

Book Review

Alive and Well: A Review of Reviews of Mathematics Education Research in Australasia¹

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Bill Atweh, Kay Owens, and Peter Sullivan (Eds.). (1996).
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Research in Mathematics Education in Australasia 1992-1995 is, in the first instance, a testament to the extensive and wide-ranging research in the field emanating from Australasia, and to the success of the Mathematics Education Research Group of Australasia (MERGA) as the major organisation giving voice and impetus to such activity. The book is the product of reviews of research work in mathematics education in Australasia published between 1992 and 1995, with a lengthy reference list at the end of each chapter (notwithstanding references to the same research article in a number of different chapters). As a text with the major purpose of indicating the "scope and focus of mathematics education research conducted in this part of the world and to identify sources for researchers who may wish to examine particular aspects of the research in more detail" (p. 1) it meets its goal admirably. It is indeed a "comprehensive guide to research" (p. 5) and thus an invaluable resource, particularly for newcomer researchers who need to access what has been done, by whom and where.

The fifteen chapters are arranged into four main parts, starting with the broad context in which mathematics education is located and hence through which it needs to be interpreted; then becoming more and more specific as the chapters move from research into curriculum and instruction, to teacher and adult education and, finally, to topic areas in mathematics such as early arithmetic, algebra and geometry.

The book begins with brief introductions to MERGA and its goals. This is

¹Available from the MERGA office (see inside front cover) for A\$25 plus A\$20 overseas postage if applicable.

followed by an introduction to the book by the editors, who provide a chapter by chapter summary where each area covered in that chapter is briefly described and key aspects pulled out for attention and comment. So, what can a review of reviews add that is not already said in the introduction to the book? The simple answer here is, not much. For this reason, I will not provide, as part of this review, a summary of the book. Instead, I will comment on the four parts of the book from my position as a mathematics educator who is not directly involved in Australasian research; who is concerned to understand and explain issues of equity and justice and the enabling of access to mathematical knowledge; and who is concerned with the growth, diversification and quality of the mathematics education field.

It is noteworthy that the first section of collected reviews in Part I is focused on the context in which mathematics education is located. Upfront is a bold statement to researchers of the significance of context in mathematics education research². The four chapters here provide descriptions and overviews of research activity in mathematics education where a knowledge-power nexus is assumed and where social, cultural and political questions are the primary focus of attention. Chapter 1 is most explicit in its perspective that the individual and the socio-cultural context are mutually constitutive—which in turn implies this as a necessary base for understanding and interpreting difference, be it gender, cultural, linguistic or in relation to constructs like “ability”. Chapter 1 usefully provides an analysis of the range of theoretical perspectives that inform context-focused research in mathematics education, and hence an interpretive framework for this growing area of study. Chapters 2, 3 and 4 deal with ethnomathematics (cultural questions), gender and the politics of curriculum construction respectively. All review research that raises the problems of access to mathematical knowledge and related power relations. In Chapter 4, issues of power and access are extended beyond learner access to mathematical knowledge to reveal contestations over curriculum construction, particularly in Australia and New Zealand, within the profession and between professionals and government.

That social and cultural contexts are key in mathematics education research is then evidenced through a range of chapters in the rest of the book where issues like gender are visited in, for example, research on the teaching and learning of geometry. Over and over again through the book, contextual factors are recognised by researchers for whom this was not an explicit focus of attention. The authors of Chapter 1 nevertheless argue cogently that many of the studies that embrace contextual factors remain within dominant psychological discourses. What Chapter 1 offers is a “redefining of context within a sociological framework” where there is a legitimisation of “the integral role of context in the construction of meaning” (p. 32).

That said, I note with interest that in Chapter 1 which sets this contextual frame, very few of the papers reviewed have been published outside Australasia,

²By way of contrast, the order of sections in the recent international handbook of the field (Bishop, Clements, Keitel, Kilpatrick, & Laborde, 1996) is reversed, with mathematics specific chapters first.

with most actually residing in MERGA proceedings. The authors openly discuss how the challenging of dominant discourses entails “working at the margins” (p. 32) and the location of the papers in this review chapter is indicative of the marginal position of sociologically informed mathematics education research in a field dominated by psychological discourses. Nevertheless, as is implied throughout the chapter, Australian researchers have much to offer the growth of knowledge in this area. Hopefully the next MERGA review will reflect a wider dissemination of critical and sociologically informed research in the field.

A focus on “learning and instruction” in the five chapters in Part II (or what I prefer to call “learning and teaching”, in the sense of *Obucheni*—the single Russian word for both learning and teaching—where these are understood as deeply inter-related in complex ways) is brought out through overviews of constructivist-based research, research on cognition and instruction, advanced mathematical thinking, problem solving, and language factors. The linking thread through these chapters lies in the shared interest in mathematical thinking across the research reviewed. That interest in and research from a constructivist perspective flourished in Australia in the period 1992-1995 reflects the zeal with which this perspective on knowing mathematics has been taken up internationally. Constructivist discourse in mathematics education connects with learner- or student-centred discourses prevalent in wider educational discourse. The value of the first chapter in this section lies in its presentation of the growth of the field as well as the emerging cracks in what might mischievously be referred to as the uncritical and perhaps ideological embracing by the mathematics (and science) education research community of a perspective that privileges the learner and his or her private and diverse ways of knowing.

