

Mathematics Education as a Research Domain: A Search for Identity

**An ICMI Study
Book 1**

Edited by

Anna Sierpinska and Jeremy Kilpatrick

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Mathematics Education As A Research Domain A Search For Identity

P.J. Fensham



Mathematics Education As A Research Domain A Search For Identity:

Mathematics Education as a Research Domain: A Search for Identity Anna Sierpinska, Jeremy Kilpatrick, 1998-01-31 In 1978 in the foreword to *Weeding and Sowing A Preface to a Science of Mathematics Education* Hans Freudenthal wrote that his book is a preface to a science that does not exist Almost 20 years later does his claim still hold true The present book is the result of the reflection of many individuals in mathematics education on this and related questions Is mathematics education a science Is it a discipline In what sense What is its place within other domains of research and academic disciplines What accounts for its specificity In the book the reader will find a range of possible answers to these questions a variety of analyses of the actual directions of research in different countries and a number of visions for the future of research in mathematics education The book is a result of an ICMI Study whose theme was formulated as What is Research in Mathematics Education and What are Its Results One important outcome of this study was the realization of the reasons for the difficulty of the questions that the study was posing leading possibly to a set of other questions better suited to the actual concerns and research practices of mathematics education researchers The book addresses itself to researchers in mathematics education and all those working in their neighborhood who are concerned with the problems of the definition of this new scientific domain emerging at their borders

Mathematics Education as a Research Domain Jeremy Kilpatrick, Anna Sierpinska, 1998

Mathematics Education as a Research Domain: A Search for Identity Anna Sierpinska, Jeremy Kilpatrick, 2013-11-13 No one disputes how important it is in today's world to prepare students to understand mathematics as well as to use and communicate mathematics in their future lives That task is very difficult however Refocusing curricula on fundamental concepts producing new teaching materials and designing teaching units based on mathematicians' common sense or on logic have not resulted in a better understanding of mathematics by more students The failure of such efforts has raised questions suggesting that what was missing at the outset of these proposals designs and productions was a more profound knowledge of the phenomena of learning and teaching mathematics in socially established and culturally politically and economically justified institutions namely schools Such knowledge cannot be built by mere juxtaposition of theories in disciplines such as psychology sociology and mathematics Psychological theories focus on the individual learner Theories of sociology of education look at the general laws of curriculum development the specifics of pedagogic discourse as opposed to scientific discourse in general the different possible pedagogic relations between the teacher and the taught and other general problems in the interface between education and society Mathematics aside from its theoretical contents can be looked at from historical and epistemological points of view clarifying the genetic development of its concepts methods and theories This view can shed some light on the meaning of mathematical concepts and on the difficulties students have in teaching approaches that disregard the genetic development of these concepts

Mathematics Education as a Research Domain: A Search for Identity Anna

Sierpinska,Jeremy Kilpatrick,2014-02-19 Mathematics Education As a Research Domain Anna Sierpinska,Jeremy Kilpatrick,2014-01-15 **Mathematics Education as a Research Domain: A Search for Identity** Anna

Sierpinska,Jeremy Kilpatrick,2013-03-14 No one disputes how important it is in today's world to prepare students to understand mathematics as well as to use and communicate mathematics in their future lives. That task is very difficult, however. Refocusing curricula on fundamental concepts, producing new teaching materials, and designing teaching units based on mathematicians' common sense or on logic have not resulted in a better understanding of mathematics by more students. The failure of such efforts has raised questions suggesting that what was missing at the outset of these proposals, designs, and productions was a more profound knowledge of the phenomena of learning and teaching mathematics in socially established and culturally, politically, and economically justified institutions, namely schools. Such knowledge cannot be built by mere juxtaposition of theories in disciplines such as psychology, sociology, and mathematics. Psychological theories focus on the individual learner. Theories of sociology of education look at the general laws of curriculum development, the specifics of pedagogic discourse, as opposed to scientific discourse in general, the different possible pedagogic relations between the teacher and the taught, and other general problems in the interface between education and society. Mathematics, aside from its theoretical contents, can be looked at from historical and epistemological points of view, clarifying the genetic development of its concepts, methods, and theories. This view can shed some light on the meaning of mathematical concepts and on the difficulties students have in teaching approaches that disregard the genetic development of these concepts. **Defining an Identity** P.J. Fensham,2012-12-06 Research in science education is now an international activity. This book asks for the first time: Does this research activity have an identity? It uses the significant studies of more than 75 researchers in 15 countries to see to what extent they provide evidence for an identity as a distinctive field of research. It considers trends in the research over time and looks particularly at what progression in the research entails. It provides insight into how researchers influence each other and how involvement in research affects the being of the researcher as a person. It addresses the relation between research and practice in a manner that sees teaching and learning in the science classroom as interdependent with national policies and curriculum traditions about science. It gives graduate students and other early researchers an unusual overview of their research area as a whole. Established researchers will be interested in and challenged by the identity the author ascribes to the research and by the plea he makes for the science content itself to be seen as problematic. Mathematics & Mathematics Education: Searching for Common Ground Michael N. Fried, Tommy Dreyfus,2013-11-29 This book is the fruit of a symposium in honor of Ted Eisenberg concerning the growing divide between the mathematics community and the mathematics education community, a divide that is clearly unhealthy for both. The work confronts this disturbing gap by considering the nature of the relationship between mathematics education and mathematics and by examining areas of commonality as well as disagreement. It seeks to provide insight into the mutual benefit both stand to gain by building

