

STANDARDS FOR PREPARING TEACHERS OF MATHEMATICS



EXECUTIVE SUMMARY



ASSOCIATION OF MATHEMATICS TEACHER EDUCATORS

MOTIVATION AND CONTEXT

The mission of the Association of Mathematics Teacher Educators (AMTE) is to promote the improvement of mathematics teacher education Pre-K–12. Two of the organization's stated goals focus on effective mathematics teacher education programs and advocacy for effective policies and practices related to mathematics teacher education at all levels. As the lead organization for mathematics teacher education in the United States, AMTE puts forth the Standards for Preparing Teachers of Mathematics (SPTM) as an aspirational vision that will support candidates in becoming effective teachers of mathematics who have the knowledge and skills to support each and every student in their future classrooms.

AMTE, in the *Standards for Preparing Teachers of Mathematics*, puts forward a national vision of initial preparation for all Pre-K–12 teachers who teach mathematics. *SPTM* pertains not only to middle and high school mathematics teachers who may teach mathematics exclusively but also to elementary school teachers teaching all disciplines, special education teachers, teachers of emergent multilingual students, and all other teaching professionals and administrators who have responsibility for students' mathematical learning. *SPTM* has broad implications for teacher preparation programs, in which stakeholders include faculty and administrators in both education and mathematics at the university level; teachers, principals, and district leaders in the schools with which preparation programs partner; and the communities in which preparation programs and their school partners are situated.

SPTM is intended as a national guide that articulates a vision for mathematics teacher preparation and supports the continuous improvement of teacher preparation programs. Such continuous improvement includes changes to preparation program courses and structures, partnerships involving schools and universities and their leaders, the ongoing accreditation of such programs regionally and nationally, and the shaping of state and national mathematics teacher preparation policy. *SPTM* is also designed to inform accreditation processes for mathematics teacher preparation programs, to influence policies related to preparation of teachers of mathematics, and to promote national dialogue around preparing teachers of mathematics. The vision articulated in *SPTM* is aspirational in that it describes a set of high expectations for developing a well-prepared beginning mathematics teacher who can support meaningful student learning. The vision is research-based and establishes a set of goals for the continued development and refinement of a mathematics teacher preparation program and a research agenda for the study of the effects of such a program.

SPTM contains detailed depictions of what a well-prepared beginning teacher knows and is able to do related to content, pedagogy, and disposition, and what a strong preparation program entails with respect to learning experiences, assessments, and partnerships. Stakeholders in mathematics teacher preparation will find messages related to their roles.

STAKEHOLDER ROLE

MESSAGES RELATED TO THE ROLE



For **education faculty members or administrators** in a university setting

The standards guide discussions related to teacher preparation program design, policy, and practice.



For **mathematics faculty members or administrators** in a university setting

The standards provide targeted guidance for the content preparation of all prospective teachers.



For **Pre-K–12 teachers, principals, or district leaders**

The standards illustrate the aspects of productive school-university partnership and the specific pedagogical practices and dispositions that mentor teachers foster in student teachers.



For **state and national education policymakers**

The standards serve as a guide for the design of standards for state teacher licensure and national program accreditation, as well as informing national discussion and action related to education policy.



For **families, community members, and business leaders** concerned with mathematics education

The standards describe productive ways in which the larger community can collaborate with schools and universities to foster a productive vision of mathematics teaching.

Standards for Preparing Teachers of Mathematics includes standards and indicators for teacher candidates and for the design of teacher preparation programs. *SPTM* outlines assessment practices related to overall quality, program effectiveness, and candidate performance. *SPTM* describes specific focal practices by grade band and provides guidance to stakeholders regarding processes for productive change. These standards rest on five key assumptions that frame the vision that *SPTM* promotes.

