Mathematics education research in South Africa – a review and critical reflection

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Our goal

To build from the 2000 – 2006 survey on mathematics (and science) education research in SA, through

- a survey of research in mathematics education published 2007 – 2015
- to consider and critically reflect on how our field is growing and in what directions.







Overview of presentation

- 1. What were key questions, foci and findings in the 2000 2006 review, and proposed agenda for going forward?
- 2. What did we do in the 2007-2015 review?
- 3. What findings, and their relation to the 2006 review and proposed agenda?
- 4. What else did we see and find important to present and reflect on?
 - "new", "emerging" journals and marketisation of publishing







1. 2000 – 2006 review

AJRMSTE

Special issue

2009

AFRICAN JOURNAL OF RESEARCH IN MATHEMATICS, SCIENCE AND TECHNOLOGY EDUCATION

> SPECIAL ISSUE Edited by Mamokgethi Setati, Jill Adler and Marissa Rollnick

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PAGE

5

28

47

65

81

Editorial Marissa Rollnick, Jill Adler and Mamokgethi Setati

ARTICLES

Mathematics and science education research, policy and practice in South Africa: What are the relationships? H. Venkat, J. Adler, M. Rollnick, M. Setati and E. Vhurumuku

Mathematics and science teacher education in South Africa: A review of research, policy and practice in times of change J. Adler, C. Pournara, D. Taylor, B. Thorne, and G. Moletsane

Issues of teaching & learning in South Africa: A disjunction between curriculum policy and implementation A. Lelliott, W. Mwakapenda, M. Doidge, J. du Plessis, M. Mhlolo, A. Msimanga, F. Mundalamo, M. Nakedi and L. Bowie

Research on multilingualism in mathematics education in South Africa: 2000–2007 M. Setati, N. Chitera, and A. Essien

Positions and purposes for contextualisation in mathematics education in South Africa H. Venkat, L. Bowie, and M. Graven

The nature of science and indigenous knowledge systems in South Africa, 2000–2007: A critical review of the research in science advection







Key questions

- Concern with state and status of research in mathematics and science education in South Africa
 - What is being done (research priorities), how, by whom, where ...
- In particular research-policy-practice relation
 - Does our research influence policy? How does it speak to practice?
 - Different communities, interests, priorities, discourses
 - What is our role (as researchers and teacher educators) in (re) building mathematics education, particularly in SA but also across our countries?
 - How does our location in universities both facilitate and impede an active and fruitful role?







Journals surveyed for maths review

Local journals

- Pythagoras
- African Journal of Research in Mathematics, S
- Journal of Education (JoE)
- Perspectives in Education (PiE)
- South African Journal of Education (SA JoE)
- South African Journal of Higher Education (

International journals

- Educational Studies in Mathematics (ESM)
- For the Learning of Mathematics (FLM)
- Journal for Research in Mathematics Educati
- Journal of Mathematics Teacher Education ().
- Mathematics Education Research Journal (MEN
- Journal of Curriculum Studies
- Journal of Education for Teaching: International Research & Pedagogy





What was not reviewed

Books and book chapters

- •Conference proceedings (refereed too)
- •'Other' published research reports e.g. CDE, SA TIMSS
- many other' journals, some maths ed might be in these, many international (e.g. Curriculum, teacher education, educational research, education development and many others)



Number of papers reviewed 2006 Total=150









Findings: clusters

- Curriculum reform and implementation
 - IKS, relevance in mathematics
 - Learner centred practices
- Teacher education
- Language Multilingual learners and learning context

Reminder (and reflection) of context







Findings and research agenda

Connections

- Access and equity the overarching driver
- While qualitative and small scale studies predominate, they do connect (e.g relevance and language: and both with curriculum reform – and so links with policy and practice)
 – and so accumulate
- With international research

Gaps

- Large scale
 - Primary, teriary







Findings and research

Qualitative bias

- strengths (practice)
- weaknesses (policy e.g. language)

Dominance of secondary level, urban studies

- a function of location of researchers "transformation"
- a problem given "mismatch between learner levels ... and curriculum demands ... in late primary and early secondary", and in rural settings

Impact

 Points to need for quality (valid) assessment items, processes







Established, thriving, connected, communities with concerns for access and equity and impact on policy and practice

that are also fragile







2. 2007-2015 Review

What did we do?







Current context – some comments

- From curriculum reform (policy implementation) and a transformation agenda (access, equity)
- TO
- Performance and quality within and equity agenda

Within an increasingly financially constrained and higher education context







Questions guiding the review

- Has the research community continued to grow?
 - In what ways?
 - Is it still 'fragile'?
- Have the foci and questions changed?
 - In what ways? What is the same? Different?

- What is being done (research priorities), how, by whom, where ...
- Does our research influence policy? How does it speak to practice?
 - Different communities, interests, priorities, discourses
- What is our role (as researchers and teacher educators) in (re) building mathematics education, particularly in SA but also across our countries?
- How does our location in universities both facilitate and impede an active and fruitful role?







