

Research in Mathematics Education
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Florence Mihaela Singer
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Mathematical Problem Posing

From Research to Effective Practice

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Mathematical Problem Posing From Research To Effective Practice Research In Mathematics Education

Meixia Ding



Mathematical Problem Posing From Research To Effective Practice Research In Mathematics Education:

Mathematical Problem Posing Florence Mihaela Singer, Nerida F. Ellerton, Jinfa Cai, 2015-06-12 The mathematics education community continues to contribute research based ideas for developing and improving problem posing as an inquiry based instructional strategy for enhancing students learning A large number of studies have been conducted which have covered many research topics and methodological aspects of teaching and learning mathematics through problem posing The Authors groundwork has shown that many of these studies predict positive outcomes from implementing problem posing on student knowledge problem solving and posing skills creativity and disposition toward mathematics This book examines in depth the contribution of a problem posing approach to teaching mathematics and discusses the impact of adopting this approach on the development of theoretical frameworks teaching practices and research on mathematical problem posing over the last 50 years *Problem Posing and Problem Solving in Mathematics Education* Tin Lam Toh, Manuel Santos-Trigo, Puay Huat Chua, Nor Azura Abdullah, Dan Zhang, 2024-01-01 This book presents both theoretical and empirical contributions from a global perspective on problem solving and posing PS PP and their application in relation to the teaching and learning of mathematics in schools The chapters are derived from selected presentations in the PS PP Topical Study Group in ICME14 Although mathematical problem posing is a much younger field of inquiry in mathematics education this topic has grown rapidly The mathematics curriculum frameworks in many parts of the world have incorporated problem posing as an instructional focus building on problem solving as its foundation The juxtaposition of problem solving and problem posing in mathematics presented in this book addresses the needs of the mathematics education research and practice communities at the present day In particular this book aims to address the three key points to present an overview of research and development regarding students mathematical problem solving and posing to discuss new trends and developments in research and practice on these topics and to provide insight into the future trends of mathematical problem solving and posing **Mathematical Problem Posing** Lukas Baumanns, 2022-11-19 Mathematical problem posing as the substantive formulation of mathematical problems is an activity that lies at the heart of mathematics In recent years research in mathematics education has endeavored to gain insights into problem posing conceptually as well as empirically In problem posing research there has been a focus on analyzing products that is the posed problems Insights into the processes that lead to these products however have so far been lacking Within four journal articles summarized in this cumulative dissertation the author attempts to contribute to the understanding of problem posing processes through conceptual considerations and empirical investigations The conceptual part consists of a conducted systematic literature review to investigate problem posing situations and problem posing activities The studies in the empirical part deal with the analyses of problem posing processes of pre service mathematics teachers from a macroscopic and microscopic perspective The aim is to develop coherent and meaningful conceptual perspectives for analyzing empirical observations of problem

posing processes Broadening the Scope of Research on Mathematical Problem Solving Nélia Amado,Susana Carreira,Keith Jones,2018-11-30 The innovative volume seeks to broaden the scope of research on mathematical problem solving in different educational environments It brings together contributions not only from leading researchers but also highlights collaborations with younger researchers to broadly explore mathematical problem solving across many fields mathematics education psychology of education technology education mathematics popularization and more The volume s three major themes technology creativity and affect represent key issues that are crucially embedded in the activity of problem solving in mathematics teaching and learning both within the school setting and beyond the school Through the book s new pedagogical perspectives on these themes it advances the field of research towards a more comprehensive approach on mathematical problem solving Broadening the Scope of Research on Mathematical Problem Solving will prove to be a valuable resource for researchers and teachers interested in mathematical problem solving as well as researchers and teachers interested in technology creativity and affect Problem Posing and Solving for Mathematically Gifted and Interested Students Deniz Sarikaya,Lukas Baumanns,Karl Heuer,Benjamin Rott,2023-09-29 Mathematics and mathematics education research have an ongoing interest in improving our understanding of mathematical problem posing and solving This book focuses on problem posing in a context of mathematical giftedness The contributions particularly address where such problems come from what properties they should have and which differences between school mathematics and more complex kinds of mathematics exist These perspectives are examined internationally allowing for cross national insights