UNDERLYING ASSUMPTIONS

- ASSUMPTION 1** Ensuring the success of every learner demands a deep, integrated focus on equity in every program that prepares teachers of mathematics.
- ASSUMPTION 2** Teaching mathematics effectively requires career-long learning about teaching mathematics.
- ASSUMPTION 3** Learning to teach mathematics requires a central focus on mathematics.
- ASSUMPTION 4** Multiple stakeholders should be responsible for and invested in preparing teachers of mathematics.
- ASSUMPTION 5** Those involved in mathematics teacher preparation must be committed to improving their effectiveness in preparing future mathematics teachers.

These five assumptions serve as a foundation for the specific standards and indicators in *SPTM*, the guidance on assessment of programs and candidates, and the recommendations for action. The view that a focus on equity should be pervasive across program experiences underlies the assumptions. The collaborative nature of mathematics teacher preparation is represented in the description of multiple stakeholders; this idea in conjunction with Assumptions 1 and 3 implicates all these stakeholders in considering how to prepare teachers with strong content knowledge and in ways that attend to equity of candidates and the students they will teach. According to Assumption 5, across the areas of content, pedagogy, partnerships, and dispositions, programs must continuously assess their effectiveness. The elaborated standards and indicators describe goals for candidates and programs—goals that embody these five assumptions. The work of building, implementing, assessing, and revising mathematics teacher preparation programs at all levels must include explicit attention to these five assumptions.

THE STANDARDS

SPTM articulates a set of high expectations for what well-prepared beginning teachers of mathematics should know and be able to do as well as characteristics for effective programs that prepare teachers. As such, the standards address **candidate knowledge, skills, and dispositions** and the **program characteristics** that will support the development of candidate knowledge, skills, and dispositions. Each standard is associated with a set of **indicators** that elaborate the standard in more detail and provide a guide for stakeholders to interpret and apply the standard.

CANDIDATE KNOWLEDGE, SKILLS, AND DISPOSITIONS

In Chapter 2, *SPTM* includes four equally important and interrelated standards that are focused on and describe the knowledge, skills, and dispositions that well-prepared beginners should attain. The focus on the importance of mathematical understanding throughout all four candidate standards and across all grade bands is intentional. Well-prepared beginning teachers of mathematics need not only to have deep mathematical knowledge relevant to teaching but also to situate their mathematical knowledge for teaching in their learning of effective strategies for teaching mathematics and in understanding their students' mathematical knowledge, skills, and dispositions. Initial preparation that is focused on candidates' knowledge of the subject, of curriculum, and of how students learn mathematics is more effective than general methods coursework focused on generic teacher behaviors that might be unrelated to the content itself. Well-prepared beginning teachers should have knowledge of the social, historical, and institutional contexts that affect teaching and learning; thus, the reader will see the themes of equity and access interwoven throughout the standards.

STANDARDS FOR WELL-PREPARED BEGINNING TEACHERS OF MATHEMATICS

C.1 MATHEMATICS CONCEPTS, PRACTICES, AND CURRICULUM

Well-prepared beginning teachers of mathematics possess robust knowledge of mathematical and statistical concepts that underlie what they encounter in teaching. They engage in appropriate mathematical and statistical practices and support their students in doing the same. They can read, analyze, and discuss curriculum, assessment, and standards documents as well as students' mathematical productions.

C.2 PEDAGOGICAL KNOWLEDGE AND PRACTICES FOR TEACHING MATHEMATICS

Well-prepared beginning teachers of mathematics have foundations of pedagogical knowledge, effective and equitable mathematics teaching practices, and positive and productive dispositions toward teaching mathematics to support students' sense making, understanding, and reasoning.

C.3 STUDENTS AS LEARNERS OF MATHEMATICS

Well-prepared beginning teachers of mathematics have foundational understandings of students' mathematical knowledge, skills, and dispositions. They know how these understandings can contribute to effective teaching and are committed to expanding and deepening their knowledge of students as learners of mathematics.

