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The Journal of Mathematical Behavior

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Abstract

The Journal of Mathematical Behavior solicits original research on the learning and teaching of mathematics, from young children to adults, with a focus on how mathematical ideas are developed in learners under certain conditions that support learning. We are interested especially in basic research that aims to clarify, in detail and depth, how mathematics is learned.

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Chapter 22
The Journal of Mathematical Behavior



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Abstract *The Journal of Mathematical Behavior* solicits original research on the learning and teaching of mathematics, from young children to adults, with a focus on how mathematical ideas are developed in learners under certain conditions that support learning. We are interested especially in basic research that aims to clarify, in detail and depth, how mathematics is learned.

Keywords Mathematics · Learning · Teaching · Research

22.1 Introduction

The Journal of Mathematical Behavior (JMB) has continued to serve as a leading journal in the field for almost half a century. It was founded by the late Robert B. Davis in 1971 as the *Journal of Children's Mathematical Behavior*. The first issue of the journal that was available for the research community was Volume 1, issue number 3, September 1975. This volume includes the following statement: "The Madison Project is one of the federally-funded 'New Math' projects. It is concerned both with practical assistance to schools and teachers, and also with theoretical questions in the areas of the nature of learning, the selection of appropriate curricula, and the creation of effective learning environments." In autumn 1980, Volume 3 became the first issue of *The Journal of Mathematical Behavior*, with the expanded focus on mathematics learning, teaching, assessment and policy.

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Robert B. Davis' view in establishing the journal was to introduce new perspectives about learning mathematics with ideas drawn from cognitive science, to reshape, and make more rigorous, the ways that we investigate and conceptualize how mathematics can be learned. His book *Learning mathematics: The cognitive science approach to mathematics education* (Davis 1984) summarized this new perspective. Many influential papers were published at this time in a range of research journals, illustrating the cognitive science approach for studying mathematics learning.

The original mission of *The Journal of Mathematical Behavior* is reflected in current work. *The Journal of Mathematical Behavior* continues to seek to stimulate investigation and discussion of important questions about how people learn mathematics, reason mathematically, solve mathematical problems and use mathematics in their daily lives. As noted on the Journal's web site, "*The Journal of Mathematical Behavior* solicits original research on the learning and teaching of mathematics. We are interested especially in basic research that aims to clarify, in detail and depth, how mathematical ideas develop in learners." We welcome papers that "develop detailed, fundamental understanding of how people, in realistic settings, build, retain, communicate, apply and understand important mathematical ideas."

A *distinguishing feature* of JMB is that we focus on qualitative analyses that provide detail in how mathematical ideas and ways of reasoning are built by learners, supported, if applicable, with appropriate quantitative (statistical) data analysis.

22.2 Scope

As described on the JMB website, "Our intended audience includes researchers who concentrate on the learning of mathematics and science, psychologists, mathematicians, cognitive scientists, teachers, teacher educators, curriculum developers, parents, administrators, and policy makers." For example, recent findings have highlighted the importance of research on newly-developing aspects of mathematics learning, teaching, and assessment such as the complexity of learning mathematics and the attention to be paid to issues for English language learners (EL students) and learners with specific learning challenges.

The editors encourage submission of reports of basic studies that might indicate a range of possibilities not commonly recognized. Such studies might do the following: clarify potential obstacles to student understanding of mathematics; describe and analyze relevant efforts to improve curriculum or pedagogy in mathematics, at any level, from early childhood through adulthood; offer analyses of appropriate goals for mathematics curricula for diverse student populations; and critically discuss what might be changed in curricula or in learning experiences. In addition to more formal studies, the editors welcome dialogue, discussion, and debate. We encourage authors to submit short papers that continue, extend, modify, or challenge work that has appeared in JMB.

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22.3 Guide for Authors

Instructions for preparing a paper for submission are available on the Elsevier website https://www.journals.elsevier.com/the-journal-of-mathematical-behavior.

