



# Equity in mathematics education

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## Abstract

This paper reviews research on equity in mathematics education (excluding gender equity) for the period 2017–2022. From the publications identified, five themes were distilled: conceptualizations and framing of equity in mathematics education; research methodologies and researcher positionalities; equity-focused practices, pedagogies and teacher education; equitable mathematics curriculum content, access and pathways; and equity in mathematics education at system levels, nationally and internationally. The review concludes by engaging some of the critique and suggests future directions for research. The research demonstrates that there is growing voice and visibility of equity-focused studies in mathematics education and that conceptualizations of equity have broadened and deepened through an increasing diversity of studies in this area. At the same time, the review also shows the dominance of the Global North in shaping equity discourses and the paucity of research on equity in mathematics education from the Global South.

**Keywords** Equity · Diversity · Inclusion · Marginalization · Equity-focused pedagogies

## 1 Introduction: Growing voice and visibility of equity in mathematics education

Many societies across the globe are growing increasingly diverse and unequal. Within and across countries, migration due to war, conflicts, climate change, poverty (to name a few), are shifting the nature of contemporary societies. Schools in general and mathematics classrooms in particular, reflect societal diversity and inequities as well as contain the possibilities to transform them. Providing access to quality mathematics education to learners from different cultural perspectives and knowledge backgrounds, diverse racial,

ethnic, religious, linguistic, gender, socio-economic status and sexual orientations, is an important endeavor. Within this context, it is not surprising that there has been a growing focus on equity-related research in mathematics education practices, theories, curricula and policies.

In the past five years there have been a number of developments which collectively show this increase in research on equity in mathematics education. In 2022, the Journal for Research in Mathematics Education (JRME) published two special issues on this topic. In their editorial to the first issue, Crespo et al. (2022) show that equity-focused articles in JRME increased from 11% in 2013 to 22% in 2021 and argue that “equity-focused research in mathematics education is now closer to the mainstream of topics with which our field is concerned” (p. 88). In the second issue, a more diverse group of authors commented on the papers in the first issue, leading to a deepening of key concepts (Mathews et al., 2022). ZDM-Mathematics Education commissioning reviews in equity research highlights this growth. Two other leading international journals, Educational Studies in Mathematics and the Journal of Mathematics Teacher Education, have reflected in their editorials on their approaches to equity, and considered how to broaden representation from across the world: both in the national origins of authors and in the conceptualisations of mathematics education in their

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# New Directions For Equity In Mathematics Education

**H. Richard Milner IV, Kofi Lomotey**



### **New Directions For Equity In Mathematics Education:**

*New Directions for Equity in Mathematics Education* Walter G. Secada, Elizabeth Fennema, Lisa Byrd Adajian, 1995-04-28 This book examines equity from the standpoint of mathematics education an excellent forum for the topic since the results are quantifiable and the disparity in performance is stark

*Mapping Equity and Quality in Mathematics Education* Bill Atweh, Mellony Graven, Walter Secada, Paola Valero, 2011-01-06 Concerns about quality mathematics education are often posed in terms of the types of mathematics that are worthwhile and valuable for both the student and society in general and about how to best support students so that they can develop this mathematics Concerns about equity are about who is excluded from the opportunity to develop quality mathematics within our current practices and systems and about how to remove social barriers that systematically disadvantage those students This collection of chapters summarises our learning about the achievement of both equity and quality agendas in mathematics education and to move forward the debate on their importance for the field