C.4 SOCIAL CONTEXTS OF MATHEMATICS TEACHING AND LEARNING

Well-prepared beginning teachers of mathematics realize that the social, historical, and institutional contexts of mathematics affect teaching and learning and know about and are committed to their critical roles as advocates for each and every student.

PROGRAM CHARACTERISTICS TO DEVELOP CANDIDATE KNOWLEDGE, SKILLS, AND DISPOSITIONS

Although teacher preparation programs take various forms across states and in different institutions within states, some qualities are important for all effective mathematics teacher preparation programs to support their candidates' development of the knowledge, skills, and dispositions needed to be well-prepared beginners. The five standards in Chapter 3 describe those characteristics and qualities of effective mathematics teacher preparation programs. These standards address the capacity of the program to provide opportunities to learn mathematics for teaching, to learn to teach mathematics effectively, and to learn in clinical settings. These standards also describe the role of partnerships among stakeholders at all levels and practices for both recruiting and retaining candidates into mathematics teacher preparation programs.

Throughout the program standards, attention to equity, diversity, and social justice is evident. To meet the vision of effective mathematics teaching and learning for each and every student, equity must be a lens through which stakeholders view all aspects of mathematics teacher preparation programs. Effective programs address equity issues within mathematics methods courses or in program experiences focused specifically on mathematics; the program standards address the prevalence of deficit-thinking models and the need to help teacher candidates build a new framework that is supportive of each and every learner.

STANDARDS FOR EFFECTIVE PROGRAMS FOR PREPARING BEGINNING TEACHERS

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| P.1 | ESTABLISH PARTNERSHIPS | An effective mathematics teacher preparation program has significant input and participation from all appropriate stakeholders. |
| P.2 | OPPORTUNITIES TO LEARN MATHEMATICS | An effective mathematics teacher preparation program provides candidates with opportunities to learn mathematics and statistics that are purposefully focused on essential big ideas across content and processes that foster a coherent understanding of mathematics for teaching. |
| P.3 | OPPORTUNITIES TO LEARN TO TEACH MATHEMATICS | An effective mathematics teacher preparation program provides candidates with multiple opportunities to learn how to teach through mathematics-specific methods courses (or equivalent professional learning experiences) in which mathematics, practices for teaching mathematics, knowledge of students as learners, and the social contexts of mathematics teaching and learning are integrated. |
| P.4 | OPPORTUNITIES TO LEARN IN CLINICAL SETTINGS | An effective mathematics teacher preparation program includes clinical experiences that are guided on the basis of a shared vision of high-quality mathematics instruction and have sufficient support structures and personnel to provide coherent, developmentally appropriate opportunities for candidates to teach and to learn from their own teaching and the teaching of others. |
| P.5 | RECRUITMENT AND RETENTION OF TEACHER CANDIDATES | An effective mathematics teacher preparation program attracts, nurtures, and graduates high-quality teachers of mathematics who are representative of diverse communities. |

GRADE-BAND ELABORATIONS OF THE STANDARDS

The grade-band elaborations relate the standards to the preparation of teachers of mathematics at different levels of instruction or grade bands (to address the differential needs for teachers of learners of different ages) and to align them with other standards. Vignettes that illuminate the needs of teachers and learners and examples of how to effectively address those needs are provided for each grade band. Below is a brief description of each grade band with two selected elaborations from the respective grade-band chapter.

EARLY CHILDHOOD GRADE-BAND ELABORATIONS OF THE STANDARDS

CH4 Early Childhood
(PreK–2)

Effective programs instill in their candidates **positive and productive dispositions** toward mathematics teaching and learning, which they will, in turn, pass on to their students. The teaching they are expected to enact daily with young learners often stands in sharp contrast to what many candidates experienced themselves as learners of mathematics (Isenberg, 2000). They often describe their own experiences as being teacher-centered instruction emphasizing memorization of facts and procedures with little to no emphasis on understanding, problem solving, reasoning, and application. Effective programs preparing teachers of mathematics at the early childhood level develop candidates' abilities to use high-leverage, effective mathematics teaching practices (NCTM, 2014) that require deep understandings of the mathematics candidates are expected to teach. In addition, early childhood teacher candidates should **engage in clinical experiences** in which they contribute to and witness mathematical learning that reflects these mathematical dispositions. Two of the 11 elaborations for the early childhood grade band are presented here.