Mathematics Instruction: Goals, Tasks And Activities - Yearbook 2018, Association Of Mathematics Educators Pee Choon Toh,Boon Liang Chua,2018-05-21 The book the tenth volume in the series of yearbooks by the Association of Mathematics Educators in Singapore comprises 14 chapters written by renowned researchers in mathematics education The chapters offer mathematics teachers a cache of teaching ideas and resources for classroom instruction Readers will find various task design principles examples of mathematical tasks used in classrooms and teaching approaches to implement the tasks Through these discussions readers are invited to reflect and rethink their beliefs about mathematics teaching and learning in the 21st century and reexamine the tasks and activities that they use in the classroom in order to bring about positive impact on students learning of mathematics This book contributes towards literature in the field of mathematics education specifically on mathematics instruction and the design of mathematical tasks and activities **Mathematical Problem Solving** Peter Liljedahl,Manuel Santos-Trigo,2019-02-12 This book contributes to the field of mathematical problem solving by exploring current themes trends and research perspectives It does so by addressing five broad and related dimensions problem solving heuristics problem solving and technology inquiry and problem posing in mathematics education assessment of and through problem solving and the problem solving environment Mathematical problem solving has long been recognized as an important aspect of mathematics teaching mathematics and learning mathematics It has

influenced mathematics curricula around the world with calls for the teaching of problem solving as well as the teaching of mathematics through problem solving And as such it has been of interest to mathematics education researchers for as long as the field has existed Research in this area has generally aimed at understanding and relating the processes involved in solving problems to students development of mathematical knowledge and problem solving skills The accumulated knowledge and field developments have included conceptual frameworks for characterizing learners success in problem solving activities cognitive metacognitive social and affective analysis curriculum proposals and ways to promote problem solving approaches

Digitalization in Additive Manufacturing Numan M. Durakbasa, Kerim Cetinkaya, Pinar Demircioglu, Ismail Bogrekci, 2025-07-14 This book features a selection of papers presented at the 8th International Congress on 3D Printing Technologies and Digital Industry 2024 3D PTC2024 held from September 6 8 2024 in Antalya T rkiye in a hybrid format It covers several topics reflecting the dynamic landscape of additive manufacturing and digital innovation The chapters explore cutting edge advancements in materials and techniques alongside practical applications in medical dental and industrial realms Digital design simulation and sustainability considerations are presented with discussions on regulatory frameworks and future trends offering a comprehensive view of this transformative field

Handbook of International Research in Mathematics Education Lyn D. English, David Kirshner, 2015-07-30 This third edition of the Handbook of International Research in Mathematics Education provides a comprehensive overview of the most recent theoretical and practical developments in the field of mathematics education Authored by an array of internationally recognized scholars and edited by Lyn English and David Kirshner this collection brings together overviews and advances in mathematics education research spanning established and emerging topics diverse workplace and school environments and globally representative research priorities New perspectives are presented on a range of critical topics including embodied learning the theory practice divide new developments in the early years educating future mathematics education professors problem solving in a 21st century curriculum culture and mathematics learning complex systems critical analysis of design based research multimodal technologies and e textbooks Comprised of 12 revised and 17 new chapters this edition extends the Handbook s original themes for international research in mathematics education and remains in the process a definitive resource for the field

Imaging Education: Taking CHAT Based Transformative Action Sharada Gade, 2022-02-07 This book is about the reflective journey of Sharada Gade a teacher practitioner who turned into a researcher practitioner The book holds many lessons as the author talks about her collaboration with teachers and her experience in coauthoring research reports with them She also discusses how to teach and implement instructional interventions This practical knowledge is supported by perspectives from cultural historical activity theory CHAT Such a stance offers conceptual clarity to the book s lessons by drawing from across continents institutions and academic fields The culmination of these efforts makes for fascinating reading one that sheds much needed theoretical practical light for practitioners to take transformative action in their own

