Introduction to Standards for the Preparation of Teachers of Lower Elementary (PK-3) Education

Purpose

The purpose of the Standards for the Preparation of Teachers of Lower Elementary (PK-3) Education is to establish a shared vision for the content and skills that entry-level teachers of lower elementary (PK-3) education in Michigan should possess and be able to demonstrate in their teaching, regardless of whether they follow a traditional or alternative route into the profession. The standards reflect a vision of a well-prepared beginning teacher whose primary role is to deliver high-quality, Tier 1 instruction in PK-3 Literacy, Mathematics, Science, and Social Studies to all Michigan children within a Multi-Tiered System of Supports.

These standards are organized into five sections of professional preparation to teach elementary education and define acceptable levels of performance at teachers' point of entry into the field. These standards establish outcomes for graduates of teacher preparation programs in lower elementary (PK-3) education and are to be used to inform program development and continuous improvement efforts at Michigan's institutions of higher education. Each section is written differently, as the stakeholder teams who drafted these standards developed a structure that they believed best represented the essential disciplinary knowledge and pedagogical skills of the respective section. For example, the Literacy section details understandings and practices related to literacy development, assessment, and instruction that are key to effective implementation of the Essential Instructional Practices in Early Literacy for the appropriate grade band. This contrasts with the Mathematics section, which focuses on mathematical competencies and pedagogical concerns for a core set of high-leverage mathematical topics in mathematics that are foundational to later mathematics instruction and provide necessary skills for engaging with other areas of mathematics.

Despite this variation in structure, an overarching goal of all the areas in these standards is to ensure preparation programs are conscientious in preparing new teachers to deliver instruction aligned to Michigan's State Board of Education-approved Early Childhood Standards of Quality for Prekindergarten and K-12 academic standards. Whereas previous sets of teacher preparation standards for elementary education focused strongly on defining teacher candidates' knowledge base in topics appropriate for elementary instruction, these standards shift to focus on demonstration of instructional practices, deferring elementary-level content knowledge and definition of student outcomes to the respective PK or K-12 standards. Should the State Board of Education adopt new PK-12 standards in any area covered by these PK-3 preparation standards, preparation programs will be expected to ensure teacher candidates are equipped to deliver instruction aligned to those new PK-12 standards.

Not only does this shift support Michigan's Top 10 in 10 Years strategic goal to "provide every child access to an aligned, high-quality P-12 system from early childhood to post-secondary attainment," it is also part of a broader effort to shift educator preparation in Michigan to a practice-based system. These standards are to be implemented alongside Michigan's Clinical Experience Requirements and Core Practices to ensure teacher candidates have sufficient opportunity to demonstrate proficiency in these standards and Core Practices in authentic PK-12 classroom settings.

Development of the Proposal

For over three years, the Michigan Department of Education (MDE), in collaboration with Michigan's stakeholders, have been working to revise Michigan's teacher certification structure and improve the preparation of the educator workforce in Michigan. This is in direct alignment with the MDE's Strategic Plan for becoming a Top Ten Education State within Ten Years.

This collaboration has led to the design of a structure that places students at the heart of the system. A key goal of this structure is deeper preparation of teachers to meet the unique learning needs of children at each grade level, particularly in early literacy. The structure includes: focused grade bands to provide new teachers with specialized knowledge about the students and content they will teach, defined clinical experiences and foundational coursework for each grade band, unique preparation for instructing middle level learners, and enhanced content knowledge preparation for middle school teachers to award high school credit.

Concurrently with the collaboration to design a new certification structure, stakeholder committees representing PK-12 educators and administrators, college and university teacher educators, and education researchers began meeting in October 2016 to revise elementary education teacher preparation standards to support the new grade bands. The elementary teacher preparation standards were the first set of standards selected for review and revision due to an expressed need to enhance the preparation of early literacy and mathematics instruction for beginning teachers. In concert with the MDE's Early Literacy Initiative, stakeholders with expertise in early literacy instruction were the first to meet.

Michigan's Certification Standards for the Preparation of All Elementary Teachers – Reading Instruction were adopted by the State Board of Education (SBE) in 2002, and are based on International Reading Association (now, International Literacy Association, or ILA) standards from the late 1990s. These standards were separate from the reading and language arts related standards within Michigan's Certification Standards for Elementary Teachers, adopted by the SBE in 2008. Since adoption of these Michigan standards, the ILA has updated its teacher preparation standards multiple times, while the SBE adopted more rigorous K-12 standards for English Language Arts (ELA) and Mathematics. The stakeholder committee began its work by reviewing the 2002 Michigan teacher preparation standards, the ELA portion of the 2008 Michigan elementary teacher preparation standards, the Michigan K-12 ELA standards, and the Michigan Early Childhood Standards of Quality for Prekindergarten. The committee considered the question of whether to reaffirm existing Michigan teacher preparation standards, compose new standards, or adopt the new ILA standards as Michigan's standards. The stakeholder committee was unanimous in recommending that new standards be composed for Michigan teacher preparation in literacy, and utilized the following documents as source material for composing these standards:

- Michigan Association of Intermediate School Administrators' (MAISA) General Education Leadership Network Early Literacy Task Force (GELN-ELTF) Essential Instructional Practices in Early Literacy, Grades K to 3 (2016)
- MAISA GELN-ELTF Essential Instructional Practices in Early Literacy, Prekindergarten (2016)

- ILA Standards for the Preparation of Literacy Professionals (2017, draft versions)
- International Dyslexia Association Knowledge and Practice Standards for Teachers of Reading (2010)
- Michigan Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects K-12 (2010)
- Michigan Early Childhood Standards of Quality for Prekindergarten (2013)

The stakeholder committee completed a first draft of teacher preparation standards for grades PK-3 in March 2017. The committee met approximately monthly throughout 2017 to refine the draft standards in response to feedback solicited from additional stakeholders (including members of Governor Snyder's PreK-12 Literacy Commission and attendees at the Michigan Reading Association's Annual and Summer Literature Conferences) and to ensure alignment between the standards and research into effective literacy instruction. Stakeholders with expertise in upper elementary literacy instruction were recruited and began meeting in late 2017 to develop comparable 3-6 teacher preparation standards in literacy, building upon the work of the PK-3 standards development stakeholder committee. In addition to the above source documents, the 3-6 team also utilized MAISA GELN-ELTF's Essential Instructional Practices in Literacy, Grades 4 to 5 (2017). The resulting standards will allow for greater continuity in literacy education for Michigan's children from pre-kindergarten through grade six and help to highlight the developmental nature of literacy learning.

Stakeholder committees to review and revise the mathematics standards for grades PK-3 and 3-6 began meeting in November 2016, and they followed a similar process as the literacy stakeholder teams. Source materials utilized for composing new standards in mathematics teacher preparation for these grade bands are the following:

- Michigan Early Childhood Standards of Quality for Prekindergarten (2013)
- Michigan K-12 Standards, Mathematics
- Association for Mathematics Teacher Educators (AMTE) Standards for Mathematics Teacher Preparation
- Teaching for Robust Understanding (TRU) Framework
- The Mathematical Education of Teachers II

As with the literacy standards, drafts of the mathematics standards were shared with selected stakeholders representing PK-12 schools and districts, intermediate school districts, college and university teacher education programs, and the education research community, and were shared by members of the stakeholder committee for feedback at annual conferences of the Michigan Association of Mathematics Teacher Educators.

Stakeholder committees with expertise in science and social studies teacher preparation, research, and instructional practices were recruited and began work on revising the respective components of the 2008 Michigan elementary teacher preparation standards. These standards were updated to ensure appropriateness for PK-3 and 3-6 grade bands and alignment with Michigan PK-12 standards in these content areas.

These standards were presented to the Michigan State Board of Education at its regular meeting on August 14, 2018. Following this presentation, the Office of Educator Excellence solicited public comment on the proposed standards through September 26, 2018. A total of 433 individuals (PK-12 teachers, teacher candidates, teacher educators, education organization representatives, parents, and interested citizens) selected a level of support and submitted comments by the close of the public comment period. Several commenters stated the standards needed greater emphasis on knowledge and skills related to early childhood development and learning. Commenters recommended the addition of selected standards from the current Early Childhood–General and Special Education (ZS) endorsement standards to the Professional section of these standards to provide more detailed information about the whole child and the social emotional needs of children. Although the draft standards referenced and provided links to the MDE's whole child definition and Social and Emotional Learning Competencies and Indicators, the MDE incorporated the recommended additions and received approval of the revisions from key stakeholders representing early childhood education. Additional references to Michigan's Early Childhood Standards of Quality for Prekindergarten were added to each section of the standards to ensure that teachers in the PK-3 grade band are adequately prepared to support children's development and learning in prekindergarten settings.

Program Considerations

In alignment with the certification structure, programs are expected to address discipline area standards, Core Teaching Practices, and Clinical Experiences Requirements. This set of board-approved discipline area standards is the only set of standards for Lower Elementary programs, and subsumes all other previous standards documents, including the Standards in Reading for all Elementary Programs.

In addition to requirements in the Administrative Rules for Teacher Certification, in order to adequately address the standards, the stakeholder committee recommends the following credit structure:

- 12 credits of Literacy coursework (including the 6 credits required by R390.1123)
- 12 credits of Mathematics coursework
- 6 credits of Science coursework
- 6 credits of Social Studies coursework

Programs have flexibility to be innovative in structuring coursework for integration of content and to adequately address the standards.