EC.2. Positive Attitudes Toward Mathematics and Productive Dispositions Toward Teaching Mathematics

Well-prepared beginning teachers of mathematics at the early childhood level demonstrate positive attitudes toward mathematics as a discipline and productive dispositions toward the teaching and learning of mathematics. [Elaboration of C.1.3]

EC.11. Clinical Experiences in Mathematics for Early Childhood Teachers

Effective programs preparing teachers of mathematics at the early childhood level provide clinical experiences specific to mathematics focused on children's mathematical thinking and mathematics instruction with diverse learners in preschool and primary settings. [Elaboration of P.1 and P.4]

UPPER ELEMENTARY GRADE-BAND ELABORATIONS OF THE STANDARDS

CH5 Upper Elementary
(Grades 3–5)

Well-prepared beginning teachers of mathematics for upper elementary grades must **understand mathematics** and **use mathematical practices and processes**, develop strong mathematical dispositions, and use mathematical tools and technology. They must learn how to plan and implement effective instruction, analyze their teaching practices, and collaborate with colleagues, families, and community members. Well-prepared beginners must understand students' mathematical thinking, their use of strategies and mathematical practices, and the development of their mathematical dispositions. Candidates must understand and be committed to **an advocacy role for every mathematics learner**.

Effective programs preparing teachers of mathematics at the upper elementary level develop candidates' abilities to use high-leverage, effective mathematics teaching practices (NCTM, 2014) that require deep understanding of the mathematics they are expected to teach. Programs must include carefully designed opportunities for candidates to learn effective mathematics-specific pedagogy, to learn about students as mathematics learners, and to participate in practice-based clinical experiences that are carefully designed and sequenced. Two of the nine upper elementary grade-band elaborations are presented.

UE.1. Mathematics Concepts and Connections to Mathematical Practices

Well-prepared beginning teachers of mathematics at the upper elementary level understand foundational mathematics concepts that they will teach, and they connect those concepts to mathematical practices as well as to the mathematics of Pre-K–2 and the middle level curriculum. [Elaboration of C.1.1 and C.1.2]

UE.6. Ethical Advocates for Students

Well-prepared beginning teachers of mathematics at the upper elementary level understand their roles as ethical advocates for elementary-grades students to have access to and advance in mathematics that cultivates positive mathematics identities and connects to students' mathematical thinking and lived experiences; these teachers build partnerships with families and communities and work to eliminate institutional and curricular barriers to learning. [Elaboration of C.4.1] thinking and lived experiences; these teachers build partnerships with families and communities and work to eliminate institutional and curricular barriers to learning. [Elaboration of C.4.1]

MIDDLE LEVEL GRADE-BAND ELABORATIONS OF THE STANDARDS

CH6 Middle Level
(Grades 6 - 8)

Effective teacher preparation programs at the middle level must develop candidates' abilities to use **high-leverage, effective mathematics teaching practices** (NCTM, 2014) **that reflect the needs of early adolescents**. Middle level students are changing socially, emotionally, and physically, and growing in their abilities to reason abstractly. Accordingly, many middle schools consist of interdisciplinary teams; well-prepared beginning teachers should be able to design **interdisciplinary instruction** and engage in interdisciplinary conversations, offering ideas for how important mathematics can be connected to other disciplines (AMLE, 2012). A priority in the preparation of middle level candidates is helping them commit to such teaching practices, even if that is not how they experienced middle level mathematics. This commitment will come to fruition only when programs provide robust experiences through courses and fieldwork that illustrate the benefits of effective instruction that support each and every middle level learner. Two of the 10 middle level grade-band elaborations are presented.

