

100 questions that promote Mathematical Discourse

QUESTIONS THAT WILL:

Help students **work together** to make sense of mathematics

1 What **strategy** did you use?

2 Do you **agree**?

3 Do you **disagree**?

4 Would you **ask the rest of the class** that question?

5 Could you **share your method** with the class?

6 What part of what he said **do you understand**?

7 Would someone like to **share** _____?

8 Can you **convince the rest of us** that your answer makes sense?

9 What do **others think** about what [student] said?

10 Can someone **retell or restate** [student]'s explanation?

11 Did you **work together?** In what way?

13 Have you **discussed this** with your group? With others?

12 Would anyone like to **add to** what was said?

14 Did anyone get a **different answer**?

16 **Did everybody get a fair chance** to talk, use the manipulatives, or be the recorder?

17 How could you help someone without telling them the answer?

15 Where would you go for **help**?

18 How would you **explain** _____ to someone who missed class today?

Mathematical Discourse

Marco A. Bravo, Kip Téllez



Mathematical Discourse:

Mathematical Discourse: Let the Kids Talk! Barbara Blanke, 2019-12-10 This invaluable resource provides teachers with the tools they need to facilitate mathematical discourse and create opportunities for students to think constructively communicate effectively and increase mathematics proficiency This book will help teachers develop a new set of pedagogical skills and strategies to assess plan and organize their classrooms in a manner that is conducive to mathematical discourse With helpful tips and strategies that are easy to implement this standards based book supports an equitable learning environment by encouraging active listening clear communication justification of perspective and acknowledgement of students experiences Each chapter includes Culturally and Linguistically Responsive Teaching and Learning strategies to address cultural norms for diverse populations and support the needs of English language learners With tips for implementing Math Talks and Number Talks this resource will get students thinking like mathematicians in no time *The Role of Mathematics Discourse in Producing Leaders of Discourse* Libby Knott, 2010-01-01 The intent of this monograph is to showcase successful implementation of mathematical discourse in the classroom Some questions that might be addressed are How does a teacher begin to learn about using discourse purposefully to improve mathematics teaching and learning How is discourse interwoven into professional development content courses to provide teachers with the tools necessary to begin using discourse in their own classrooms What does a discourse rich classroom look like and how is it different from other classrooms from both the teacher s and the students perspectives How can teachers of pre service teachers integrate discourse into their content and methods courses How can we use discourse research to inform work with teachers both pre and in service for example to help them know how to respond to elicited knowledge from students in their classrooms What are the discourse challenges in on line mathematics courses offered for professional development Can on line classrooms also be discourse rich What would that look like In what ways does mathematical discourse differ from discourse in general

Mathematical Discourse Kay O'Halloran, 2004-12-01 This book examines mathematical discourse from the perspective of Michael Halliday s social semiotic theory In this approach mathematics is conceptualized as a multisemiotic discourse involving language visual images and symbolism The book discusses the evolution of the semiotics of mathematical discourse and then proceeds to examine the grammar of mathematical symbolism the grammar of mathematical visual images intersemiosis between language visual images and symbolism and the subsequent ways in which mathematics orders reality The focus of this investigation is written mathematical texts The aims of the book are to understand the semantic realm of mathematics and to appreciate the metaphorical expansions and simultaneous limitations of meaning in mathematical discourse The book is intended for linguists semioticians social scientists and those interested in mathematics and science education In addition the close study of the multisemiotic nature of mathematics has implications for other studies adopting a social semiotic approach to multimodality *A Handbook of Mathematical Discourse* Charles Wells, 2003 Mathematical

Discourse that Breaks Barriers and Creates Space for Marginalized Learners ,2017-01-01 For the past decade reform efforts have placed importance on all students being able to participate in collaborative and productive mathematical discourse as an essential component for their learning of mathematics with deep conceptual understandings In this book our intent is to support mathematics education researchers teacher educators teachers and policy makers in providing positive solutions to the enduring challenge in mathematics education of enabling all participants including diverse students to equitably access mathematical discourse By diverse learners we mean learners who are minoritized in terms of gender disability or and social cultural ethnic racial or language backgrounds We aim to increase understanding about what it means to imagine design and engage with policy and practice which enhance opportunities for all students to participate in productive mathematical discourse In widening the lens across policy and practice settings we recognize the interplay between the many complex factors that influence student participation in mathematics The various chapters tell practical stories of equitable practices for diverse learners within a range of different contexts Different research perspectives empirical traditions and conceptual foci are presented in each chapter Various aspects of diversity are raised issues of concern are engaged with and at times conventional wisdom challenged as the authors provide insights as to how educators may address issues of equitable access of minoritized learners to the mathematical discourse within settings across early primary through to high school and situated in schools or in family and community settings

