



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS

# The Role of Elementary Mathematics Specialists in the Learning and Teaching of Mathematics

*A Call for Elementary Mathematics Specialists in Support of High-Quality Teaching and Learning of Mathematics (Fall, 2022)*

This updated joint position of the Association of Mathematics Teacher Educators (AMTE), the Association of State Supervisors of Mathematics (ASSM), NCSM: Leadership in Mathematics Education (NCSM) and the National Council of Teachers of Mathematics (NCTM) calls for elementary mathematics specialists to help ensure equitable and effective mathematics learning for each and every student.

## Our Position

AMTE, ASSM, NCSM, and NCTM strongly recommend using Elementary Mathematics Specialists (EMSs) in PK–6 environments to enhance the planning, teaching, learning, and assessment of mathematics. We further advocate that every elementary school has access to an EMS professional. We know that elementary mathematics specialists positively affect student achievement, particularly when they have completed specialized preparation and have sufficient time to interact with teachers. Mathematics teacher educators in school districts, state/province departments of education, and institutes of higher education should collaborate in providing initial preparation programs and ongoing support for elementary mathematics specialists. This includes continuing to increase access to rigorous programs and certification. Those serving as elementary mathematics specialist professionals should be expected to have a deep and broad knowledge of mathematics content, expertise in using and helping others use effective instructional practices, and the ability to support efforts that help all PK–6 students learn important mathematics. Programs established by colleges and universities, state/province departments of education, or school districts to prepare and provide continuing support for elementary mathematics specialist professionals should include an overarching attention to access and equity with specific foci on mathematics content, pedagogy, and leadership knowledge and skills.

## The Value of Elementary Mathematics Specialists

A challenge in most elementary schools is to provide students with the opportunity to make sense of problems and deeply engage with mathematics content; share, listen to, understand, and respond to the ideas of others; and build new learning by drawing on prior experiences from their lives, both in and out

of school. This challenge is addressed when teachers have a positive mathematics identity, strong content and pedagogical knowledge, a deep understanding of how students learn mathematics, and a belief that all students are capable of learning mathematics at high levels.

Elementary mathematics specialists can help address these challenges through their focus on a school or school district's mathematics program improvement. They model and provide the necessary support for teachers' use of the effective and equitable teaching practices<sup>1,2</sup> known to make a difference for students engaging deeply with both the mathematics content and mathematical practices and processes.<sup>3</sup> Elementary mathematics specialists directly or indirectly support each and every student as they develop deep mathematical understanding; engage in reasoning, problem solving, and sense making; and form a positive math identity and strong sense of agency.

Research studies at the elementary and middle school levels indicate that the efforts of EMSs positively affect student achievement in mathematics.<sup>2,3</sup> Note that studies of greater duration indicate that significant impact on student mathematics achievement is related to both the experience of elementary mathematics specialists and sufficient time for them to interact with teachers.<sup>4-7</sup> Elementary mathematics specialist professionals influence mathematics learning and teaching due to their unique positions within their classrooms and schools and their ability to support responsive professional development for the teachers involved.<sup>8</sup>

## The Work of Elementary Mathematics Specialists

The work of an elementary mathematics specialist takes many forms, including work with teachers and work with students. Work with teachers occurs one-on-one or within a grade-level team, in a space where teachers are safe to explore their teaching and deepen their understanding of mathematics content and pedagogy as well as their ability to responsively use high-quality instructional materials. An elementary mathematics specialist develops and regularly monitors teachers' understanding and instructional implementation. These specially prepared professionals are regularly involved in mentoring novice and experienced teachers; coaching, which often includes co-planning and co-teaching; planning and providing professional development opportunities; and planning for and helping to maintain professional learning communities.

An elementary mathematics specialist working with students may do so as either a mathematics interventionist or a mathematics teacher for multiple groups of students. As mathematics interventionists, they provide rigorous and engaging instruction for students needing additional support or further challenge. They may also plan for and coordinate the efforts of others providing the mathematics

intervention. As an elementary mathematics teacher, an elementary mathematics specialist may share students with grade-level colleagues (e.g., teaching mathematics to all second- and third-grade students, teaching mathematics and science to all fourth graders). They may also open their classroom as a learning lab where they model effective and equitable teaching, using this as a space for learning with and from others.