ML.4. Meaningful and Interdisciplinary Contexts

Well-prepared beginning teachers of mathematics at the middle level understand how to engage middle level learners in meaningful and interdisciplinary contexts, including the use of mathematical modeling. [Elaboration of C.2.2]

ML.9. Pedagogical Preparation for Middle Level Teachers of Mathematics

Effective programs preparing teachers of mathematics at the middle level include coursework focused specifically on teaching middle level mathematics, the middle level learner, and content prior to and following middle school. [Elaboration of P.3.1, P.3.2, P.3.3, and P.3.4]

HIGH SCHOOL GRADE-BAND ELABORATIONS OF THE STANDARDS

CH7 High School
(Grades 9 - 12)

Well-prepared beginning teachers of mathematics at the high school level need **knowledge, skills, and dispositions** related to mathematics and statistics **content** relevant for teaching, along with **processes and practices, mathematics-specific pedagogy, the needs of individual students and their cultural contexts, and the political context** for teaching. Well-prepared beginners must understand the critical importance of providing **each and every high school student** with **opportunities to learn** mathematics that will effectively prepare them for their futures. Well-prepared beginners draw on students' strengths to cultivate positive mathematical identities that will contribute to their students' successful participation in mathematics. To ensure that candidates who will teach mathematics at the high school level are indeed well prepared, effective programs need to be specifically focused on preparing high school teachers of mathematics. Two of the 10 high school grade-band elaborations are presented here.

HS.3. Supporting Each and Every Student's Opportunity to Learn Mathematics

Well-prepared beginning teachers of mathematics at the high school level understand the importance of providing each and every high school student with opportunities to learn mathematics that will enable him or her to think analytically and creatively in preparation for the workforce, college, citizenship, and life. [Elaboration of C.2.1]

HS.7. Mathematical Content Preparation of Teachers of Mathematics at the High School Level

Effective programs preparing teachers of mathematics at the high school level are focused on the relevant content knowledge needed for teaching high school mathematics, including connections to material that comes before and after high school mathematics. Coursework consists of the equivalent of an undergraduate major in mathematics (including statistics) with at least three content courses particularly relevant to teaching high school mathematics and incorporating sufficient attention to a data-driven, simulation-based modeling approach to statistics. [Elaboration of P.2]

ASSESSING MATHEMATICS TEACHER PREPARATION

The *SPTM* describes assessment as “a cornerstone for all educational endeavors, the means by which those striving to support learning come to know the knowledge, skills, and dispositions of those whose learning they are supporting” (AMTE, 2017, p. 147). Thus, assessment is used to design learning experiences, develop curriculum and programs, and promote reflection of learners and their teachers. The purposes of assessment are served through sound and efficient program assessments designed to provide information, support interpretation, and spur action. Assessments are used to appraise mathematics teacher candidates, providing timely formative information needed to give ongoing feedback to candidates and to tailor learning experiences that support their growth. Summative assessments provide information on the outcomes of teacher preparation, most crucially providing information on the quality of the knowledge, skills, and dispositions of mathematics teacher candidates and the candidates’ proficiencies in supporting mathematical learning as well as the quality of a program.

The discussion of assessment begins with recommendations about general features of effective assessments used in mathematics teacher preparation. The recommendations for features of effective assessments should guide assessment decisions of instructors and program personnel when they select, design, and use assessments. The second section of the chapter includes recommendations for assessments designed to determine progress toward attaining the Candidate Standards. Finally, recommendations are given for assessments designed to determine progress toward attaining the Program Standards.

Together these recommendations should be used to effectively guide efforts to support candidate growth and improve mathematics teacher preparation programs. Note that the match between these recommendations for assessment and the Candidate and Program Standards in Chapters 2 and 3 is not one to one. The features of effective assessments apply to all assessments of both candidate and program quality.