From that site, authors can download the *Understanding the Publishing Process* document or the *Author Information Pack* or read the *Guide for Authors* online. Also refer to the *Authors' Update* web page https://www.elsevier.com/connect/authors-update for up-to-date information of interest to authors, reviewers, and readers.

To submit a manuscript, log on to EVISE for *The Journal of Mathematical Behavior* at https://www.evise.com/profile/#/MATBEH/login.

Follow the instructions for creating an account if you do not already have one. Submit a manuscript by selecting the *My Author Tasks* tab and then clicking on the blue button for *Start New Submission*. Enter information under the four categories (*Enter manuscript information*, *Upload files*, *Provide additional information*, and *Review and submit*).

Authors should note the following common misunderstandings relating to submitting manuscripts to JMB.

- The EVISE system requires that you submit only a blinded version of the manuscript. Please do not submit an unblinded manuscript.
- There is no limit on the length of a submission.
- Page numbers are not required, but they are very helpful to reviewers and editors.
- This Journal does not accept manuscripts focusing on strictly statistical analyses. We accept manuscripts with statistical analyses that supplement and support qualitative research.
- Manuscripts submitted to this journal that include summaries of results must also include supporting data.
- The Journal does not accept manuscripts describing lesson plans, unless they are in the context of student learning.
- Papers on strictly mathematical topics (e.g., proofs of theorems) are not suitable for this journal.
- Due dates for submissions of revised manuscripts are set automatically by system default. If you need more time to revise a manuscript, send a request to the editor handling your manuscript. Such requests are usually granted.
- If any parts of the decision letter are not clear, ask the editor handling your manuscript for clarification.

22.4 Language Editing Services

Editing, proofreading, and translation services are available to authors whose first language is not English. These services are available through the WebShop at https://webshop.elsevier.com/.

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22.5 Special Issues

In order to address particular areas of mathematics learning that require multiple perspectives and contributions, we invite proposals for *Special Issues*. Over the years, *Special Issues* involved a variety of topics related to learning and teaching particular areas of mathematics, elementary through tertiary.

Special Issues, either stand-alone or as Special Issue Sections, consist of original papers focused on a particular topic; these collections have made important contributions to the field. Table 22.1 gives the range of Special Issue topics that have been published in this journal.

Table 22.1 Special issues of the journal of mathematical behavior

Year and Vol.	Special issue/Link	Editors
2018	Learning through activity	Martin Simon, Maria Blanton
2018	International teaching and learning of mathematics	Peter Sullivan, Louise C. Wilkinson
2018	The roles of examples in proving and learning to prove	Orit Zaslavsky, Eric Knuth, Amy Ellis
2017, 46	Preparing and implementing successful mathematics coaches and teacher leaders	Aimee Ellington, Joy Whitenack, Christine Trinter
	https://www.sciencedirect.com/journal/the-journal-of-mathematical-behavior/vol/46/suppl/C	
2016, 41	The many colors of math: Engaging students through collaboration and agency	Jo Boaler
	https://www.sciencedirect.com/journal/the-journal-of-mathematical-behavior/vol/41/suppl/C	
2015, 40A	The language of learning mathematics	Louise Wilkinson
	https://www.sciencedirect.com/journal/the-journal-of-mathematical-behavior/vol/40/part/PA	
2013, 32.4	The teaching abstract algebra for understanding project: designing and scaling up a curriculum innovation	Sean Larsen, Estrella Johnson, Keith Weber
	https://www.sciencedirect.com/journal/the-journal-of-mathematical-behavior/vol/32/issue/4	
2007, 26.3	An inquiry oriented approach to differential equations	Chris L. Rasmussen
	https://www.sciencedirect.com/journal/the-journal-of-mathematical-behavior/vol/26/issue/3	

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Table 22.1 (continued)

