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Introduction of Special Issue on Challenges and Solutions in Mathematics Teaching for ALL Students in the Inclusive Classroom

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Welcome to the Journal of Mathematics Education's (JME) Special Issue on Challenges and Solutions in Mathematics Teaching for ALL Students in the Inclusive Classroom. For more than thirty-five years, mathematics teachers in the United States have been encouraged to use a variety of strategies to help students succeed in learning mathematics (NCTM 1989, 2000, 2010, & 2014). Educators today are seeking effective classroom teaching practices and innovative programs in response to new and old challenges. There has never been a greater need to ensure today's students are prepared for the rapidly changing future in which we hope they become productive members of society. Teachers are encouraged to supplement traditional teaching with strategies that encourage active learning, educational technologies, and making connections between different areas of learning.

This special issue focuses on effective and innovative teaching practices, providing strategies for mathematics teachers to support learning by all students in their classrooms. As the field of mathematics education internationalizes, emergent challenges merging with existing difficulties are counter-balanced by exciting solutions shared across countries and cultures (Hiebert et al., 2003; Huang & Li, 2009). This Special Issue of JME contributes to this effort of internationalization of pedagogy. As described in the original Call for Papers (JME, 2022), the focus for this special issue is research on effective classroom teaching practice and innovative programs in response to new and old challenges including innovative teacher training programs, effective mathematics teaching strategies in the inclusive classrooms, research practices that support ALL students' mathematics learning and equity, diversity, and inclusion strategies in STEM integration in mathematics classrooms. As listed on its webpage

(https://journalofmathed.scholasticahq.com/about), "JME is an internationally oriented, peer-reviewed [double-blind], open access academic journal. Our focus is on advancing ongoing research and practice of diverse studies in the field of mathematics education" (Para 1). As a stable, scholarly publication, JME provides an important contribution to the continuing internationalization of mathematics education scholarship.

In particular, this Special Issue includes four peer-reviewed research reports contributing to the description of specific challenges and possible solutions across a global scale, including research from Taiwan, Italy, and the United States. For example, the article titled *Special Education Teachers' Knowledge of Fraction Division*—by Hsiu-fei Lee (Department of Special Education, National Taitung University), Shuhua An (Department of Teacher Education, California State University, Long Beach), and Jane Jane Lo (Department of Mathematics, Western Michigan University)—describes a study that investigated both procedural and conceptual knowledge of fraction division for 74 Taiwanese special education in-service teachers inspired by a study by Ma (2010). Solving the arithmetic problem using procedural knowledge while focusing on posing a word problem for conceptual knowledge brings to light how many teachers lack a solid understanding of fraction division. Lee, An, and Lo compare their findings with other international findings on fractional thinking (e.g., Ball, 1990; Copur-Gencturk, 2022; Isik & Kar, 2012; Ma, 2010; Xie & Masingila, 2017). Such studies involving special education are sorely needed for the mathematics education field (Lambert & Tan, 2020).

Consider another article in this Special Issue titled *Math Placement of Language Minority High School Students* by Kimberly Powers (Huntington Beach Union High School District) and Shuhua An (Department of Teacher Education, California State University, Long Beach). Powers and An used a theoretical framework adapted from Byrnes and Miller's Opportunity-Propensity Model (2007) to explore opportunities students have when placed in the proper initial mathematics course. They examined how the Initial Math Course Placement Level impacted the math course final grades of language minority immigrant high school students (LMIHS), and the relationships between the Initial Math Course Placement Level and English Language Development (ELD) Placement, and between Math Course Final Grades and ELD Placement. The results of their study suggest using simplified English instructions with minimal vocabularies for math placement tests of these students, as well as assessing LMIHS students multiple times with initial math placement tests to better ensure accurate placement in the mathematics courses. They conclude that using combinations of appropriate mathematics and ELD placements while evaluating LMIHS students "provide[s] them with opportunity to learn and access to rigorous mathematics coursework to ensure their success in math."

A third article is titled *Variation Approach on Semiotic Registers/Sets using Eastern-Western Abaci in Primary Schools* by Giuseppe Bianco (Department of Mathematics and Computer Science, Università degli Studi di Palermo) uses the methods of Variation Theory (Marton et al., 2004) to present the design and preliminary findings of a multimodal tool shaped by the variation approach. Bianco applies this technique to the use of different Western, Chinese, and Japanese Abaci and their visualizations during simple addition and subtraction computations of 60 primary school students in Italy. The strengths (using the tool for displaying student thinking) and weakness (such as confusion over color, student movement of abaci beads in conflicting directions, and uncertain teacher roles) of these interactive tools on building pre-algebraic competency is shared. Additionally, most students preferred the Western abaci first, Soroban second, and Suanpan third.