RECOMMENDATIONS ABOUT THE ASSESSMENT OF MATHEMATICS TEACHER PREPARATION PROGRAMS

FEATURES OF EFFECTIVE ASSESSMENTS (AF)

AF.1 FOCUS ON MATHEMATICS TEACHING IN ASSESSMENTS

Effective assessments are tailored to provide information relevant to the development of mathematics teacher candidates.

AF.2 PROMOTE EQUITY AND ACCESS IN ASSESSMENTS

Effective assessments are designed, implemented, interpreted, and used to advance equity and access.

AF.3 EMBODY OPENNESS IN ASSESSMENTS

Effective assessments are part of a transparent process in which those assessing, those being assessed, and other stakeholders know the assessment focus, the nature of assessment methods and criteria, and the uses of the information gathered.

AF.4 SUPPORT VALID INFERENCES AND ACTION BASED ON ASSESSMENTS

Effective assessments appropriately include multiple measures that are well suited to gather the types and amounts of information needed to make valid inferences and take action.

AF.5 EMBODY COHERENCE AND SUSTAINABILITY IN ASSESSMENTS

Effective assessments are aligned with teacher preparation goals, opportunities to learn, and intended uses of the information they generate. They are designed and enacted in ways that can be sustained over time.

AC.1 ASSESSMENT OF MATHEMATICAL KNOWLEDGE RELEVANT TO TEACHING

ASSESSING MATHEMATICS TEACHER CANDIDATE QUALITY (AC)

Effective assessments of mathematics knowledge incorporate attention to candidates' development of mathematical knowledge relevant to teaching, including processes and practices.

AC.2 ASSESSMENT OF MATHEMATICS TEACHING PRACTICE

Effective assessments of mathematics teaching practice include observations of teaching focused on how well the teaching supports learning of important mathematical content, processes, and practices by each and every student.

AC.3 ASSESSMENT OF DISPOSITIONS

Effective assessments provide data on a range of dispositions related to mathematics teaching, including dispositions toward engaging in mathematics, identity as a mathematics teacher and learner, and commitment to support the mathematics learning of each and every student.

AP.1 ASSESSMENT OF STAKEHOLDER ENGAGEMENT

ASSESSING MATHEMATICS TEACHER PREPARATION PROGRAM QUALITY (AP)

Effective mathematics teacher preparation programs assess the degree to which a broad range of stakeholders are meaningfully engaged in the program and involved in its ongoing improvement.

AP.2 ASSESSMENT OF PROGRAM CURRICULUM AND INSTRUCTION

Effective mathematics teacher preparation programs assess the effectiveness of courses or equivalent professional-learning opportunities in promoting their candidates' progress and work to improve them.

AP.3 ASSESSMENT OF EFFECTIVE CLINICAL EXPERIENCES

Effective mathematics teacher preparation programs assess and work to improve the quality of the clinical experiences they provide mathematics teacher candidates.

AP.4 ASSESSMENT OF RECRUITMENT AND RETENTION

Effective mathematics teacher preparation programs assess and work to improve their success in recruiting prospective teachers, in retaining candidates in the program, and in supporting beginning teachers' continued professional growth, with a focus on developing a mathematics-teacher workforce that reflects the diversity of the student population in the region.

ENACTING EFFECTIVE PREPARATION OF TEACHERS OF MATHEMATICS

In summary, the *Standards for Preparing Teachers of Mathematics* challenges all stakeholders to take actions that will move toward realizing the vision articulated in these standards. While all sectors collaborate together to improve mathematics teacher preparation, it is important that underlying assumptions that are the foundation remain central to our shared work.