classrooms *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 side lined 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 Teaching Early Algebra through Example-Based Problem Solving Meixia Ding, 2021-04-07 Drawing on rich classroom observations of educators teaching in China and the U S this book details an innovative and effective approach to teaching algebra at the elementary level namely teaching through example based problem solving TEPS Recognizing young children s particular cognitive and developmental capabilities this book powerfully argues for the importance of infusing algebraic thinking into early grade mathematics teaching and illustrates how this has been achieved by teachers in U S and Chinese contexts Documenting best practice and students responses to example based instruction the text demonstrates that this TEPS approach which involves the use of worked examples representations and deep questions helps students learn and master fundamental mathematical ideas making it highly effective in developing algebraic readiness and mathematical understanding This text will benefit post graduate students researchers and academics in the fields of mathematics STEM and elementary education as well as algebra research more broadly Those interested in teacher education classroom practice and developmental and cognitive psychology will also find this volume of interest **Mathematical Challenges For All** Roza Leikin, 2023-03-17 This book argues that mathematical challenge can be found at any level and at every age and constitutes an essential characteristic of any mathematics classroom aimed at developing the students mathematical knowledge and skills Since each mathematics classroom is heterogeneous with respect to students mathematical potential quality mathematical instruction results from

matching the level of mathematical challenge to different students potential Thus effective integration of mathematical challenge in the instructional process is strongly connected to the equity principle of mathematics education In the three sections in this volume readers can find diverse views on mathematical challenges in curriculum and instructional design kinds and variation of mathematically challenging tasks and collections of mathematical problems Evidence based analysis is interwoven with theoretical positions expressed by the authors of the chapters Cognitive social and affective characteristics of challenging mathematical activities are observed and analyzed The volume opens new avenues of research in mathematics education and pose multiple questions about mathematical instruction rich in mathematical challenge for all The authors invite readers to explore and enjoy mathematical challenges at different levels

What Matters? Research Trends in International Comparative Studies in Mathematics Education Ji-Won Son,Tad Watanabe,Jane-Jane Lo,2017-03-03 This book provides a unique international comparative perspective on diverse issues and practices in mathematics education between and among the US and five high performing TIMSS education systems Japan China Singapore South Korea and Taiwan The book offers multiple perspectives on the important factors that contribute to mathematics teaching and learning in different educational systems and cultural contexts Using large scale data generated by numerous international comparative studies the book analyzes and provides context for various methodological perspectives The book raises compelling questions and issues for mathematics education researchers leading to a critical examination of what can be learned from other education systems Authors address four major research perspectives by critically examining cross national similarities and differences such as research on the influence of curriculum on student learning research on institutional systems of mathematics teacher education research on improving teacher knowledge and pedagogical approaches and research using large scale data This collection of perspectives serves as a foundation for reviewing and analyzing the international comparative studies introduced in the book

Mathematical Creativity and Mathematical Giftedness Florence Mihaela Singer,2018-03-07 This book discusses the relationships between mathematical creativity and mathematical giftedness It gathers the results of a literature review comprising all papers addressing mathematical creativity and giftedness presented at the International Congress on Mathematical Education ICME conferences since 2000 How can mathematical creativity contribute to children s balanced development What are the characteristics of mathematical giftedness in early ages What about these characteristics at university level What teaching strategies can enhance creative learning How can young children s mathematical promise be preserved and cultivated preparing them for a variety of professions These are some of the questions addressed by this book The book offers among others analyses of substantial learning environments that promote creativity in mathematics lessons discussions of a variety of strategies for posing and solving problems investigations of students progress throughout their schooling and examinations of technological tools and virtual resources meant to enhance learning with understanding Multiple perspectives in the interdisciplinary fields of mathematical creativity and giftedness are

developed to offer a springboard for further research The theoretical and empirical studies included in the book offer a valuable resource for researchers as well as for teachers of gifted students in specialized or inclusive settings at various levels of education *Research Studies on Learning and Teaching of Mathematics* Jinfa Cai,Gabriel J. Stylianides,Patricia Ann Kenney,2023-08-02 This book is about promising research advancements that sparked directly or indirectly from intellectual contributions by distinguished internationally recognized mathematics educator and researcher Edward A Silver The features of this book include A focus on the research areas that have benefited from Dr Silver s intellectual contributions and influence such as designing instructional tasks problem posing problem solving preservice teacher learning in service teacher professional development and mathematics assessment Chapters written by contributors who at one time were his doctoral or post doctoral colleagues along with any invited co authors A brief bio of Dr Silver showing his intellectual journey key milestones in his career and scholarly accomplishments that sparked from his intellectual contributions The Oxford Handbook of Creativity and Education EDITOR.,2025-05-13 The Oxford International Handbook of Creativity and Education brings together cutting edge scholarship about the global trends and future directions of creativity in education Diverse models and frameworks capture the state of the field with a focus on cognitive social and cultural areas of creativity in education Barriers and supports to creativity are examined in educational policy assessment curriculum classroom environments and school contexts This handbook is designed to propagate new research and applications in the field by helping students researchers and program evaluators understand and apply these models of creativity to how students teachers and leaders enact creativity in learning teaching and leading The handbook will inspire new work to advance the study and practice of creativity in education Section I provides an overview of creativity frameworks models and pedagogies of education to anchor the handbook Research on creativity in students teachers and schools are discussed in Section II Culture and communities of creativity are explored in depth in Section III Section IV covers creativity in academic disciplines like art music math science and engineering Lastly Section V provides thought provoking chapters on researching education