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Standards for the Preparation of Teachers of Lower Elementary (PK-3) Education

Professional Standards

Michigan aspires to become a state in which all graduates are prepared to be competent global citizens successful in the workforce and society. In order to accomplish this goal, beginning teachers must be prepared to address the needs of the whole child; use relevant, research-based criteria to establish a supportive, engaging environment that fosters learning; and use practices that meet individual children's needs. To support this vision, standards related to professional knowledge and skills in the areas of Learner-Centered Supports, Ethics and Professional Growth, and Strategic Partnerships are presented first, as these standards describe what beginning teachers should know and be able to do regardless of the specific discipline area of specialization or instruction.

P.1. Learner-Centered Supports

Well-prepared beginning teachers will be able to:

a. Support the whole child through knowledge and understanding of young children's characteristics and needs, including multiple interrelated areas of child development and learning, learning processes, and motivation to learn.
b. Demonstrate knowledge and understanding of the multiple influences on development and learning of the whole child, including but not limited to: cultural and linguistic context, economic conditions of families, social emotional needs, trauma, health status and disabilities, peer and adult relationships, children's individual and developmental variations, opportunities to play and learn, family and community characteristics, and the influence and impact of technology and the media.
c. Support children's Approaches to Learning[1] by using practices that engage and empower young learners.
d. Demonstrate the ability to build meaningful learning environments and curriculum by focusing on children's characteristics, needs and interests; linking children's language, culture, and community to early learning; using social interactions during routines and play based experiences; incorporating technology and integrative approaches to content knowledge; and utilizing incidental teaching opportunities and informal experiences to build children's development in all areas.
e. Implement norms and routines and use classroom management strategies support individual and group motivation and behavior among children to generate active engagement in play and learning, self-motivation, and positive social interaction, and to create supportive and dynamic indoor and outdoor learning environments.
f. Utilize individual and group guidance and problem-solving techniques to develop positive and supportive relationships with children, encourage and teach positive social skills and interaction among children, promote positive strategies of conflict resolution, and develop personal self-regulation, motivation, and esteem.

[1] Approaches to Learning begins on page 14 of the Early Childhood Standards of Quality for Prekindergarten.

g. Demonstrate understanding of the implications for development in early learning of common disabilities in young children, including etiology, characteristics and classification of common disabilities.
h. Demonstrate knowledge and use of a variety of strategies, instructional accommodations, and adaptations of the learning environment including the accommodation of instructional and assessment materials as appropriate to meet children's abilities or disabilities, home language, and culture to promote the full participation of all children, including those with special needs, in general education classrooms.
i. Demonstrate understanding of the teacher's role as a participant in the development, enactment and assessment of an Individualized Education Program (IEP) and 504 Plan, including the identification and evaluation process.
j. Demonstrate knowledge and use of a variety of strategies to promote full participation of English learners in classrooms (including literacy strategies).
k. Demonstrate an ability to manage and implement standards-based content instruction to support English learners in accessing the core curriculum as they learn language and academic content.
l. Demonstrate knowledge of and maintain currency in public policy issues and processes and the impact on the education of all children, including English learners and children with special needs.
m. Identify signs of emotional distress, toxic stress, child abuse and/or neglect in young children and follow appropriate procedures for mandated reporting and utilize skills and strategies for clarifying and communicating sensitive issues with appropriate parties (including but not limited to child abuse, neglect, hygiene, and nutrition) to promote young children's physical and psychological health, safety, and sense of security.
n. Demonstrate understanding of and ability to use ongoing systematic observation, documentation, screening tools, and play-based assessment, and other appropriate forms of formative and summative assessment tools, and approaches embedded in assessment-related activities in curriculum and daily routines.
o. Demonstrate knowledge and application of research-based instructional strategies to support the whole child's learning and development through the visual and performing arts.
p. Demonstrate knowledge and application of research-based instructional strategies to support the whole child's learning and development through movement and physical activities.
q. Demonstrate knowledge and application of research-based instructional strategies to create opportunities to develop critical knowledge, skills, and behaviors that contribute to life-long health.

P.2. Ethics and Professional Growth

Well-prepared beginning teachers will be able to:

a. Demonstrate knowledge of and critically analyze the ethical/professional codes of conduct in education including the Michigan State Board of Education Code of Ethics.
b. Demonstrate knowledge and application of legal and ethical guidelines and professional standards related to children and families.
c. Evaluate continually the effects of their professional and personal decisions and actions on children, parents, and other professionals in the learning community.
d. Identify, analyze, and engage in ongoing professional learning opportunities that strengthen their instructional practice and use reflective practices to design, monitor, and adapt their instruction as a means for gauging their own professional growth.