UNDERLYING ASSUMPTIONS

The assumption that is focused on equity issues is highlighted as central to enacting the standards. In fact, the *SPTM* authors suggest that equity become “a lens through which all aspects of programs preparing teachers of mathematics are viewed,” and the question “How effective was this experience in cultivating the teacher candidate’s ability to support each and every learner?” become central when decisions about programs are made. Visualizing a continuum of mathematics teacher preparation from initial experiences to induction into the field to long-term professional learning, ensuring that teacher candidates develop content knowledge for mathematics teaching, establishing partnerships between all stakeholders, and using the *SPTM* as a springboard for improvement are also discussed as mechanisms through which the vision of *SPTM* may be realized.

PROCESS FOR SUPPORTING IMPROVEMENT OF MATHEMATICS TEACHER PREPARATION

SPTM provides concrete practices or approaches that can be used to support the improvement of mathematics teacher preparation programs. The process preparation programs need to undertake is cyclic in nature, including the following key elements: build a common vision, assess the context, define which practices are effective and what changes are needed, select change strategies, test and refine strategies, plan next steps, disseminate, and ensure sustainability. Depending on the grain size of the changes being made, this cycle may stretch from one or more semesters to several years.

A FINAL CALL TO ACTION

SPTM concludes with several priority actions that need to be taken by all those involved in preparing teachers of mathematics to begin to enact the vision of this document. Summaries of the action recommendations are given in the table (to the right--location).

CONCLUDING REMARKS

The *Standards for Preparing Teachers of Mathematics* sets forth an ambitious but achievable vision for the preparation of teachers of mathematics, grounded in fundamental assumptions that underlie the improvement of mathematics teacher preparation. *SPTM* was developed from these assumptions. These standards describe the knowledge, skills, and dispositions needed by well-prepared beginning teachers of mathematics (Chapter 2) and how to create effective mathematics teacher preparation programs to ensure that those successfully completing such programs are indeed well prepared to meet the diverse needs of the students they will teach (Chapter 3). Elaborations of these standards are then provided to describe specific guidelines to prepare teacher candidates who will be teaching mathematics at different grade levels (Chapters 4–7), followed by recommendations for how to effectively assess progress in meeting these standards and elaborations (Chapter 8). In the final chapter (Chapter 9), recommendations are given for enacting the vision.

AMTE hopes that these standards will evoke deep discussions among those involved in mathematics teacher preparation. Furthermore, AMTE hopes that Standards for Preparing Teachers of Mathematics will spur actions among those providing mathematics teacher preparation programs toward realizing the vision in their programs. Finally, AMTE hopes that these standards will shape the broader discourse around the need for continuous improvement in mathematics teacher preparation, serving as a seminal resource for reconsidering policies and practices that support mathematics teacher preparation.

ACTION STEPS TOWARD THE VISION OF SPTM

- ACTION 1** **Mathematics and statistics teacher educators** must collaborate with **mathematicians and statisticians** to enact the vision for the content preparation of beginning teachers presented in these standards, building on related documents offered by other professional organizations (e.g., CBMS, 2012; Franklin et al., 2016; Tucker, Burroughs, & Hodge, 2015).
- ACTION 2** **Programs** preparing beginning teachers of mathematics **and Pre-K–12 schools and districts** must develop close, respectful, bidirectional relationships that support the preparation of the next generation of teachers of mathematics, ensuring that school partners are included in the decision making about the preparation of beginning teachers.
- ACTION 3** **Mathematics educators and researchers** must make these standards a focal point for research that will guide the improvement of mathematics teacher preparation.
- ACTION 4** **Faculty in programs preparing teachers of mathematics** must build collaborations with faculty in other programs preparing teachers of mathematics.
- ACTION 5** **Higher education administrators of programs that prepare teachers of mathematics** must ensure that commitment and focus are placed on those programs, including allocating qualified personnel and resources needed to achieve the vision of this document.
- ACTION 6** The *SPTM* must become a focal point for the **continuing work of AMTE**, including serving as an organizing theme of future conferences and publications. **Committees and other working groups** of the organization need to consider how their activities fit with the recommendations of this document.
- ACTION 7** **AMTE** must work to **engage other organizations** with related missions in dialogue around how the standards can inform the preparation of teachers of mathematics. Finally, this document should serve as a primary resource for those involved in decisions regarding policies and accreditation standards for preparing teachers of mathematics.