Year and Vol.	Special issue/Link	Editors
2005, 24.3	Mathematical problem solving: What we know and where we are going	Jinfa Cai, Joanna Mamona-Downs, Keith Weber
	https://www.sciencedirect.com/journal/the-journal-of-mathematical-behavior/vol/24/issue/3	
2003, 22.3	Fractions, ratio and proportional reasoning, Part B	Gary E. Davis
	https://www.sciencedirect.com/journal/the-journal-of-mathematical-behavior/vol/22/issue/3	
2003, 22.2	Fractions, ratio and proportional reasoning, Part A	Gary E. Davis
	https://www.sciencedirect.com/journal/the-journal-of-mathematical-behavior/vol/22/issue/2	
1998, 17.2	Representations and the psychology of mathematics education, Part II	Gerald A. Goldin, Claude Janvier
	https://www.sciencedirect.com/journal/the-journal-of-mathematical-behavior/vol/17/issue/2	
1998, 17.1	Representations and the psychology of mathematics education, Part I	Gerald A. Goldin, Claude Janvier
	https://www.sciencedirect.com/journal/the-journal-of-mathematical-behavior/vol/17/issue/1	
1997, 16.3	An investigation into students' understanding of abstract algebra (binary operations, groups, and subgroups) and the use of abstract structures (through cosets, normality, and quotient groups)	Ed Dubinsky
	https://www.sciencedirect.com/journal/the-journal-of-mathematical-behavior/vol/16/issue/3	
1994, 13.1	What mathematics should children learn?	Robert B. Davis
	https://www.sciencedirect.com/journal/the-journal-of-mathematical-behavior/vol/13/issue/1	

22.5.1 Proposals for Special Issues

The editors encourage new proposals. Special Issues (about 12–15 papers) or Special Sections (about 8–10 papers) should appear in fewer than half the issues that make up the Journal each year. Given the number of suggestions received, the editors have to be quite selective in accepting ideas and topics that will make an important, timely and high-quality contribution to the field. To optimize the appropriate timing of publication, the editors welcome suggestions at an early stage in their development. In some cases, initial contact may be made with any of the editors for exploratory discussions, and these may lead to a proposal by the prospective guest editors. Alternatively, guest editors may also proceed directly to submitting a proposal. The following list gives the information needed in a proposal for a Special Issue. All proposals are reviewed by the journal editors in consultation with the Publisher.

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22.5.1.1 Basic Information

- Provisional title
- Names, titles, affiliations and contact information (including email information) of all the proposed guest editors
- Short title of the Special Issue (maximum 23 characters including spaces).

22.5.1.2 Overview

- Proposed topic, with outline scope and structure
- Academic rationale (contribution of the issue to the development of the field, etc.)
- Any special circumstances (conference, major research project, festschrift, etc.)
- Special Issue rationale.

22.5.1.3 Possible Contributors

- Number of expected papers to be published in this Special Issue
- If known, a list of the potential authors plus topics; if not known, the steps to be used to identify such a list.

22.5.1.4 Process for Reviewing Papers

- Stages of submission, review and decision
- Mode of submission and review
- Role of any workshops, meetings, etc.
- Brief information about the editorial and related experience of the guest editors.

22.5.1.5 Schedule

- The date the first submission is expected
- The date by which all papers should be submitted
- The delivery date by which all manuscripts should be fully reviewed and final decisions made on all manuscripts
- Expected date of submission to the publishers.

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22.6 Reviewing for *the Journal of Mathematical Behavior*

If you register for the Evise system in order to submit a manuscript, you are automatically placed in the system to be considered as a reviewer. Potential reviewers should specify areas of interest (e.g. *algebra, preservice teacher preparation, language of mathematics*). Alternately, those interested in reviewing manuscripts can get in touch with one of the editors.

Reviewer guidelines can be found at https://www.elsevier.com/reviewers/how-to-review.

Brief guidelines are as follows:

- You should agree to do a review only if the manuscript fits with your area of expertise, there is no conflict of interest, and you will be able to complete the review within the required time frame.
- The manuscript should be treated as confidential.
- Verify that the methods section describes a sound methodology and that the conclusions are consistent with the data.
- Reviews should be courteous and constructive. Personal details about the reviewer, including name, should not be included.
- The recommendation will be reject, accept, major revisions, or minor revisions. All recommendations should be supported by specific details about the manuscript.