***Sociocultural Research on Mathematics Education*** Bill Atweh, Helen Forgasz, Ben Nebres, 2013-03-07 This volume the first to bring together research on sociocultural aspects of mathematics education presents contemporary and international perspectives on social justice and equity issues that impact mathematics education In particular it highlights the importance of three interacting and powerful factors gender social and cultural dimensions Sociocultural Research on Mathematics Education An International Perspective is distinguished in several ways It is research based Chapters report on significant research projects present a comprehensive and critical summary of the research findings and offer a critical discussion of research methods and theoretical perspectives undertaken in the area It is future oriented presenting recommendations for practice and policy and identifying areas for further research It deals with all aspects of formal and informal mathematics education and applications and all levels of formal schooling As the context of mathematics education rapidly changes with an increased demand for mathematically literate citizenship an increased awareness of issues of equity inclusivity and accountability and increased efforts for globalization of curriculum development and research questions are being raised more than ever before about the problems of teaching and learning mathematics from a non cognitive science perspective This book contributes significantly to addressing such issues and answering such questions It is especially relevant for researchers graduate students and policymakers in the field of mathematics education

***Handbook of Urban Education*** H. Richard Milner IV, Kofi Lomotey, 2013-11-20 This volume brings together leading scholars in urban education to focus on inner city matters specifically as they relate to educational research theory policy and practice Each chapter provides perspectives on the history and evolving nature of urban education the current education landscape and helps chart an all important direction for future work and needs The Handbook addresses seven areas that capture the breadth and depth of available knowledge in urban education 1 Psychology Health and Human Development 2 Sociological Perspectives 3 Families and Communities 4 Teacher Education and Special Education 5 Leadership

Administration and Leaders 6 Curriculum Instruction and 7 Policy and Reform      A Journey in Mathematics Education Research Erna Yackel, Koen Gravemeijer, Anna Sfard, 2010-11-30 Our objective is to publish a book that lays out the theoretical constructs and research methodologies within mathematics education that have been developed by Paul Cobb and explains the process of their development We propose to do so by including papers in which Cobb introduced new theoretical perspectives and methodologies into the literature each preceded by a substantive accompanying introductory paper that explains the motivation rationale for developing the new perspectives and or methodologies and the processes through which they were developed and Cobb's own retrospective comments In this way the book provides the reader with heretofore unpublished material that lays out in considerable detail the issues and problems that Cobb has confronted in his work that from his viewpoint required theoretical and methodological shifts advances and provides insight into how he has achieved the shifts advances The result will be a volume that in addition to explaining Cobb's contributions to the field of mathematics education also provides the reader with insight into what is involved in developing an aggressive and evolving research program When Cobb confronts problems and issues in his work that cannot be addressed using his existing theories and frameworks he looks to other fields for theoretical inspiration A critical feature of Cobb's work is that in doing so he consciously appropriates and adapts ideas from these other fields to the purpose of supporting processes of learning and teaching mathematics He does not simply accept the goals or motives of those fields As a result Cobb reconceptualizes and reframes issues and concepts so that they result in new ways of investigating exploring and explaining phenomena that he encounters in the practical dimensions of his work which include working in classrooms with teachers and with school systems The effect is that the field of mathematics education is altered Other researchers have found his new ways of looking useful to them And they in turn adapt these ideas for their own use The complexity of many of the ideas that Cobb has introduced into the field of mathematics education can lead to a multiplicity of interpretations by practitioners and by other researchers based on their own experiential backgrounds Therefore by detailing the development of Cobb's work including the tensions involved in coming to grips with and reconciling apparently contrasting perspectives the book will shed additional light on the processes of reconceptualization and thus help the reader to understand the reasons mechanisms and outcomes of researchers' constant pursuit of new insights      **International Handbook of Mathematics Education** Alan Bishop, M.A. (Ken) Clements, Christine Keitel-Kreidt, Jeremy Kilpatrick, Colette Laborde, 2012-12-06

ALAN J BISHOP Monash University Clayton Victoria Australia RATIONALE Mathematics Education is becoming a well documented field with many books journals and international conferences focusing on a variety of aspects relating to theory research and practice That documentation also reflects the fact that the field has expanded enormously in the last twenty years At the 8th International Congress on Mathematics Education ICME in Seville Spain for example there were 26 specialist Working Groups and 26 special ist Topic Groups as well as a host of other group activities In 1950 the Commission Internationale pour l'Etude et l'