The Pragmatics of Mathematics Education Tim Rowland,2000 Annotation In The Pragmatics of Mathematics Education Tim Rowland examines students in the process of making and coming to know mathematics focusing on the gap between conjecture and belief between assertion and conviction The unexpected finding is that vague language plays an essential role in the communication of students propositions and attitudes Drawing on a large original corpus of mathematical conversations with students whose ages range from 5 to 25 the book includes reports of four empirical studies each of which highlights how students and teachers deploy vague language in various mathematical contexts The book offers Introduction to pragmatics and pragmatic tools Understanding of vague language and what speakers achieve by using it Awareness of the prevalence and function of vague language in the classroom Wide ranging psychological and philosophical discussion of induction and generalisation Major reference on generic examples as a mode of proof

Studying Virtual Math Teams Gerry Stahl,2010-05-03 Studying Virtual Math Teams centers on detailed empirical studies of how students in small online groups make sense of math issues and how they solve problems by making meaning together These studies are woven together with materials that describe the online environment and pedagogical orientation as well as reflections on the theoretical implications of the findings in the studies The nature of group cognition and shared meaning making in collaborative learning is a foundational research issue in CSCL More generally the theme of sense making is a central topic in information science While many authors allude to these topics few have provided this kind of detailed analysis of the mechanisms of intersubjective meaning making This book presents a

coherent research agenda that has been pursued by the author and his research group The book opens with descriptions of the project and its methodology as well as situating this research in the past and present context of the CSCL research field The core research team then presents five concrete analyses of group interactions in different phases of the Virtual Math Teams research project These chapters are followed by several studies by international collaborators discussing the group discourse the software affordances and alternative representations of the interaction all using data from the VMT project The concluding chapters address implications for the theory of group cognition and for the methodology of the learning sciences In addition to substantial introductory and concluding chapters this important new book includes analyses based upon the author's previous research thereby providing smooth continuity and an engaging flow that follows the progression of the research The VMT project has dual goals a to provide a source of experience and data for practical and theoretical explorations of group knowledge building and b to develop an effective online environment and educational service for collaborative learning of mathematics Studying Virtual Math Teams reflects these twin orientations reviewing the intertwined aims and development of a rigorous science of small group cognition and a Web 2.0 educational math service It documents the kinds of interactional methods that small groups use to explore math issues and provides a glimpse into the potential of online interaction to promote productive math discourse

Language for Learning Mathematics: Assessment for Learning in Practice Clare Lee, 2006-06-16 Assessment for learning is a powerful way to raise standards and improve learning However as this book shows effective assessment for learning in the mathematics classroom depends on pupils being able and willing to use mathematical language to express their ideas When discussion negotiation and explanation are encouraged teachers use assessment for learning creatively the work quickly becomes more challenging and the pupils come to see themselves as successful learners Many pupils find it difficult to express ideas in mathematics because of problems with the language that is used to convey mathematical concepts This book shows teachers how to help pupils express what they really know and understand so that assessment for learning can be used The book Discusses what mathematical language is and what it is not Suggests practical approaches to introducing more discourse into the classroom Explores the ideas of assessment for learning rich questioning and dialogue effective feedback and peer and self assessment and suggests how these can be used effectively in mathematics classrooms to improve learning Language for Learning Mathematics is key reading for teachers and trainee teachers in mathematics as well as assessment advisors at LAs

What Counts as Mathematical Discourse? Judit Moschkovich, 2003 In this paper I use situated and socio cultural perspective Gee 1996 1999 to examine descriptions of mathematical discourse and an example of student talk in a mathematics classroom Using this example I discuss how the distinction between everyday and mathematical discourse can help or hinder us in hearing the mathematical content in student talk Contains 1 figure and 1 endnote This work was supported in part by a grant from NSF REC 9896129 and REC 0096065 For complete proceedings see ED500858

Preparing Mathematics and Science

Teachers for Diverse Classrooms Alberto J. Rodriguez, Richard S. Kitchen, 2004-09-22 This book provides a theoretical basis and practical strategies to counter resistance to learning to teach for diversity in culturally and gender inclusive ways and resistance to teaching for understanding using student centered and inquiry based pedagogical approaches Teacher educators from across the United States present rich narratives of their experiences in helping prospective and practicing teachers learn to teach for diversity and for understanding in a variety of mathematics and science contexts Mathematics and science education has been slow to respond to issues of diversity and equity Preparing Mathematics and Science Teachers for Diverse Classrooms Promising Strategies for Transformative Pedagogy helps to begin a network for support and collaboration among teacher educators in science and mathematics who work for multicultural education and equity A unique and much needed contribution this book is an essential resource for teacher educators K 12 teachers who work as student teacher supervisors and cooperating teachers and graduate students in mathematics and science education and a compelling text for science and mathematics methods courses

