

Book Reviews

Clements, M. A. (“Ken”); Ellerton, Nerida F.:

Mathematics Education Research Past, Present and Future

Bangkok: UNESCO Principal Regional Office for Asia and the Pacific, 1996. – 252 p.

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All of us engaged in mathematics education benefit from being made aware of research in the area. From time to time we need to pause and take stock, as it were, to re-view something of past attempts, past achievements and changed perspectives and emphases in research. Such surveying actions help us to see practice in the contexts of under-pinning theory and cohesive relationship. We need to know where mathematics education has been, is currently at, and might move to.

There have been quite a number of published surveys of research in mathematics education which have been of help to teachers and researchers in these regards. Several which spring to mind are Shumway (Ed.), *Research in Mathematics Education* (1980), Bell et al., *A Review of Research in Mathematics Education*, 3 volumes (1983), Neshet and Kilpatrick, *Mathematics and Cognition* (1990) and Grouws (Ed.), *Handbook of Research on Mathematics Teaching and Learning* (1992). Whilst each of these publications has its own distinctive approach to reporting on, and critically commenting on, mathematics education research, there is a commonality with respect to the developed categorisations and the spectrum of coverage. And overall there is an overwhelming focus on research carried out in the UK, North America and Europe. This comment is not to be taken as a criticism of the publications; it merely acknowledges that these geographic regions are where most published research takes place. It is a statement of fact that the publications give little, if any, direct consideration to research and teaching matters in the Asian region. Implicit in the general focus of each publication is the belief that mathematics education research is universal in its nature and application; implied but not directly stated. And here is where the text under review is different. The authors of *Mathematics Education Research: Past, Present and Future* (1996), Clements and Ellerton, claim that their’s “is the first book ever to be written

where the main focus is mathematics education research in the Asia-Pacific region”. I believe that this claim can be substantiated. Furthermore, with the focus intended to produce the greatest benefit to mathematics educators in the region, both researchers and teachers, it is inevitable that a number of foundations of research based on North American or European views of education should be critically questioned. The resulting treatment by the authors makes the book both a very valuable addition to the mathematics education literature as a ground-breaking work yet, to some educators, a controversial one. It must be said that the authors are experienced, well known and highly respected researchers and teachers internationally, including in many Asian countries.

1. Contents

The book is structured around seven chapters titled as follows:

Chapter 1: *Towards a balanced perspective on contemporary mathematics education research* (30 pages). The chapter contents treat

- What is mathematics education, and what is mathematics education research?
- Culture, mathematics, and mathematics education
- Critiquing the traditions of mathematics education
- Can mathematics education research be justified?
- Towards more balanced mathematics education research programs
- Mathematics education research in the Asia-Pacific region: structural and organisational framework
- Purposes of the present book.

Chapter 2: *What are “the basics” in mathematics education?* (27 pages) treating

- The politics of mathematics education
- “The last bastions of academic standards”
- Newman error analysis research, and implications for the issue of “what is basic”
- The death of proof in school mathematics
- Concluding comments.

Chapter 3: *Historical trends in mathematics education research: 1950-1980* (20 pages) with contents

- Overview
- The rise and fall of the “new math(s)”
- The rise and fall of behaviourism in mathematics education
- The psychology of mathematics education movement

- Statistical significance testing in mathematics education research: some historical perspectives.

Chapter 4: *Modern trends in mathematics education research (since 1980)* (30 pages) giving consideration to

- Mathematics education research changes direction
- The relativist challenge and the growth of constructivist ideas
- Mathematics as a pan-cultural phenomenon
- Constructivism and mathematics education research
- Anthropological investigations into the cultural contexts of mathematics education
- Mathematics education in the Asia-Pacific context
- Changing patterns in mathematics education research.

Chapter 5: *Research and the mathematics classroom: the move towards action research* (25 pages) with treatment of

- Research versus policy
- Action research and the ownership of change
- False advocates of action research in education
- Action research and traditional education research
- Five case studies: action research in action
- Conclusions
- Ethical issues.

Chapter 6: *Pencil-and-paper tests and mathematics education research* (24 pages) with consideration of the following

- Introduction: historical perspectives
- Questioning the role and format of examinations
- Assessment, pencil-and-paper tests and mathematics education research
- Towards more authentic criteria for measuring achievement in mathematics education research.

Chapter 7: *Reconstructing the international mathematics education research agenda* (31 pages) arranged around the structure

- Overview
- Technology and the brave new world in education
- Lessons from Indonesia
- Towards a wider perspective for mathematics education
- Questioning the agenda and methods of contemporary mathematics education research
- Ten *problematiques* for mathematics education research
- Concluding comments.

There is a comprehensive section (53 pages) for references, an author index and a subject index. The entries related to the Asia-Pacific region are extensive.