Amelioration de l'Enseignement des Mathématiques CIEAEM was formed and twenty years ago another active group the International Group for the Psychology of Mathematics Education PME began at the third ICME at Karlsruhe in 1976 Since then several other specialist groups have been formed and are also active through regular conferences and publications as documented in Edward Jacobsen's Chapter 34 in this volume

*Which Way Social Justice in Mathematics Education?* Leone Burton, 2003-02-28 This contributed volume explores equity and social justice within the field of mathematics education In part one Helga Jungwirth's introductory chapter provides a strong theoretical overview that is based in actual classroom behaviors and a typology that classifies the various interpretations found within this volume Also in part one Laurie Hart discusses developments in equity research in the United States Part two focuses on results of studies about social justice and their impact on learning in mathematics classrooms in various parts of the world For example in a chapter on Peru social justice does not just encompass gender but also inequalities in opportunities to learn such as problems of resources living and social conditions communal demands and language needs And part three focuses on computers as a resource to mathematics teaching The contributors raise several important social justice issues which have previously remained unresearched Although there are a number of chapters specifically dealing with gender many of the authors use one of the following strategies their gender specific questions are set in a wider socio cultural context they challenge what have threatened to become false orthodoxies or they raise other important issues These other issues include the meaning of democratic citizenship for mathematics classrooms the links between parents and children learning mathematics and the preconceptions of some teachers of underprivileged students in Australia Other chapters explore different forms of classroom communication participation and assessment The pieces on computers state that there is still not enough research to conclude whether computers in the mathematics classrooms are supportive of or detrimental to the learning of all students The one thing on which every author in this volume does agree is that social justice in mathematics education has still not been attained but that we must strive toward it to improve educational practices and society in general

Borders in Mathematics Pre-Service Teacher Education Nenad Radakovic, Limin Jao, 2020-05-22 This book examines the current state of the field of mathematics pre service teacher education through the theme of borders Borders are ubiquitous they can be used to define classify organize make sense of and or group There are many ways that the concept of a border illuminates the field of mathematics pre service teacher education Consequently there are a multitude of responses to these borders researchers and practitioners question challenge cross blur and erase them Chapters include the following topics explorations of mathematics across topics e g geometry algebra probability and with other disciplines e g science the arts social sciences challenging gender cultural and racial borders exploring the structure and curriculum of teacher education programs spaces inhabited by teacher education programs e g university community and international collaborations and programs to promote cross cultural sharing and learning The book targets a readership of researchers and graduate students in integrated

education studies teacher education practitioners of mathematics education curriculum developers and educational administrators and policy makers      Dialogue and Learning in Mathematics Education Helle Alrø, Ole Skovsmose, 2006-01-02 Dialogue and Learning in Mathematics Education is concerned with communication in mathematics class rooms In a series of empirical studies of project work we follow students inquiry cooperation as well as students obstructions to inquiry cooperation Both are considered important for a theory of learning mathematics Special attention is paid to the notions of dialogue and critique A central idea is that dialogue supports critical learning of mathematics The link between dialogue and critique is developed further by including the notions of intention and reflection Thus a theory of learning mathematics is developed which is resonant with critical mathematics education      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      **Opening the Cage** Ole Skovsmose, Brian Greer, 2012-09-05 The picture on the front of this book is an illustration for Totakahini The tale of the parrot by Rabindranath Tagore in which he satirized education as a magnificent golden cage Opening the cage addresses mathematics education as a complex socio political phenomenon exploring the vast terrain that spans critique and politics Opening the cage includes contributions from educators writing critically about mathematics education in diverse contexts They demonstrate that mathematics education is politics they investigate borderland positions they address the nexus of mathematics education and power and they explore educational possibilities Mathematics education is not a free enterprise It is carried on behind bars created by economic political and social demands This cage might not be as magnificent as that in Tagore s fable But it is strong Opening the cage is a critical and political challenge and we may be surprised to see what emerges      **Third International Handbook of Mathematics Education** M.A. (Ken) Clements, Alan Bishop, Christine Keitel-Kreidt, Jeremy Kilpatrick, Frederick Koon-Shing Leung, 2012-11-15 The four sections in this Third International Handbook are concerned with a social political and cultural dimensions in mathematics education b mathematics education as a field of study c