Power Up Your Math Community Holly Burwell, Sue Chapman, 2024-09-02 A yearlong learning adventure designed to help you build a vibrant math community A powerful math community is an active group of educators students and families alive with positive energy efficacy and a passion for mathematics Students teachers and leaders see themselves and each other as mathematically capable and experience mathematics as a joyful activity Power Up Your Math Community is a hands on 10 month guide designed to help you and your school maximize your students math learning and strengthen your mathematics teaching and learning community Each chapter offers a month s worth of practice based professional learning focused on a desired math habit alongside parallel math problems and learning activities for teachers to use themselves and with students This format allows educators to work together to improve math teaching and learning across a school year building a strong foundation for students mathematical proficiency identity and agency The book ignites solutions and advocates for rigorous and joyful mathematics instruction for everyone including school leaders teachers students and their families Authors Holly Burwell and Sue Chapman provide educators with a detailed roadmap for creating a positive and effective math community that supports all students mathematical learning by Offering guidance on building a math community with chapter vignettes and prompts such as Mathematical Me Let s Do Some Math Since We Met Last Let s Try It Math Talks Manipulatives and Models Matter Game Time and more Emphasizing an assets based approach to teaching math that recognizes the unique strengths and experiences of each student Providing strategies for promoting growth mindset in math and equity and inclusion in math education Focusing on both classroom level and building level improvement as well as offering support for teachers instructional coaches principals and district leaders Power Up Your Math Community will inspire you to reimagine the way you teach math and empower you with the tools to make a lasting impact on your students mathematical understanding So get ready to power up your math community and watch as your students thrive in their mathematical journey

Mathematics Instruction in Dual Language Classrooms Marco A. Bravo, Kip Téllez, 2024-07-01 Language and culture play a critical role in the teaching of mathematics and this role intensifies when considering the teaching of mathematics in dual language classrooms This book unpacks lessons learned from socio cultural theory being applied to research of the teaching of mathematics to Emergent Bilinguals with the end of informing practice Utilizing a socio cultural lens authors present the possibilities and limits of the teaching of mathematics in dual language programs 90 10 50 50 models Themes of translanguaging disciplinary literacy instruction and culturally responsive instruction are leveraged to test the potential of these constructs to assist Spanish English Emergent Bilinguals access rigorous mathematics content Authors also present limits to these models as often they can overshadow the mathematics learning We embrace a stance where language and literacy are seen as tools for content area learning and not as ends unto themselves Proposals for Research Gerry Stahl, 2011-01-11 My career has usually been funded by grants Here are some of the proposals I wrote at the University of Colorado and at Drexel University Successful grant proposals are tricky to write The ones reproduced here might provide helpful examples They may also provide explicit statements of some of the goals of my research over the years

Multilingual Learners and Academic Literacies Daniella Molle, Edynn Sato, Timothy Boals, Carol A. Hedgspeth, 2015-03-05 Shifting the discourse from a focus on academic language to the more dynamic but less researched construct of academic literacies this volume addresses three key questions What constitutes academic literacy What does academic literacy development in adolescent multilingual students look like and how can this development be assessed What classroom contexts foster the development of academic literacies in multilingual adolescents The contributing authors provide divergent definitions of academic literacies and use dissimilar theoretical and methodological approaches to study literacy development Nevertheless all chapters reflect a shared conceptual framework for examining academic literacies as situated overlapping meaning making practices This framework foregrounds students participation in valued disciplinary literacy practices Emphasized in the new college and career readiness standards the notion of disciplinary practices allows the contributing authors to bridge the language content dichotomy and take a more holistic as well as nuanced view of the demands that multilingual students face in general education classrooms The volume also explores the implications of the emphasis on academic literacy practices for classroom instruction research and policy **Enabling Mathematics**

Learning of Struggling Students Yan Ping Xin, Ron Tzur, Helen Thouless, 2022-07-11 This book provides prospective and practicing teachers with research insights into the mathematical difficulties of students with learning disabilities and classroom practices that address these difficulties This linkage between research and practice celebrates teachers as learners of their own students mathematical thinking thus contributing an alternative view of mathematical progression in which students are taught conceptually The research based volume presents a unique collaboration among researchers in special education psychology and mathematics education from around the world It reflects an ongoing work by members of

the International Group for the Psychology of Mathematics Education PME and the North American Chapter of the PME Working Groups The authors of chapters in this book who have been collaborating extensively over the past 7 years are from Australia Canada the United Kingdom and the United States **Language and Mathematics Education** Judit N.

