

Mathematics is a loaded term: society seems to divide between those few who experience sheer joy from the subject, and the majority for whom it is a phobia. Nations obsess about their ability to impart and absorb mathematical knowledge; global comparative studies on the matter are taken as grounds for national pride or shame. Post-apartheid South Africa has had its own share of self-flagellation, with much research into the reasons behind the country's poor comparative performance.

This book on the pedagogy of mathematics offers an overview of that research, reasserting some of the findings of previous studies. Those include evidence that the state of mathematics teaching and performance in South Africa today reflects the impact of its colonial and apartheid past, and a racist system that presupposed that keeping mathematical knowledge from the oppressed would prove their supposed inferiority. However, this book goes beyond historical issues to pose crucial questions: why at all do we teach mathematics? What is the subject's actual utility to life? And there is a unifying logic informing our South African way of teaching mathematics?

In seeking to answer those questions, the authors explore some of the best practices in mathematics education, both locally and internationally. They argue for possible methods of nurturing mathematical thinking amongst young people in South Africa.

Key issues to emerge are the importance of teaching mathematics in a way that links to learners' concrete social environment and the necessity for joint efforts on the part of government, unions and private partners. In addition, the study argues for the importance of teachers developing a deeper understanding of mathematics and of creating learners with productive mathematical identities capable of making sense of mathematics in South Africa's diverse languages.

The Pedagogy of Mathematics in South Africa is an important book for anyone interested in how to accelerate the slow improvements in mathematics that are underway in South Africa.



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The Pedagogy of Mathematics in South Africa: Is There a Unifying Logic?

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Is There a Unifying Logic?



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Preface

The teaching of mathematics proceeds from simple calculations to complex conceptualisations. As numerical figures and symbols and shapes morph towards complex abstractions, there seems almost to be a ‘natural selection’ in society between a few who experience sheer joy from the subject and phobia for the majority.

Today, the world places great value on mastering mathematics as a basis for integration into the world of work in a global epoch of rapid technological change. Thus, understandably, most nations obsess about their ability to impart and absorb mathematical knowledge. Global comparative studies on that issue are taken as grounds for national pride and self-perceptions of intelligence. Sheer horror greets poor outcomes; the empirical and the substantive merge into a confounding vortex of misconceptions. Finger-pointing and hyperbole ensue, and politics enters the fray in its most shameful and destructive forms.

Post-1994, South Africa has had its own share of self-flagellation. There has been much research on the reasons behind the country’s poor comparative performance. While there have been some improvements in the recent period, those are barely enough. Though framed in hyperbole, the levels of concern are useful in propelling the country towards better outcomes.

This book on the pedagogy of mathematics and whether it should have a unifying logic reasserts some of the findings of previous studies. Those relate to: the impact of a racist system that perversely reckoned that keeping mathematical knowledge from the oppressed would prove their supposed inferiority; the relevance of the language of teaching; changing school curricula and the questions of how to speed up movement from universal access to better outcomes. The authors go beyond that to pose the simple but telling question: why at all do we teach mathematics, and what is its actual utility to life? Arising from that, it becomes evident that mathematics is more than a narrow field of specialisation. Rather, it is a transdisciplinary base of

knowledge to help in understanding the logic of social and natural phenomena in their delightful and devastating relationships.

Historically, even besides the recognised centres of excellence that existed in various parts of the continent a few thousand years ago, ordinary life among hunter-gatherers and pastoral communities demanded skills of measurement, calculation and abstraction, without which, survival would have been impossible.

A few simple premises connect the various chapters of this book. The first one is that pedagogy should be understood as transcending classroom activities to scale the heights of mathematics' relevance to social values and societal action. Social mindsets that constrain ability are exposed as unfortunate transpositions from a harmful colonial heritage, with nations in the East having transcended that predisposition. Issues that are interrogated in some depth include the chaotic transition from foundation to intermediate phase; curriculum coverage and pacing; the value of appreciating mathematics beyond its various branches of arithmetic, algebra, geometry, trigonometry and calculus; and the utility of modern technological platforms in teaching the subject.

As this book clearly reveals, teaching mathematics through dialogue that is linked to a concrete social environment is fundamental to speeding up the improvements South Africa has started to experience. So are the joint efforts of government, the unions and private partners to improve the situation.

One of the central messages in this study is that research into the pedagogy and practical teaching of mathematics should form a critical part of the efforts to attain better outcomes. With a community of researchers on maths education committed to that approach, a unifying logic to mathematics pedagogy in South Africa will emerge. International case studies that have been selected, limited as they may be in scope and depth, emphasise that simple truism. Those studies include the work being done by global mathematics educators, including South Africans, who bring psychology, sociology and politics into the discourse on the pedagogy of mathematics.

The Mapungubwe Institute is convinced that this effort at extracting new insights from local and international experiences on the pedagogy of mathematics will initiate further strategic reflections to inform better performance. The first steps have been taken, but the journey must be pacier. MISTRA wishes to thank the project leaders and the authors who were courageous enough to venture with us into this exercise. The government's Department of Science and Technology and the First Rand Foundation fully appreciated the need for this work from the outset; and the importance of their financial support cannot be overstated.

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