International Horizons in Mathematics Modelling Education Toshikazu Ikeda,Akihiko Saeki,Vince Geiger,Gabriele Kaiser,2025-08-09 This edited volume provides an extensive overview of the recent strides in global modelling education It examines the interplay between modelling education and various dimensions of the educational landscape Firstly it delves deeply into the intersection of modelling education with interdisciplinary STEM education teacher education lesson study engineering problem solving and posing and creativity Moreover the book places a strong emphasis on the integration of modelling education with foundational mathematical concepts including algebra geometry functions and statistics demonstrating their integral role across elementary secondary and tertiary levels of mathematics education Furthermore the book delves into the specific issues and considerations that shape modelling education It addresses critical pedagogical aspects the integration of technology and cultural and contextual considerations In essence this book stands as a

comprehensive guide that not only surveys the recent advances in global modelling education but also offers invaluable insights and practical guidance *Fostering Collateral Creativity in School Mathematics* Sergei Abramovich,Viktor Freiman,2023-10-03 This book explores the topic of using technology both physical and digital to motivate creative mathematical thinking among students who are not considered mathematically advanced The book reflects the authors experience of teaching mathematics to Canadian and American teacher candidates and supervising several field based activities by the candidates It consists of eight chapters and an Appendix which includes details of constructing computational learning environments Specifically the book demonstrates how the appropriate use of technology in the teaching of mathematics can create conditions for the emergence of what may be called collateral creativity a notion similar to Dewey s notion of collateral learning Just as collateral learning does not result from the immediate goal of the traditional curriculum collateral creativity does not result from the immediate goal of traditional problem solving Rather mathematical creativity emerges as a collateral outcome of thinking afforded by the use of technology Furthermore collateral creativity is an educative outcome of one s learning experience with pedagogy that motivates students to ask questions about computer generated or tactile derived information and assists them in finding answers to their own or the teacher s questions This book intends to provide guidance to teachers for fostering collateral creativity in their classrooms **Research On and Activities For Mathematically Gifted Students** Florence Mihaela Singer,Linda Jensen Sheffield,Viktor Freiman,Matthias Brandl,2016-06-13 This open access Topical Survey offers a brief overview of the current state of research on and activities for mathematically gifted students around the world This is of interest to a broad readership including educational researchers research mathematicians mathematics teachers teacher educators curriculum designers doctoral students and other stakeholders It first discusses research concerning the nature of mathematical giftedness including theoretical frameworks and methodologies that are helpful in identifying and or creating mathematically gifted students which is described in this section It also focuses on research on and the development of mathematical talent and innovation in students including connections between cognitive social and affective aspects of mathematically gifted students Exemplary teaching and learning practices curricula and a variety of programs that contribute to the development of mathematical talent gifts and passion are described as well as the pedagogy and mathematics content suitable for educating pre service and in service teachers of mathematically gifted students The final section provides a brief summary of the paper along with suggestions for the research activities and resources that should be available to support mathematically gifted students and their teachers parents and other stakeholders

Mathematical Problem Posing From Research To Effective Practice Research In Mathematics Education Book Review: Unveiling the Power of Words

In a global driven by information and connectivity, the power of words has be evident than ever. They have the capacity to inspire, provoke, and ignite change. Such could be the essence of the book **Mathematical Problem Posing From Research To Effective Practice Research In Mathematics Education**, a literary masterpiece that delves deep to the significance of words and their affect our lives. Published by a renowned author, this captivating work takes readers on a transformative journey, unraveling the secrets and potential behind every word. In this review, we will explore the book is key themes, examine its writing style, and analyze its overall effect on readers.

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