bridges based on the natural bonds between them Handbook of International Research in Mathematics Education Lyn D. English, David Kirshner, 2010-04-02 The second edition continues the mission of bringing together important new mathematics education research that makes a difference in both theory and practice It updates and extends the Handbook's original key themes and issues for international research in mathematics education for the 21st century namely priorities in international mathematics education research lifelong democratic access to powerful mathematical ideas advances in research methodologies influences of advanced technologies Each of these themes is examined in terms of learners teachers and learning contexts with theory development being an important component of all these aspects This edition also examines other catalysts that have gained increased import in recent years including a stronger focus on the teacher and teacher practice a renewed interest in theory development an increased focus on the mathematics needed in work place settings and a proliferation of research designs and methodologies that have provided unprecedented opportunities for investigating and ultimately improving mathematical teaching and learning This edition includes ten totally new chapters all other chapters are thoroughly revised and updated **Invited Lectures from the 13th International Congress on Mathematical Education**

Gabriele Kaiser, Helen Forgasz, Mellony Graven, Alain Kuzniak, Elaine Simmt, Binyan Xu, 2018-02-05 The book presents the Invited Lectures given at 13th International Congress on Mathematical Education ICME 13 ICME 13 took place from 24th 31st July 2016 at the University of Hamburg in Hamburg Germany The congress was hosted by the Society of Didactics of Mathematics Gesellschaft f r Didaktik der Mathematik GDM and took place under the auspices of the International Commission on Mathematical Instruction ICMI ICME 13 the biggest ICME so far brought together about 3500 mathematics educators from 105 countries additionally 250 teachers from German speaking countries met for specific activities The scholars came together to share their work on the improvement of mathematics education at all educational levels The papers present the work of prominent mathematics educators from all over the globe and give insight into the current discussion in mathematics education The Invited Lectures cover a wide spectrum of topics themes and issues and aim to give direction to future research towards educational improvement in the teaching and learning of mathematics education This book is of particular interest to researchers teachers and curriculum developers in mathematics education

Critical Mathematics Education Paul Ernest, Bharath Sriraman, Nuala Ernest, 2016-01-01 Mathematics is traditionally seen as the most neutral of disciplines the furthest removed from the arguments and controversy of politics and social life However critical mathematics challenges these assumptions and actively attacks the idea that mathematics is pure objective and value neutral It argues that history society and politics have shaped mathematics not only through its applications and uses but also through molding its concepts methods and even mathematical truth and proof the very means of establishing truth Critical mathematics education also attacks the neutrality of the teaching and learning of mathematics showing how these are value laden activities indissolubly linked to social and political life Instead it argues that the values of openness

dialogicality criticality towards received opinion empowerment of the learner and social political engagement and citizenship are necessary dimensions of the teaching and learning of mathematics if it is to contribute towards democracy and social justice This book draws together critical theoretic contributions on mathematics and mathematics education from leading researchers in the field Recurring themes include The natures of mathematics and critical mathematics education issues of epistemology and ethics Ideology the hegemony of mathematics ethnomathematics and real life education Capitalism globalization politics social class habitus citizenship and equity The book demonstrates the links between these themes and the discipline of mathematics and its critical teaching and learning The outcome is a groundbreaking collection unified by a shared concern with critical perspectives of mathematics and education and of the ways they impact on practice