technology in the mathematics curriculum and d international perspectives on mathematics education These themes are taken up by 84 internationally recognized scholars based in 26 different nations Each of section is structured on the basis of past present and future aspects The first chapter in a section provides historical perspectives How did we get to where we are now the middle chapters in a section analyze present day key issues and themes Where are we now and what recent events have been especially significant and the final chapter in a section reflects on policy matters Where are we going and what should we do Readership Teachers mathematics educators ed policy makers mathematicians graduate students undergraduate students Large set of authoritative international authors Educating Everybody's Children Robert W. Cole W. Cole,2008-06-15 Designed to promote reflection discussion and action among the entire learning community Educating Everybody s Children encapsulates what research has revealed about successfully addressing the needs of students from economically ethnically culturally and linguistically diverse groups and identifies a wide range of effective principles and instructional strategies Although good teaching works well with all students educators must develop an extensive repertoire of instructional tools to meet the varying needs of students from diverse backgrounds Those tools and the knowledge base behind them are the foundation of this expanded and revised second edition of Educating Everybody s Children Each strategy discussed in the book includes classroom examples and a list of the research studies that support it The most important thing we have learned as a result of the education reform movement is that student achievement stands or falls on the motivation and skills of teachers We must ensure that all teachers are capable of delivering a standards based curriculum that describes what students should know and be able to do and that these standards are delivered by means of a rich and engaging pedagogy of plenty By these two acts we can ensure that all schools will be ready and able to educate everybody s children

**In Search of a Pedagogy of Conflict and Dialogue for Mathematics Education** Renuka Vithal,2012-12-06 In Search of a Pedagogy for Conflict and Dialogue for Mathematics Education is of interest to mathematics educators researchers in mathematics education gender social justice equity and democracy in education and practitioners teachers interested in the use of project work in mathematics teaching and learning This book brings together diverse recent developments exploring social cultural political dimensions in mathematics education It builds theoretical ideas from a careful substantial description of practice in the attempt to improve both theory and practice in mathematics education In doing so it interrogates and develops theoretical research tools for mathematics education and simultaneously provides ideas for practice in mathematics classrooms International Perspectives on Gender and Mathematics Education Olof Steinhorsdottir,Helen J.

Forgasz,Joanne Rossi Becker,Kyeonghwa Lee,2010-06-01 Why a book on gender issues in mathematics in the 21st century Several factors have influenced the undertaking of this project by the editors First an international volume focusing on gender and mathematics has not appeared since publication of papers emerging from the 1996 International Congress on Mathematical Education Keitel 1998 Surely it was time for an updated look at this critical area of mathematics education

Second we have had lively discussion and working groups on gender issues at conferences of the International Group for the Psychology of Mathematics Education PME for the past four years sessions at which stimulating and ground breaking research has been discussed by participants from many different countries Some publication seemed essential to share this new knowledge emerging from a wider variety of countries and from different cultural perspectives Third some western countries such as Australia and the USA have experienced in recent years a focus on the boy problem with an underlying assumption that issues of females and mathematics have been solved and are no longer worthy of interest Thus it seemed timely to look more closely at the issue of gender and mathematics internationally When the idea for this volume first emerged invitations were issued to those regularly attending the working and discussion groups at PME Potential authors were charged to focus on gender issues in mathematics and were given wide scope to hone in on the issues that were central to their own research efforts or were in receipt or in need of close attention in their own national or regional contexts

