominantly found within the chapters focussing on specific grade levels (e.g., early years, middle years).

Surprisingly, an invitation had to be issued for an additional chapter with a focus on research in technology use in mathematics to be written. The reference list from that chapter (see Thomas & Chinnappan in this volume) indicates the extent of the research in this area and the importance of its inclusion. It was intended that a chapter be included that focused on exceptional students, including gifted students and those with special needs. The prospective authors of the chapter subsequently withdrew, citing limited published research in the area during the period, an issue identified by Perry et al. (2004) in the most recent MERGA 4-yearly review of the Australasian mathematics education literature. The area of exceptional children and mathematics learning would appear to represent a gap in the extent of the research undertaken in the area; it was not an oversight in the process for identifying research to be included in this review. A proposed chapter on history, policy, and curriculum suffered a similar fate.

The authors of the previous MERGA 4-yearly review (Perry et al., 2004) were invited to write a chapter reflecting on the four year period, 2000-2003 in which the research reported in their review took place. They were asked to do this to set the scene for the reader with respect for the work reported in the present volume. Ken Clements, a founding member of MERGA and long-time observer of Australasian mathematics education, was invited to write a final chapter to highlight aspects from specific chapters included in the current review, to provide an overview and synthesis of the research presented, and to identify future research directions.

Further to the discussion above of the specific research themes *privileged* through the chapter foci identified and included in this volume, it is important for readers to recognise that there are some idiosyncrasies associated with the conduct of research programs in Australasia. Unlike in some international locations where there are substantial programs addressing specific aspects of content such as fractions or algebra, for example, in Australasia there are often fewer studies addressing specific content areas. This may create an impression that Australasian research in mathematics education is somewhat eclectic. Also contributing to this view is an interest in the social dimensions of education, such as teacher learning or student disadvantage, with some content focussed studies undertaken under such umbrellas. These emphases do not, however, detract from the quality of the research within specific, traditional, mathematics content areas. Readers are reminded that they may need to search across the various chapters for discussions of research within particular mathematical education research fields and content domains of interest.

POLICY AND RESEARCH CONTEXT

One of the characteristics of mathematics education research in the Australasian context has been that many of the studies are unfunded or, if funded, the funding is relatively small. The shortage of funding for sophisticated equipment and additional research assistance can limit the scale of many research studies, and this is reflected in a number of the reports of the research summarised in the following chapters. Also reported here is outstanding research conducted by graduate students. Such studies are generally small scale, both in sample size and in duration. In whichever category the research might be found, neither the scale nor the available financial or resource support limits the rigor with which the research was conducted. This is clearly reflected in all of the chapters included in this review of the Australasian mathematics education literature for the years 2004-2007.

Within the policy context in which the researchers have undertaken their studies, there have been some interesting shifts over the past four years. It is not easy to document all of these. However, considering the field generally, the editors share certain perceptions.

In the period 2004-2007, the national governments in New Zealand and Australia spearheaded the development of accountability measures for research funding and research activity. It should be noted that the New Zealand government has implemented many of the measures described at a faster pace than has the Australian government, but similar directions and outcomes are anticipated. With these developments necessarily comes an increase in bureaucratisation – more forms to complete, more adoption of standardised terminology, for example, more use of sanctioned definitions of “research” etc. The related shifts in the policy context of research in terms of the dichotomies and complementarities can be characterised as described below.

1. *A decrease in creative and idiosyncratic research v. an increase in programmatic research.*

In a healthy national research-supportive environment one would expect that both kinds of research would receive adequate funding and similar emphasis – programmatic research may produce useful data, but creative research is also needed, particularly in a field like mathematics education where the context and conditions are changing with increased rapidity. Developing creative research is always much more difficult but is equally necessary.

2. *A decrease in individual research v. an increase in group or team research.*

Both for purposes of funding, and also because of governmental pressures to define research groupings within universities, the pressure is on to reduce the significance of individual research. There are of course good reasons for encouraging group or

team research, particularly in a mixed discipline field such as mathematics education. However PhD research, one of the main sources of research ideas, is emphasised as a largely individual matter, and whilst research training is a strong part of a PhD program, it is still possible, and we would think highly desirable, to be developing a next generation of individual, and creative, researchers.

3. *A decrease in funding for basic research v. an increase in funding for practice-oriented projects.*

With a growing concern about the teacher shortages in mathematics, together with a (dubious) perception that standards of mathematics learning in schools are lower than governments would wish, has come an increase in funding for in-service and practice-oriented projects, such as the Australian Schools Innovation in Science, Technology and Maths project (ASISTM). A related development can be seen in New Zealand where in-service initiatives are more closely linked to research and where there is an increased expectation that any findings will be published in research contexts. One example comes from the annual publication on developments with the national Numeracy Development Project, which are now called *Findings from the New Zealand Numeracy Development Projects*. Whilst this overall shift is no bad thing, and many researchers are assisting with these programs, it is still the case that imaginative, basic research needs continuing support. In-service, practice-based work is not research, and whilst in-service is aimed at the immediate teaching context, research has inevitably a longer term perspective.

4. *A decreasing concern with the quantity of research v. an increasing concern with the quality of research.*

This has been formalised nationally in New Zealand where the Performance-Based Research Fund (PBRF) regime was trialled in 2003, and the first full 6-year cycle was completed in 2006. In Australia also there has been much preparation for the introduction of a Research Quality Framework system, which has now been put on hold by the newly elected national government. It is however likely that it will return in some form in the future. Whilst these moves have brought many concerns about ways to judge research quality, on a more positive note, there may well be useful lessons to be learnt about weaknesses of peer evaluation of research and about worthwhile criteria for judging quality. Within universities academics have been used to accumulating their research references and credentials, almost with the ‘publish or perish’ maxim implying that more is better. Now we see a greater concern for judging one’s own ‘best outputs’, the ‘impact’ of one’s research and the development of similar qualitative criteria. No bad thing, one may say.

We believe that growth, not a decline, is likely to be seen in these shifts over the next four years, and it will be interesting indeed to speculate on how this will affect the research outcomes over the next four years.

FINAL COMMENTS

We hope that in reading this review, insights into the range of research undertaken in Australasia in the period 2004-2007 will be gained. The process of summarising, reviewing, and critiquing research over an extended period provides the potential for building informed, cohesive, and focused future research agendas. This is particularly important in a context where individual researchers are trying to work across institutions or with international colleagues, and when students are often isolated from a substantive research community. Such a process can highlight the gaps that exist in the foci and extent of the research undertaken, and thus what has been highlighted in the various chapters in this volume. We encourage readers to examine critically the research presented, recognise the constraints under which the researchers have worked, and ensure that these issues are taken into consideration in planning future research projects in which needs, not tradition or external demands, are guiding principles.

Finally we commend the research efforts of our colleagues, the high quality of their published research, and their willingness to author chapters in this volume, continuing a long and important tradition established by MERGA of sharing and critiquing Australasian mathematics education research.

ACKNOWLEDGMENTS

The editors wish to acknowledge the financial support of MERGA in the production of this volume. We thank Anne Bult for her assistance in working with the Sense template and her careful proofreading of each of the chapters. We are also most grateful to reviewers for their constructive comments that contributed to the final quality of each chapter included in the book.

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INTRODUCTION: MERGA RESEARCH REVIEW

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