22.7 Summary Statistics on Utilization

From July 2017 through June 2018, there were 193 manuscripts submitted to the Journal, with 71 manuscripts accepted, a rate of about 37%.

Table 22.2 gives information about most-downloaded articles.

Table 22.3 gives information on most-cited manuscripts.

22.8 Editorial Team

In conclusion, *The Journal of Mathematical Behavior* offers researchers and scholars an unparalleled opportunity to share knowledge and to invite colleagues to join in discussion about the significant issues of mathematical learning, teaching, and assessment. We encourage potential authors to search the published articles in the journal for colleagues whose interests and work align with their own; this, in turn can lead to collaborations that enhance the efforts that each individually may make.

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Table 22.2 Articles most-downloaded from JMB

Title	Date	Authors
Learning mathematics through algorithmic and creative reasoning	December 2014	Bert Jonsson, Mathias Norqvist, Yvonne Liljekvist, Johan Lithner
Knowledge of nonlocal mathematics for teaching	March 2018	Nicholas H. Wasserman
Mathematics teachers' attention to potential classroom situations of argumentation	March 2018	Michal Ayalon, Rina Hershkowitz
Secondary mathematics teachers' instrumental integration in technology-rich geometry classrooms	March 2018	Karen Hollebrands, Samet Okumuş
Reflective abstraction in computational thinking	September 2017	Ibrahim Cetin, Ed Dubinsky
Playing number board games supports 5-year-old children's early mathematical development	September 2016	Jessica Elofsson, Stefan Gustafson, Joakim Samuelsson, Ulf Träff
Designing mathematics classes to promote equity and engagement	March 2016	Jo Boaler
Discovering and addressing errors during mathematics problem-solving—A productive struggle?	June 2016	Carina Granberg
The many colors of algebra: The impact of equity focused teaching upon student learning and engagement	March 2016	Jo Boaler, Tesha Sengupta-Irving
An operational definition of learning	September 2010	Guershon Harel, Boris Koichu

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Table 22.2 (continued)

Title	Date	Authors
From language as a resource to sources of meaning in multilingual mathematics classrooms	June 2018	Richard Barwell
Prerequisite algebra skills and associated misconceptions of middle grade students: A review	September 2013	Sarah B. Bush, Karen S. Karp
Are indirect proofs less convincing? A study of students' comparative assessments	March 2018	Stacy Ann Brown
Students' conceptualisations of multiplication as repeated addition or equal groups in relation to multi-digit and decimal numbers	December 2017	Kerstin Larsson, Kerstin Pettersson, Paul Andrews
Academic literacy in mathematics for English Learners	December 2015	Judit N. Moschkovich
The language of learning mathematics: A multimodal perspective	December 2015	Kay L. O'Halloran
Educative experiences in a games context: Supporting emerging reasoning in elementary school mathematics	June 2018	P. Janelle McFeetors, Kylie Palfy
Habits of mind: An organizing principle for mathematics curricula	December 1996	Al Cuoco, E. Paul Goldenberg, June Mark
Eye color and the practice of statistics in Grade 6: Comparing two groups	March 2018	Jane Watson, Lyn English
Students' epistemological frames and their interpretation of lectures in advanced mathematics	March 2018	Victoria Krupnik, Timothy Fukawa-Connelly, Keith Weber
Using contextualized tasks to engage students in meaningful and worthwhile mathematics learning	January 2018	Doug Clarke, Anne Roche
Effectively coaching middle school teachers: A case for teacher and student learning	June 2017	Aimee Ellington, Joy Whitenack, David Edwards
Evaluation of three interventions teaching area measurement as spatial structuring to young children	June 2018	Douglas H. Clements, Julie Sarama, Douglas W. Van Dine, Jeffrey E. Barrett, Craig J. Cullen, Aaron Hudyma, Ron Dolgin, Amanda L. Cullen, Cheryl L. Eames
Undergraduates' images of the root concept in $\mathbb{R}$ and in $\mathbb{C}$	March 2018	Igor' Kontorovich
How mathematicians assign points to student proofs	March 2018	David Miller, Nicole Infante, Keith Weber