Moschkovich,2010-11-01 Issues of language in mathematics learning and teaching are important for both practical and theoretical reasons Addressing issues of language is crucial for improving mathematics learning and teaching for students who are bilingual multilingual or learning English These issues are also relevant to theory studies that make language visible provide a complex perspective of the role of language in reasoning and learning mathematics What is the relevant knowledge base to consider when designing research studies that address issues of language in the learning and teaching of mathematics What scholarly literature is relevant and can contribute to research In order to address issues of language in mathematics education researchers need to use theoretical perspectives that integrate current views of mathematics learning and teaching with current views on language discourse bilingualism and second language acquisition This volume contributes to the development of such integrated approaches to research on language issues in mathematics education by describing theoretical perspectives for framing the study of language issues and methodological issues to consider when designing research studies The volume provides interdisciplinary reviews of the research literature from four very different perspectives mathematics education Moschkovich Cultural Historical Activity Theory Gutierrez Sengupta Irving Dieckmann systemic functional linguistics Schlepppegrell and assessment Solano Flores This volume offers graduate students and researchers new to the study of language in mathematics education an introduction to resources for conceptualizing framing and designing research studies For those already involved in examining language issues the volume provides useful and critical reviews of the literature as well as recommendations for moving forward in designing research Lastly the volume provides a basis for dialogue across multiple research communities engaged in collaborative work to address these pressing issues **Research for Educational Change** Jill Adler,Anna Sfard,2016-06-17 Research for Educational Change presents

ways in which educational research can fulfil its commitments to educational practice Focussing its discussion within the context of mathematics education it argues that while research generated insights can have beneficial effects on learning and teaching the question of how these effects are to be generated and sustained is far from evident The question of how to turn research into educational improvement is discussed here in the context of learning and teaching hindered by poverty and social injustice In the first part of the book four teams of researchers use different methodologies while analysing the same corpus of data collected in a South African mathematics classroom In the second part each of these teams makes a specific proposal about what can be done and how so that its research generated insights have a tangible beneficial impact on what is happening in mathematical classrooms Combining two discourses that of researchers speaking to one another and that of researchers communicating their insights to those responsible for educational practice the book deals with the perennial

question of communication between those who study educational processes and those who are directly responsible for teacher education educational research and classroom practices This book will be key reading for postgraduates researchers and academics in education and particularly in the areas of mathematics education education research teacher education and classroom practice It will also appeal to teacher educators practitioners and undergraduate students interested in educational research

Rough Draft Math Amanda Jansen, 2023-10-10 Talking and writing about unfinished ideas is vital to learning mathematics but most students only speak up when they think they have the right answer especially middle school and high school students Amanda Jansen and her collaborating teachers have developed a breakthrough approach to address this challenge In *Rough Draft Math: Revising to Learn* Jansen shares the power of infusing math class with the spirit of revision so that students feel comfortable thinking aloud as they problem solve rather than talking only to perform right answers Creating a Community of Learners As part of the rough draft framework a class of students becomes an equitable and inclusive community of thinkers one where students feel safe to engage in discourse while developing mathematical competency and confidence Practical Application of Innovative Ideas This book includes specific teaching techniques and a range of classroom vignettes showing rough draft math in action within a student centered teaching approach Children can develop solutions at their own pace and share thought processes behind their conclusions Classroom Tested Jansen has developed the concept of rough draft math in collaboration with a diverse group of dynamic and reflective teachers *Rough Draft Math* provides a blueprint for educators to allow free thinking discussion while maintaining the mathematical learning goals *Rough Draft Math* Jansen shows how to create an energetic classroom culture where students readily participate and share their evolving understanding while engaging in math talk collaborative problem solving and ongoing revision of ideas

Rethinking the Teaching Mathematics for Emergent Bilinguals Ji Yeong I, Hyewon Chang, Ji-Won Son, 2019-11-09 This book focuses on the role of cultural background in Korean public schools and provides essential insights into how Korean teachers perceive and respond to the transition of their classroom situations with Korean language learners It reveals the perspectives and the practices of Korean teachers especially with regard to multicultural students who struggle with language barriers when learning mathematics The information provided is both relevant and topical as teaching mathematics to linguistically and culturally diverse learners is increasingly becoming a worldwide challenge

Exploiting Mental Imagery with Computers in Mathematics Education Rosamund Sutherland, John Mason, 2012-12-06 The advent of fast and sophisticated computer graphics has brought dynamic and interactive images under the control of professional mathematicians and mathematics teachers This volume in the NATO Special Programme on Advanced Educational Technology takes a comprehensive and critical look at how the computer can support the use of visual images in mathematical problem solving The contributions are written by researchers and teachers from a variety of disciplines including computer science mathematics mathematics education psychology and design Some focus on the use of external

visual images and others on the development of individual mental imagery The book is the first collected volume in a research area that is developing rapidly and the authors pose some challenging new questions

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