Regardless of their role when elementary mathematics specialists interact with groups of teachers, they can leverage powerful professional learning techniques such as doing math together, co-planning and co-teaching, examining student work, and analyzing video or live lessons. Doing so regularly builds continuity and maintains momentum for refining practice.<sup>9</sup> In addition, focusing group meetings on issues of practice is crucial, such as student learning and best teaching practices.<sup>10</sup> Elementary mathematics specialists recognize the seemingly constant intersection of their content, pedagogical, and leadership knowledge and skills as they navigate relationships, conflicting initiatives, and their responsibilities related to improving teacher practice and student learning.<sup>11, 12</sup>

# The Call to Action for Elementary Mathematics Specialists

Action must be taken to turn the recommendation of having an elementary mathematics specialist for every elementary school into reality. Educators interested in advanced elementary mathematics preparation and leadership must have both incentives to participate in and access to professional learning opportunities

and continued support. Recommended actions that should be taken by stakeholders from educators, administrators, and district leaders to teacher educators, state/province supervisors, and policymakers are presented below.

## 1. Collaborate to establish incentives for elementary mathematics specialists in recognition of the positive impact they can have on the day-to-day work in schools.

Incentives may include the following:

- Creation of National Board Certification for elementary mathematics specialists and elementary mathematics teacher leaders just as there is a literacy designation for programs involving students ages 3–12
- Mathematics specialist certification opportunities in every state just as there are reading specialist credentials in every state
- Recognition through salary incentives to pursue elementary mathematics specialist certification similar to related salary increments for advanced study or certification
- Compensation when elementary mathematics specialist duties extend beyond the individuals' typical job responsibilities

## 2. Provide high-quality mathematics professional learning that not only prepares elementary mathematics specialists for their work but also supports and sustains district and school ongoing mathematics improvement efforts.

Elementary mathematics specialist preparation includes the following:

- Deepening the mathematical content knowledge<sup>15</sup> needed for elementary mathematics teaching including the across-the-grades learning progressions and broadened purposes of mathematics defined in *Catalyzing Change in Early Childhood and Elementary Mathematics*<sup>3</sup> (i.e., develop deep understanding as confident and capable learners; understand and critique the world; experience the wonder, joy, and beauty of mathematics)
- Strengthening pedagogical knowledge and skills<sup>15</sup>, specifically the ability to use and support others' use of the effective and equitable mathematics teaching practices<sup>1,2</sup> that nurture both students' identity development and learning needs
- Developing leadership knowledge and skills<sup>13–15</sup>, with an emphasis on advocating for equitable structures<sup>3</sup> in mathematics, leading ongoing collegial learning, and facilitating school-wide mathematics improvement<sup>13,16</sup>

**3. Plan structures within schools and districts that allow for the consistent focus on improving mathematics learning opportunities for students, their teachers, and the specialists themselves.**

Structures may include:

- Elementary mathematics specialist positions with expectations for supporting ongoing growth of teachers while also being responsive to local needs of teachers, other professionals, and students
- Schedules that include time for elementary-mathematics-specialist–led mathematics professional learning and grade-level team collaboration
- Opportunities for elementary mathematics specialists to connect, communicate, and collaborate in support of their ongoing professional learning and growth

**4. Engage in further elementary-mathematics-specialist–related research designed to inform preparation, ongoing support, and effective use.**

Research efforts may focus on:

- Evaluation of initial preparation (i.e., professional learning tasks, courses, programs) of EMS;
- Approaches for ongoing professional development and support for elementary mathematics specialists;
- Models and formats for EMS use (e.g., with teachers, with students, or a combination; one-on-one or grade-level team);
- The impact elementary mathematics specialists have on teacher learning, teacher practice, student achievement; and
- The potential of secondary (i.e., middle and high school) mathematics specialists.