REFERENCES

Association for Middle Level Education (AMLE). (2012). Association for middle level education: Middle level teacher preparation standards with rubrics and supporting explanations. Retrieved from <http://www.amle.org/AboutAMLE/ProfessionalPreparation/AMLEStandards.aspx>

Association of Mathematics Teacher Educators. (2017). *Standards for Preparing Teachers of Mathematics*. Available online at <http://amte.net/standards>

Conference Board of the Mathematical Sciences (CBMS). (2012). *The mathematical education of teachers II*. Providence, RI, and Washington, DC: American Mathematical Society and Mathematical Association of America.

Franklin, C., Bargagliotti, A., Case, C., Kader, G., Schaeffer, R., & Spangler, D. (2015). *Statistical education of teachers*. Arlington, VA: American Statistical Association. Retrieved from <http://www.amstat.org/>

Isenberg, J. P. (2000). The state of the art in early childhood professional preparation. In D. Horm-Wingerd & M. Hyson (Eds.), *New teachers for a new century: The future of early childhood professional preparation* (pp. 17–58). Washington, DC: U.S. Department of Education.

National Council of Teachers of Mathematics. (2014). *Principles to actions: Ensuring mathematical success for all*. Reston, VA: Author.

Tucker, A., Burroughs, E., & Hodge, A. (2015). *A professional program for preparing future high school mathematics teachers*. In M. Siegel, C. Schumacher & P. Zorn (Eds.), 2015 CUPM curriculum guide to majors in the mathematical sciences. Washington, D.C.: Mathematical Association of America. Retrieved from <http://www.maa.org/sites/default/files/HighSchoolMathematicsTeachersPASGReport.pdf>

STANDARDS FOR PREPARING TEACHERS OF MATHEMATICS WRITING TEAM:

Nadine Bezuk, San Diego State University, Chair
Jennifer M. Bay-Williams, University of Louisville, Leadership Team Member
Douglas H. Clements, University of Denver, Leadership Team Member
W. Gary Martin, Auburn University, Leadership Team Member

Julia Aguirre, University of Washington Tacoma
Timothy Boerst, University of Michigan
Elizabeth A. Burroughs, Montana State University
Ed Dickey, University of South Carolina
Rochelle Gutiérrez, University of Illinois at Urbana-Champaign
Elizabeth Hughes, University of Northern Iowa
DeAnn Huinker, University of Wisconsin — Milwaukee
Karen Karp, Johns Hopkins University
W. James Lewis,* University of Nebraska-Lincoln
Travis A. Olson, University of Nevada, Las Vegas
Randolph A. Philipp, San Diego State University
Nicole Rigelman, Portland State University
Marilyn E. Strutchens, Auburn University
Christine D. Thomas, Georgia State University
Dorothy Y. White, University of Georgia

* W. James Lewis participated as a member of the Writing Team while serving at the National Science Foundation. Any opinion, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

EXECUTIVE SUMMARY WRITING TEAM

The Executive Summary was prepared by the following individuals:

Timothy M. Hendrix, Chair; Meredith College; Executive Director, Association of Mathematics Teacher Educators
Michael D. Steele, AMTE Board Member-at-Large; University of Wisconsin-Milwaukee
Marilyn E. Strutchens, SPTM Writing-Team Member; Auburn University

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Joe Champion, Boise State University; Website Director, Association of Mathematics Teacher Educators
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Tony Nguyen, Meredith College; Graphic Designer & Webmaster, Association of Mathematics Teacher Educators
Bonnie Schappelle, San Diego State University; Research Assistant & Copy-Editor