Perspectives on Adults Learning Mathematics D. Coben, J. O'Donoghue, Gail E. FitzSimons, 2006-05-10 At a time when the importance of lifelong education is becoming recognised around the world this is the first book to explore an important but hitherto neglected area adult mathematics education This book is about adults learning mathematics wherever and in whatever circumstances they do so It brings together researchers in the field and aims to lay the foundations for study and further research and practice in this fast developing area It aims to situate research and practice in adults learning mathematics within the wider field of lifelong learning and lifelong education and to be accessible both to the specialist and to the general adult reader The book features a comprehensive review of the field which sets the scene for sections on Perspectives on Research on Adults Learning Mathematics Adults Mathematics Culture and Society Adults Mathematics and Work and Perspectives in Teaching Adults Mathematics Topics covered include mathematics and common sense statistical literacy and numeracy new theories on learning mathematics mathematical competences for the workplace

ethnomathematics and the training of tutors *Researching the Socio-Political Dimensions of Mathematics Education* Paola Valero, Robyn Zevenbergen, 2006-04-11 Mathematics education research as a discipline is situated at the confluence of an array of diffuse seemingly incommensurable and radically divergent discourses Research claims that have grown out of mathematics education are wide ranging and antagonistic rather than circumscribed by hidebound disciplinary frames While there has never been a unified totalising discipline of knowledge labelled mathematics education research and while it has always been a contested terrain it is fair to say that the master paradigm out of which this field has been generated has been that of cognitive psychology Mainstream mathematics education knowledges refracting the master discourse of psychology whereby cognition serves as the central privileged and defining concept clearly delimits its possibilities for serving as a social tool of democratic transformation The central point of departure of this new collection is that mathematics education research is insufficiently univocal to support the type of uncompromising interpretation that cognitive psychologists would bring to it The hallmark contribution of this pathbreaking volume edited by Paola Valero and Robyn Zevenbergen is the paradigmatic shift the authors have effected in the field of mathematics education research taking up a position at the

faultline of socio cultural analysis and critical pedagogy

The First Sourcebook on Nordic Research in Mathematics

Education Bharath Sriraman, Simon Goodchild, Christer Bergsten, Gudbjorg Palsdottir, Lenni Haapasalo, Bettina Dahl Søndergaard, 2010-09-01 The First Sourcebook on Nordic Research in Mathematics Education Norway Sweden Iceland Denmark and contributions from Finland provides the first comprehensive and unified treatment of historical and contemporary research trends in mathematics education in the Nordic world The book is organized in sections coordinated by active researchers in mathematics education in Norway Sweden Iceland Denmark and Finland The purpose of this sourcebook is to synthesize and survey the established body of research in these countries with findings that have influenced ongoing research agendas informed practice framed curricula and policy The sections for each country also include historical articles in addition to exemplary examples of recently conducted research oriented towards the future The book will serve as a standard reference for mathematics education researchers policy makers practitioners and students both in and outside the Nordic countries

Amongst Mathematicians Elena Nardi, 2008 This book offers a unique perspective on ways in which mathematicians perceive their students learning teach reflect on their teaching practice Elena Nardi achieves this by employing two fictional yet entirely data grounded characters to create a conversation on these important issues The construction of these characters is based on large bodies of data including intense focused group interviews with mathematicians and extensive analyses of students written work collected and analyzed over a substantial period

Theories of Mathematics Education Bharath Sriraman, Lyn English, 2009-10-13 Advances in Mathematics Education is a new and innovative book series published by Springer that builds on the success and the rich history of ZDM The International Journal on Mathematics Education formerly known as Zentralblatt für Mathematik One characteristic of ZDM since its inception in 1969 has been the publication of themed issues that aim to bring the state of the art on central sub domains within mathematics education The published issues include a rich variety of topics and contributions that continue to be of relevance today The newly established monograph series aims to integrate synthesize and extend papers from previously published themed issues of importance today by orienting these issues towards the future state of the art The main idea is to move the field forward with a book series that looks to the future by building on the past by carefully choosing viable ideas that can fruitfully mutate and inspire the next generations Taking inspiration from Henri Poincaré 1854-1912 who said To create consists precisely in not making useless combinations and in making those which are useful and which are only a small minority