As the authors of the chapter point out, most constructivist research is focused at the primary level, reflecting convergence of primary mathematics with learner-centred approaches. As the level of mathematics rises, so the tensions between curriculum activity that is simultaneously subject- and learner-centred become more significant. Moreover, the disjuncture between claims from research on learning as construction with all its curriculum implications and their realisation in practice is also becoming more evident. As Cuban (1993) argues, teaching-learning practices in school are highly resistant to change, suggesting again the importance of context as integral to meaning construction. Reinterpreting a constructivist perspective and learner-centredness at more advanced levels of mathematical learning and teaching, and in critical engagement with practice, must be ongoing challenges for mathematics education research, both of which might well be assisted by the notion of “critical constructivism” (p. 128).

There are some overlaps in research reviewed in the next two chapters on cognition and instruction and problem-solving. This is not surprising since both have links with constructivist perspectives, but problem solving has clearly been an active area of research in Australasia between 1992 and 1995. The popularity of research on problem solving at this time is undoubtedly linked to curriculum initiatives in mathematics education worldwide towards more flexible learning and problem solving activity. This chapter is indeed a comprehensive guide to researchers in this area in Australasia. I was nevertheless surprised at the small number of research papers that focused on context and applications. There is a

great deal of research elsewhere that raises the problem of context in problem solving, reflecting again a focus on mathematical activity. This area would, in my view, include the “in and out of school mathematics” debate, as has been so effectively illuminated by Boaler (1997). What is implied here is perhaps an under-theorisation of problem solving in the mathematics education research reviewed in this chapter.

That language and thought are deeply related needs no rehearsing. Here lies the linking of the fifth chapter to the other four in Part II. However, the field covered by the authors is much broader. The review spans studies on classroom discourse; reading, writing and speaking for mathematical learning; cooperative learning; and mathematical learning in bilingual settings. The contribution of Australian-based research to the field of mathematics and language is clear in this chapter with its lengthy reference list. The contribution includes development of frameworks for researching and understanding the broad and complex inter-connected fields attached to “language and mathematics”, with the authors arguing the fundamental importance of culture in any interpretation of language and mathematical learning. Yet, I am left unsatisfied with the way culture is theorised in this chapter. Instead of culture as complex lived practices in multiple contexts, we have a fragmenting into discrete elements that include conflict (where western and aboriginal cultures are reified into singular conflicting sets of practices), sociolinguistics and language games, and classroom culture. Researching the complex relationship between mathematics and language is indeed a challenge, and clearly researchers in Australasia have already made a substantial contribution. As the authors conclude, “much remains to be done” (p. 221)—including, I would add, an interrogation of meanings of culture used by researchers in the field of mathematics and language.

Part III combines research in teacher and adult education unified, if unstated, by the notion of lifelong learning. The review on teacher education points to the need for “new research and new perspectives” in this area, while the review of adult education reflects, as the authors describe, the relative infancy of this area in mathematics education research. Herein lies not only a review of the field at present for researchers, but also an invitation to cast new perspectives and open new arenas.

Finally, in Part IV, we move to research on the teaching and learning of key areas of school mathematics: early arithmetical learning; space, shape and geometry; stochastics; and algebra. Here lies the heart of a great deal of ongoing research in the Australasian mathematics education community, and a reflection of its wider dissemination in educational journals outside mathematics education per se. Here the specificity of mathematics and its learning and teaching in school is the object of attention. What emerges across all four chapters is an interest in the potential of technology in mathematics learning at all levels. The most extensively researched and reported area is geometry and, as expressed in the introductory chapter of the book, the chapter reviewing research in geometry makes clear the Australasian contribution to this field. In contrast, the quantity of research on stochastics reflects its later entry into the curriculum. This again points to openings for new researchers, more so because the learning and teaching of statistics and probability presents the opportunity and challenge of working with dual goals of

acquiring knowledge and skills in stochastics and at the same time enabling critical interpretation of the formatting power of mathematics in society.

It is apt that the book ends with the overview of studies in algebra, which is such a fundamental part of mathematical knowledge and the school curriculum, because we continue as a community to struggle with enabling the entry of many students into this quite specific discourse. As is to be expected, research reviewed in this chapter focuses on whether and how we could teach areas of algebra better; whether and how movements between concrete materials and abstract representations could enhance meaning and learning; whether and how dynamic technology can play a role; and what the advent of machines which so easily carry out algorithmic functions means for the curriculum.

In conclusion, as this review of reviews reflects, research in mathematics education in Australasia is indeed alive and well! This book will be an essential guide, especially for newcomers to mathematics education research in Australasia. Its use by those further afield will be dependent on whether libraries elsewhere carry MERGA proceedings. Situated as I am in South Africa, a context of rapid social and political transformation, where issues of participation and voice are already and always upfront on the educational agenda, I must close with a question. As I read the reviews and enjoyed exposure to the length and breadth of research by a vibrant, critical and active community, I found myself asking, "In whose voices is this growing collective discourse?" As an outsider, I do not have an in-depth and personal knowledge of the Australasian mathematics education research community. I do not know its insiders and outsiders, or in Lave and Wenger's (1991) terms, its newcomers and oldtimers, its peripheral and full participants, the marginalised and the dominant. For example, are bilingual speakers participants and authors in this aspect of research? Does this matter? Perhaps these questions will find their way into the much anticipated next four year review.

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