# Notes

- <sup>1</sup> National Council of Teachers of Mathematics (NCTM), *Principles to Actions: Ensuring Mathematical Success for All* (Reston, VA: NCTM, 2014).
- <sup>2</sup> Julia Aguirre, Karen Mayfield-Ingram, and Danny Martin, *The Impact of Identity in K–8 Mathematics Learning and Teaching: Rethinking Equity-Based Practices* (Reston, VA: National Council of Teachers of Mathematics, 2013).
- <sup>3</sup> National Council of Teachers of Mathematics (NCTM), *Catalyzing Change in Early Childhood and Elementary Mathematics: Initiating Critical Conversations* (Reston, VA: NCTM, 2020).
- <sup>4</sup> S. Coniam, “Mathematics Coaching and Its Impact on Urban Fourth-Grade Students’ Mathematics Proficiency on High-Stakes Testing,” in *Proceedings of the 32nd Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*, eds. P. Brosnan, D. B. Erchick, and L. Flevares, vol. 6, 1379–86 (Columbus, OH: The Ohio State University, 2010).
- <sup>5</sup> S. Zollinger, P. Brosnan, D. B. Erchick, and L. Bao, “Mathematics Coaching: Impact on Student Proficiency Levels after One Year of Participation,” in *Proceedings of the 32nd Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*, eds. P. Brosnan, D. B. Erchick, and L. Flevares, vol. 6, 1371–78 (Columbus, OH: The Ohio State University, 2010).
- <sup>6</sup> Robert Balfanz, Douglas J. MacIver, and Vaughn Byrnes, “The Implementation and Impact of Evidence-Based Mathematics Reforms in High-Poverty Middle Schools: A Multi-Site, Multi-Year Study,” *Journal for Research in Mathematics Education* 37, no. 1 (January 2006): 33–64.
- <sup>7</sup> Patti Brosnan, and Diana Erchick, “Mathematics Coaching and Its Impact On Student Achievement,” in *Proceedings of the 32nd Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*, eds. P. Brosnan, D. B. Erchick, and L. Flevares, vol. 6, 1362–70 (Columbus, OH: The Ohio State University, 2010).
- <sup>8</sup> Patricia F. Campbell and Nathaniel N. Malkus. “The Impact of Elementary Mathematics Coaches on Student Achievement.” *The Elementary School Journal* 111, no. 3 (March 2011): 430–54.
- <sup>9</sup> Patricia F. Campbell, Matthew J. Griffin, and Nathaniel N. Malkus, “Factors Influencing Elementary Mathematics Specialists’ Impact on Student Achievement,” in *Elementary Mathematics Specialists* (Charlotte, NC: Association of Mathematics Teacher Educators, 2017), 193–202.
- <sup>10</sup> Margret A. Hjalmarson and Courtney K. Baker, “Mathematics Specialists as the Hidden Players in Professional Development: Researchable Questions and Methodological Considerations,” *International Journal of Science and Mathematics Education* 18, no. 1 (May 2020): 51–66.
- <sup>11</sup> L. K. Gibbons, A. L. Garrison, and P. Cobb, “Teacher Networks and the Role of the Mathematics Coach: How Institutional Factors Influence Coach Centrality,” in *Annual Meeting of the American Educational Research Association* (New Orleans, LA, April 8–12, 2011).
- <sup>12</sup> M. B. McGatha, R. Davis, and A. Stokes, “The Impact of Mathematics Coaching on Teachers and Students,” Professional Development, Research Brief (Reston, VA: National Council of Teachers of Mathematics, 2015).
- <sup>13</sup> L. E. Bitto, *Roles, Responsibilities, and Background Experiences of Elementary Mathematics Specialists* (Doctoral dissertation, The College of William and Mary, 2015). ProQuest 3663010.
- <sup>14</sup> Francis (Skip) Fennell, Beth McCord Kobett, and Jonathan A. Wray, “Elementary Mathematics Leaders,” *Teaching Children Mathematics* 20, no. 3 (October 2013): 172–80.
- <sup>15</sup> Association of Mathematics Teacher Educators (AMTE), *Standards for Elementary Mathematics Specialists: A Reference for Teacher Credentialing and Degree Programs* (Houghton, MI: AMTE, 2013).
- <sup>16</sup> J. T. Sutton, E. A. Burroughs, and D. A. Yopp, “Coaching Knowledge: Domains and Definitions,” *Journal of Mathematics Education Leadership* 13, no. 2 (2011): 12–20.