Shifts in the Field of Mathematics Education Peter Gates, Robyn Jorgensen

(Zevenbergen), 2014-11-02 Professor Stephen Lerman has been a leader in the field of mathematics education for thirty years His work is extensive making many significant contributions to a number of key areas of research Stephen retired from South Bank University in 2012 where he had worked for over 20 years though he continues to work at Loughborough University In this book several of his long standing colleagues and collaborators reflect on his contribution to mathematics education and

in so doing illustrate how some of Steve's ideas and interventions have resulted in significant shifts in the domain

Research in Mathematics Education in Australasia 2004 - 2007, 2008-01-01 Every four years beginning in 1984 the Mathematics Education Research Group of Australasia MERGA produces a review of Australasian research in mathematics education The authors of the chapters in this volume have summarised and critiqued research conducted during the period 2004-2007 The research foci for the period are reflected in the chapter titles Working under tight funding opportunities and the shadow of demanding research accountability measures the research undertaken has nonetheless been rigorous far ranging and at the cutting edge In bringing this regular review of the best of Australasian mathematics education to a broader international audience for the first time readers will recognise the outstanding contributions made by Australasian mathematics education researchers and the potential their findings have to inform and direct future directions in the field

Transformation - A Fundamental Idea of Mathematics Education Sebastian Rezat, Mathias Hattermann, Andrea Peter-Koop, 2013-12-13 The diversity of research domains and theories in the field of mathematics education has been a permanent subject of discussions from the origins of the discipline up to the present On the one hand the diversity is regarded as a resource for rich scientific development on the other hand it gives rise to the often repeated criticism of the discipline's lack of focus and identity As one way of focusing on core issues of the discipline the book seeks to open up a discussion about fundamental ideas in the field of mathematics education that permeate different research domains and perspectives The book addresses transformation as one fundamental idea in mathematics education and examines it from different perspectives Transformations are related to knowledge related to signs and representations of mathematics related to concepts and ideas and related to instruments for the learning of mathematics The book seeks to answer the following questions What do we know about transformations in the different domains What kinds of transformations are crucial How is transformation in each case conceptualized

Where is the Mathematics in Your Math Education Research? Xiaoheng Kitty Yan, Ami Mamolo, Igor' Kontorovich, 2025-06-25 This book brings together leading researchers in mathematics education to share personal narratives of key mathematical moments or ideas that inspired surprised or helped direct their research While the fruits of research activities and products are shared at scholarly conference and journals the footprints of mathematics that ignited the research processes is often behind the scenes and only acknowledged informally To make mathematics an essential component and a determining driving force of mathematics education research more visible chapters in this book highlight the indispensable and indisputable role of mathematics in mathematics education research The book is unique and timely in addressing the essential but increasingly sidelined role of mathematics that permeates mathematics education research journals graduate programs and the personae of the next generation in the profession It renounces the shift away from mathematics and attempts to restore the place and value of mathematics by presenting elegant intriguing and substantial contributions to mathematics education that have come from keeping mathematics at the

core of research pursuits Each chapter shares a journey in mathematics education research that was inspired by an affinity for mathematics and that helped shaped the field as we know it Each author shares insights and reflections on the status of mathematics in the mathematics education community how it has changed and what further changes might be expected This edited volume is of major interest to the mathematics education community including mathematics educators teacher educators researchers professional development providers and graduate students

Adopting the Beat of Phrase: An Psychological Symphony within **Mathematics Education As A Research Domain A Search For Identity**

In a world taken by displays and the ceaseless chatter of instantaneous interaction, the melodic elegance and emotional symphony created by the published term often diminish into the background, eclipsed by the relentless sound and interruptions that permeate our lives. Nevertheless, nestled within the pages of **Mathematics Education As A Research Domain A Search For Identity** a marvelous fictional treasure filled with fresh emotions, lies an immersive symphony waiting to be embraced. Constructed by an elegant musician of language, this captivating masterpiece conducts viewers on a psychological trip, skillfully unraveling the hidden songs and profound influence resonating within each carefully crafted phrase. Within the depths with this emotional evaluation, we will examine the book is central harmonies, analyze their enthralling publishing style, and surrender ourselves to the profound resonance that echoes in the depths of readers souls.

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