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Table 22.3 Most-cited manuscripts from JMB

Title	Date	Authors
Developing mathematical competence: From the intended to the enacted curriculum	March 2014	Jesper Boesen, Ola Helenius, Ewa Bergqvist, Tomas Bergqvist, Johan Lithner, Torulf Palm, Björn Palmberg
The fractional knowledge and algebraic reasoning of students with the first multiplicative concept	September 2013	Amy J. Hackenberg
Learning trajectories in teacher education: Supporting teachers' understandings of students' mathematical thinking	June 2013	P. Holt Wilson, Gemma F. Mojica, Jere Confrey
The language of learning mathematics: A multimodal perspective	January 2015	Kay L. O'Halloran
A local instructional theory for the guided reinvention of the group and isomorphism concepts	December 2013	Sean P. Larsen
Learning mathematics through algorithmic and creative reasoning	December 2014	Bert Jonsson, Mathias Norqvist, Yvonne Liljekvist, Johan Lithner
Examining novice teacher leaders' facilitation of mathematics professional development	March 2014	Hilda Borko, Karen Koellner, Jennifer Jacobs
The role of problem representation and feature knowledge in algebraic equation-solving	September 2013	Julie L. Booth, Jodi L. Davenport
High school students' understanding of the function concept	March 2013	Ed Dubinsky, Robin T. Wilson
Equation structure and the meaning of the equal sign: The impact of task selection in eliciting elementary students' understandings	June 2013	Ana C. Stephens, Eric J. Knuth, Maria L. Blanton, Isil Isler, Angela Murphy Gardiner, Tim Marum
Young children's recognition of quantitative relations in mathematically unspecified settings	September 2013	Jake A. McMullen, Minna M. Hannula-Sormunen, Erno Lehtinen
Covariational reasoning and invariance among coordinate systems	September 2013	Kevin C. Moore, Teo Paoletti, Stacy Musgrave
A framework for characterizing student understanding of Riemann sums and definite integrals	March 2014	Vicki Sealey
Prerequisite algebra skills and associated misconceptions of middle grade students: A review	September 2013	Sarah B. Bush, Karen S. Karp
Impacting positively on students' mathematical problem solving beliefs: An instructional intervention of short duration	March 2014	Andreas J. Stylianides, Gabriel J. Stylianides
The negative sign and exponential expressions: Unveiling students' persistent errors and misconceptions	March 2013	Richard Cangelosi, Silvia Madrid, Sandra Cooper, Jo Olson, Beverly Hartter

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Table 22.3 (continued)

Title	Date	Authors
ICT-supported problem solving and collaborative creative reasoning: Exploring linear functions using dynamic mathematics software	March 2015	Carina Granberg, Jan Olsson
Academic literacy in mathematics for English Learners	January 2015	Judit N. Moschkovich
A formative assessment of students' algebraic variable misconceptions	March 2014	Joan Lucariello, Michele T. Tine, Colleen M. Ganley
Learning angles through movement: Critical actions for developing understanding in an embodied activity	December 2014	Carmen Petrick Smith, Barbara King, Jennifer Hoyte
About the concept of angle in elementary school: Misconceptions and teaching sequences	March 2013	Claude Devichi, Valérie Munier
A model of students' combinatorial thinking	June 2013	Elise Lockwood
A local instructional theory for the guided reinvention of the quotient group concept	December 2013	Sean Larsen, Elise Lockwood
A power meaning of multiplication: Three eighth graders' solutions of Cartesian product problems	September 2013	Erik S. Tillema
Knowledge shifts and knowledge agents in the classroom	March 2014	Michal Tabach, Rina Hershkowitz, Chris Rasmussen, Tommy Dreyfus

Reference

Davis, R. B. (1984). *Learning mathematics: The cognitive science approach to mathematics education*. Norwood, New Jersey: Greenwood Publishing Group.

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