

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.

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/>.

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 | |

(continued)

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.

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.

22.6 Reviewing for *the Journal of Mathematical Behavior*

If you register for the Evis 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 |

(continued)

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 |

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

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