**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

**Second Handbook of Research on Mathematics Teaching and Learning**

Frank K. Lester, 2007-02-01 The audience remains much the same as for the 1992 Handbook namely mathematics education researchers and other scholars conducting work in mathematics education This group includes college and university faculty graduate students investigators in research and development centers and staff members at federal state and local agencies that conduct and use research within the discipline of mathematics The intent of the authors of this volume is to provide useful perspectives as well as pertinent information for conducting investigations that are informed by previous work The Handbook should also be a useful textbook for graduate research seminars In addition to the audience mentioned above the present Handbook contains chapters that should be relevant to four other groups teacher educators curriculum developers



state and national policy makers and test developers and others involved with assessment Taken as a whole the chapters reflects the mathematics education research community s willingness to accept the challenge of helping the public understand what mathematics education research is all about and what the relevance of their research fi ndings might be for those outside their immediate community

*EBOOK: Assessing Children's Mathematical Knowledge* Barry Cooper, Mairead Dunne, 1999-12-16 this work is highly relevant to the proliferation of accountability measures worldwide James Scheurich and Douglas Foley In many countries the lives of teachers and children are increasingly dominated by programmes of national testing of mathematics and other subjects In England the majority of the items in such tests have set mathematical tasks in every day situations such as shopping This requires children to make decisions about whether to use or not their own every day knowledge and experience in their problem solving Some children are likely to have a better feel for this game than others

*Assessing Children s Mathematical Knowledge* draws on the analysis of national curriculum test data from more than 600 children of 10 11 and 13 14 years of age as well as in depth interviews with 250 of these as they attempt to solve test problems in order to explore the nature of the difficulties children experience with realistic items The book shows by comparing test and interview data that many children as a consequence of their confusion over the requirements of realistic test items fail in tests to demonstrate mathematical knowledge and understanding that they actually possess The book also explores whether this problem of invalid measurement is equally spread across children from different social backgrounds and across the sexes The book will be of interest to academics and teachers studying for advanced degrees in mathematics education sociology of education and educational assessment

*The Mathematics Teacher Education Partnership* W. Gary Martin, Brian R. Lawler, Alyson E. Lischka, Wendy M. Smith, 2020-01-01 This book provides an overview of a body of work conducted over the past seven years related to the preparation of secondary mathematics teachers by the Mathematics Teacher Education Partnership MTE Partnership a national consortium of more than 90 universities and 100 school systems The MTE Partnership is organized as a Networked Improvement Community NIC which combines the disciplined inquiry of improvement science with the power of networking to accelerate improvement by engaging a broad set of participants The MTE Partnership is addressing key challenges in secondary mathematics teacher preparation including Supporting the development of content knowledge relevant to teaching secondary mathematics Providing effective clinical experiences to teacher candidates Recruiting secondary mathematics teacher candidates ensuring program completion and their subsequent retention in the field as early career teachers Supporting overall transformation of secondary mathematics teacher preparation in alignment with these challenges Ensuring a focus on equity and social justice in secondary mathematics teacher recruitment preparation and induction This book outlines existing knowledge related to each of these key challenges as well as the work of Research Action Clusters RACs formed to address the challenges Each RAC includes participants from multiple institutions who work collaboratively to iteratively develop test and refine processes and products

that can help programs more effectively prepare secondary mathematics teacher candidates The book describes promising approaches to improving aspects of secondary mathematics teacher preparation developed by the RACs including specific products that have been developed which will inform the work of others involved in secondary mathematics teacher preparation In addition reflections on the use of the NIC model provides insights for others considering this research design Particular references to the Standards for Preparing Teachers of Mathematics Association of Mathematics Teacher Educators 2017 are included throughout the book      **Culturally Responsive Mathematics Education** Brian Greer,Swapna Mukhopadhyay,Arthur B. Powell,Sharon Nelson-Barber,2009-05-20 This critical new collection presents mathematics education from a culturally responsive perspective and offers a broad perspective of mathematics as a significant liberating intellectual force in our society

Embark on a breathtaking journey through nature and adventure with is mesmerizing ebook, Natureis Adventure: **New Directions For Equity In Mathematics Education** . This immersive experience, available for download in a PDF format ( PDF Size: \*), transports you to the heart of natural marvels and thrilling escapades. Download now and let the adventure begin!

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