Fourth and finally, the article titled *Teacher Professional Development via a MOOC on Assistive Technology for Visually Impaired Students Learning Mathematics* by Margherita Piroi (Università di Torino e Politecnico di Torino), Carola Manolino (Università della Valle d'Aosta), Tiziana Armano (Università di Torino), Eugenia Taranto (Università di Catania), and Anna Capietto (Università di Torino) describes a MOOC (Massive Open Online Course) for secondary mathematics offering various accessibility solutions for visually impaired students. Using different assistive technologies to support the learning of all students, emphasis was placed on teachers' lesson designs to shape inclusive didactical praxeologies. The authors detail their coding procedures to analyze four case-studies to highlight "how different agents—activated by the MOOC at a micro-level—originated at a macro-level inclusive praxeologies, with respect to choosing assistive technology use in the classroom."

In conclusion, this Special Issue comes at an important historical moment for JME and for the evolution of its sister organization, Mathematics Classroom Teaching Research for All Students (MCTRAS), which in the last year expanded from the previous Classroom Teaching Research for All Students (CTRAS) organization by being officially registered in the United States' state of California. This Special Issue also represents another important milestone for JME—the first, inaugural, fully-electronic version of JME. We hope these studies provide illumination on some emergent and existing challenges, including offering solutions to some specific aspects of mathematics education.

This 2023 Special Issue continues JME's rich tradition of Special Issues, which have included topics ranging from STEM, online, and innovative teaching strategies, to mental computation. We also wish to call attention to the next 2024 JME Special Issue on Technology and Artificial Intelligence issues. In a world rapidly accelerating toward integration with AI algorithms, creating new exciting opportunities but raising deep and potentially disturbing new questions and concerns. We have noted a trend in the biological sciences of automated research collection that generates and analyzes massive amounts of

new data. Researchers that do not embrace this new reality risk being sidelined in the cultural evolution of the human scientific enterprise by more tech-savvy researchers. We highlight the upcoming MCTRAS conference. As the JME community continues to expand, we invite the reader to consider submitting their own research to future issues of JME.

References

Ball, D. L. (1990). Prospective elementary and secondary teachers' understanding of division. *Journal for Research in Mathematics Education*, *21*(2), 132–144.

Byrnes, J. P., & Miller D. C. (2007). The relative importance of predictors of math and science achievement: An opportunity-propensity analysis. *Contemporary Educational Psychology, 32*, 599–629.

Copur-Gencturk, Y. (2021). Teachers' conceptual understanding of fraction operations: Results from a national sample of elementary school teachers. *Educational Studies in Mathematics*, *107*(3), 525–545.

Hiebert, J., Gallimore, R., Garnier, H., Givvin, K. B., Hollingworth, H., Jacobs, J., et al. (2003). *Teaching mathematics in seven countries: Results from the TIMSS 1999 video study*. Washington, DC: NCES.

Huang, R., & Li, Y. (2009). Pursuing excellence in mathematics classroom instruction through exemplary lesson development in China. *ZDM Mathematics Education*, *41*, 297–309.

Isik, C., & Kar, T. (2012). An error analysis in division problems in fractions posed by preservice elementary mathematics teachers. *Educational Sciences: Theory and Practice*, *12*(3), 2303–2309.

Lambert, R., & Tan, P. (2020). Does disability matter in mathematics educational research? A critical comparison of research on students with and without disabilities. *Mathematics Education Research Journal*, *32*, 5–35. https://doi.org/10.1007/s13394-019-00299-6

Ma, L. (2010). *Knowing and teaching elementary mathematics: Teachers' understanding of fundamental mathematics in China and the United States*. Routledge.

Marton, F., Runesson, U., & Tsui, A. B. M. (2004). The space of learning. In Marton, F., & Tsui, A.B.M. (2004). *Classroom Discourse and the Space of Learning*. Lawrence Erlbaum Associates Publishers, (pp. 3–40). https://doi.org/10.4324/9781410609762

NCTM. (1989). *Curriculum and evaluation standards for school mathematics*. National Council of Teacher of Mathematics.

NCTM. (1991). *Professional standards for teaching mathematics*. National Council of Teacher of Mathematics.

NCTM. (2000). *Principles and standards for school mathematics*. National Council of Teacher of Mathematics.

NCTM. (2014). *Principles to actions: Ensuring mathematical success for all*. National Council of Teacher of Mathematics.

Xie, J., & Masingila, J. O. (2017). Examining interactions between problem posing and problem solving with prospective primary teachers: A case of using fractions. *Educational Studies in Mathematics, 96*(1), 101–118.

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