2. Some general impressions and reactions

“Concise”, “cohesive” and “well structured” are apt descriptors of the written text. The material through which issues are developed is well researched and compellingly marshalled to support any argument related to the issue at hand. The authors are not intent on producing some “bland” report concerning research and its uses. Rather, they are intent on identifying shortcomings of elements of Western research to arrive at what they believe to be research procedures and a research agenda appropriate to countries of the Asia-Pacific region. This mission requires a thorough knowledge of international research as it is

practised, a clear understanding of much of the educational demands and needs of Asia-Pacific countries and a preparedness to pay close attention to the development and ultimate articulation of advocated actions. In these regards, the authors are well qualified to undertake the mission. In my view, the mission has been accomplished to an extent that this book makes an important contribution to mathematics education research review and analysis. Further, the recommendations which the book contains should spark controversy and debate among researchers and educational decision makers in many areas of the world, not solely in the Asia-Pacific region.

It is neither possible nor, perhaps, desirable to attempt to give anything like a detailed commentary on the various chapter contents and considerations. Space alone would prevent this! I will, however, make at least a passing reference to two chapters; Chapters five and seven. Chapter 5: “Teachers as Researchers” has, as its central thrust, the recommendation that action research is the most appropriate mode of research for the Asia-Pacific region. The authors take this position after due consideration has been given to traditional research procedures and a “definition” of action research which places it as a situational and contextual action rather than just “another” research approach. And further, say the authors, “... much of education research is potentially of little value unless it is linked to, or embedded in, an appropriate action research context” (page 122). But, importantly, the authors also point out that action research is enhanced if it is properly informed by the results of traditional education research. At least one of the nations in the Asia-Pacific region, namely Malaysia, has adopted action research on a wide scale. Chapter five contains much which is essential to what appears in Chapter seven. Or, put differently, views which the authors express in Chapter 5 are major determinants of stances which are taken in Chapter 7.

In Chapter 7: “Reconstructing the International Mathematics Education Research Agenda”, following consideration of relevant, well chosen supporting material and examples, the authors identify what they call “Ten Problematiques for Mathematics Education” and make ten linked propositions which, in effect, challenge mathematics education research communities to set a new agenda for individual and collective actions. In concluding this review, it is worth presenting the propositions. The propositions are:

Proposition 1: Many outdated assumptions influence the way school mathematics is currently practised. The identification of those assumptions which most urgently need to be questioned represents the first, and perhaps most important, *problematique* of contemporary mathematics education research.

Proposition 2: Those concerned with mathematics education need to develop ways of investigating claims that: (a) mathematical knowledge, skills, relationships and principles are characteristically hierarchical; and (b) the main concern of school mathematics is preparation for higher level mathematics courses.

Proposition 3: The implications for mathematics education of the fact that many mathematics learners are bilingual or even multilingual urgently need to be explored.

Proposition 4: The assumption that it is reasonable to accept a form of mathematics education which results in a large

proportion of school children learning to feel incompetent and helpless so far as 'Western' Mathematics is concerned, should be rejected. Alternative forms of mathematics education, by which value would be accorded to the cultural and linguistic backgrounds of learners, should be explored.

Proposition 5: The implications of situated cognition research for mathematics curricula, and for teaching and learning of school mathematics, needs to be investigated in creative ways.

Proposition 6: The idea that the best mathematics education research is that which is based on a coherent theoretical framework should be subjected to careful scrutiny. Furthermore, popular existing theories for which strong counter data have been reported, should either be abandoned immediately, or substantially modified.

Proposition 7: A suitable framework for achieving a more unified and systematic approach to mathematics education research is needed. One possible approach would focus on research programs which linked (a) the histories of mathematics and mathematics education; (b) mathematical understandings and achievements in different cultures; (c) the influences of culture on young (pre-school) children's conceptions of mathematics; and (d) the impact of schooling on learners' conceptions of mathematics.

Proposition 8: Closer research scrutiny needs to be given to the issue of how achievement is best measured in mathematics, and pressure should be exerted on education systems, testing authorities, mathematics competition directors and, indeed, mathematics education researchers themselves, to apply the findings of such research.

Proposition 9: Practising teachers need to be involved, as equal partners, in mathematics education research projects, and the theoretical assumptions and practical approaches in such projects should not be predetermined by outside 'experts'.

Proposition 10: The present international mathematics education research community needs to move proactively so that full and equal participation is possible for mathematics educators in countries which are currently under-represented in the community."

I believe that this book could well have a significant influence on the practise of mathematics education research. The proposals, together with supporting materials and arguments from which they arise, are well worth consideration by mathematics education professionals in general, and those from the Asia-Pacific region, in particular.

3. References

- Bell, A. W. et al. (1983): A Review of Research in Mathematics Education (3 volumes). – Slough, UK: NFER-Nelson
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