The scope of the review

Peer reviewed research papers 2007-2015

- International mathematics education research journals
- National/regional (local) both mathematics education and general education

Again – selection - not full comprehensive review







Journals – overview 1

Publication Title	No. of articles: 2007-2015	
Educational Studies in Mathematics (ESM)	9	
For the Learning of Mathematics (FLM)	8	
International Journal of Educational Development	7	
ZDM	6	
International Journal of Science and Mathematics Education (IJSME)	5	
Mathematics Education Research Journal (MERJ)	5	
Journal of Mathematics Teacher Education (JMTE)	4	
Journal for Research in Mathematics Education (JRME)		
Research in Mathematics Education (RME)	1 63	
Pythagoras	98	
AJRMSTE	65	
Education as Change	22	
South African Journal of Education (SAJoE)	17 25	
Perspectives in Education	18	
urnal of Education, Natal	10	
South African Journal of Higher Education	9	
150 over 7 years 285 over 9 years More and special issues,	285	
	Publication Title Educational Studies in Mathematics (ESM) For the Learning of Mathematics (FLM) International Journal of Educational Development ZDM International Journal of Science and Mathematics Education (IJSME) Mathematics Education Research Journal (MERJ) Journal of Mathematics Teacher Education (JMTE) Journal for Research in Mathematics Education (JRME) Research in Mathematics Education (IME) Pythagoras AJRMSTE Education as Change South African Journal of Education Vurnal of Education, Natal South African Journal of Higher Education More and special issues, New journals,	

Connect

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Journals – overview 2

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What was 'captured' for analysis Spread?

- Author(s) and affiliations (who and where)
- Title and year

Policv implementation? **Oualitative?**

- Problems and methods (*what and how*)
- Participants (*Teachers, Learners, other e.g.* Is gap textbook) closing?
- Focus level (primary, secondary, tertiary)

- topic (specific?)

Results/main argument/findings







3. 2007–2015 review

What did we find?







Authors 1: Affiliations

SA Universities/institutions	1st autho	or	all/total
University of the Witwatersrand		68	
University of KwaZulu-Natal		56	61
University of Pretoria	rsities dominant	24	31
University of South Africa Universities wit	Universities with large mathematics		23
Stellenbosch University	education departments and undergraduate teacher education programmes – more researchers	16	21
Rhodes University		16	20
University of Cape Town		14	20
North-West University		8	11
Nelson Mandela Metropolitan University		8	10
Cape Peninsula University of Technology		6	10
Tshwane University of Technology		4	7
University of Johannesburg		5	5
University of the Free State		5	5
Durban University of Technology		2	5
University of the Western Cape		1	5
Central University of Technology		4	4
University of Zululand		2	2
University of Fort Hare		0	1
Walter Sisulu University		0	1



Greater spread of institutions and

authors – growing community





Authors 2: (Co)Authoring

% of papers to # of authors

















Methodology









Participants









Participants - Level









Maths topics









Teachers 1. Identity, Knowledge, Teaching









Teachers 2. PCK/SMK









Teachers 3. P/S









Growth? Changes?

- Quantitative growth community further established and expanded
- Similar patterns dominance of
 - Local publications
 - Secondary
 - Small scale
 - Research universities ... BUT
- Emergence of primary and some tertiary
- Greater emphasis on teachers' knowledge, particularly PCK, reduced emphasis on 'relevance', 'learner-centredness', shift to more emphasis on learner thinking







Tentative explanations

- Shifting context reform to performance (and focus on teachers' knowledge)
- New Chairs in Primary Mathematics
- Location of researchers in universities and in teacher education
- Limited (though increasing) reputable international journals, and limitations e.g. time lag







Our challenge

- Has qualitative growth accompanied quantitative growth
- What criteria do we use to answer this? Who decides?

• What is the purpose of our research? Who? What is it for?







4. What else did we "see"

And reflect on?







Our location, pressures to publish

- Other 'emerging' international journals
- Awareness through special issues notifications, review processes (promotions, NRF rating, job applications)

A Story

Predator conferences and publishers on the increase

- Some ompletely bogus
- Some "suspect"
- Market response to our pressures driven by profit







Our location, pressures to publish

- Other 'emerging' international journals
- Awareness through special issues notification only maths large not only maths large

Same publisher

- 2014 & Special issues and increasing number of issues per year
 - Now monthly; with up to 20 papers an issue

Contrast with

Pythagoras 98 and AJRMSTE –

65 in 9 years

General educ journal – not only maths - large number of issues per year and apers per issue

anguage)

e (IJES)

44







Journal

Authors 1. Universities

SA Universities/institutions	1st author	all/total
University of South Africa	14	15
Durban University of Technolog	3	4
University of Fort Hare	3	3
University of KwaZulu-Natal	3	3
University of Limpopo	3	3
Central University of Technology	2	2
University of the Witwatersrand	2	2
University of Venda	2	2
Vaal University of Technology	2	2
Cape Peninsula University of Technology	1	1
Nelson Mandela Metropolitan University	1	1
North-West University	1	1
University of Johannesburg	1	1
University of the Western Cape	1	1
University of Zululand	1	1
Walter Sisulu University	1	1







Authors 2. Int'l Collaboration









Methodology

% of type of methodology in OJ

63,6



Our challenge

- Has qualitative growth accompanied quantitative growth
- What criteria do we use to answer this? Who decides?

• What is the purpose of our research? Who? What is it for?









- Time lag with review and revision process in many journals including local journals ...
- Gate-keeping and exclusionary







Our purpose is to

- influence policy and practice
- through rigorous, credible research
- influence the international terrain

And so our question then is how do we work to not become victims of predatory practices, but rather agents in improving our field?