P.3. Strategic Partnerships

Well-prepared beginning teachers will be able to:

a. Promote and provide opportunities to engage parents, families, and communities.
b. Identify appropriate agencies and other resources in the larger community to support children's learning and well-being.
c. Use a variety of communication strategies that support and empower families and communities through respectful, reciprocal relationships.
d. Engage in positive partnerships with families and other professionals and articulate the value, appropriate use (and potential misuse) of assessment, including screening and referral practices.
e. Describe the roles and responsibilities of other building and district professionals in the PK-12 school system, including, but not limited to: early childhood specialist, school psychologist, social workers, occupational therapists, speech and language pathologists, physical therapists, school counselors, reading specialists, and bilingual or English as a second language educators.
f. Identify specialized personnel in the PK-12 school system and collaborate with them in a system of supports to advance children's learning.

Literacy

Literacy[2] knowledge and skills are central to success in schooling, career, and citizenship. Evidence is clear that the PK-3 years are pivotal in developing literacy. For these reasons, it is essential that beginning teachers are well prepared to develop children's literacy knowledge and skills.

The standards in this document set an unprecedented bar for what beginning teachers should know and be able to do related to literacy education. Importantly, the standards are based tightly on research in literacy. For example, specific literacy instructional practices identified in the standards are practices that have robust support in research—using these practices will foster children's literacy development.

The standards were carefully designed to align well between PK-3 and grades 3-6, and to align well with the key knowledge and skills detailed in Michigan's Early Childhood Standards of Quality for Prekindergarten (ECSQ-PK) and the Michigan K-12 Standards for English Language Arts for this grade band. Those using the standards are encouraged to read both sets of preparation standards, as well as the ECSQ-PK and K-12 academic standards, even if their preparation program or teaching assignment focuses on only one of these grade bands. The inclusion of pre-kindergarten in the standards is an important development for Michigan. This advance will allow for greater continuity in literacy education for Michigan's children from pre-kindergarten through grade three and help to highlight the developmental nature of literacy learning. It is essential that those enacting these standards emphasize the importance of developmentally appropriate practice in literacy across the PK-3 band. For example, literacy learning through play merits a particular emphasis in PK.

In order to achieve a high degree of specificity in the standards, they are organized into many relatively narrow constructs. However, it should be understood that these constructs are highly interrelated in development and education. In reality, for example, vocabulary development affects word reading development and vice versa, and a given instructional practice may affect many aspects of literacy development.

L.1. Literacy Learning Environments

Well-prepared beginning teachers of literacy will:

a. Facilitate children's access to a range of developmentally appropriate contemporary and classical digital and print materials of a variety of genres (e.g., informative/explanatory texts, narrative texts, signage including environmental print, poetry) and media (e.g., books, magazines, digital texts, audio text, speech-to-text technologies) for both in and out of school literacy.
b. Create a variety of organized, safe and respectful indoor and outdoor learning spaces and opportunities for learning that foster collaborative and meaningful literacy experiences (e.g., class meeting space, small group area,

[2] Literacy includes reading, writing, speaking, listening, viewing, and visually representing. The standards in this document address each of those areas.

furniture arrangement, writing center, reading areas, safe/appropriate use of digital technologies).

c. Make accessible and actively use word-learning artifacts (e.g., word walls for content areas, themes, high-frequency words; online dictionaries and thesauruses).
d. Use materials and space to foster literacy inquiry (e.g., class question wall, inquiry notebooks, inquiry table).
e. Provide access to materials for active literacy-enriched play (e.g., readers theater scripts, plays, 3D objects such as puppets, stationery, clipboards with paper or forms).
f. Provide access to and intentional interactions with socially, culturally and linguistically diverse texts and to high-interest, self-selected reading and writing materials with a variety of text complexity.
g. Support and guide integration of digital technologies to aid children's literacy and learning across disciplines (e.g., opportunities to create digital artifacts of learning, interactive simulations, digital stories or informational texts, digital presentations).
h. Use a variety of flexible grouping strategies that are based on the literacy task and children's specific literacy strengths, needs, prior knowledge, interests, and other factors.
i. Teach, model, facilitate, and provide independent practice with opportunities to use literacy for positive social interactions (e.g., solving conflicts; negotiating in collaborative projects).
j. Use a range of digital and non-digital tools to support dramatic play for socialization, oral language, writing development, word study, vocabulary, fluency, and comprehension.

L.2. Culturally Responsive Practices in Literacy

Well-prepared beginning teachers of literacy will:

a. Understand the importance of the children's use of their first or home language(s) and dialect(s) and development of additional languages and literacies, and design instruction that builds upon children's use of their first or home language(s).
b. Select instructional materials that value and reflect the multidimensionality of diversity represented in society and children.
c. Critically analyze texts with children for social and cultural biases by analyzing language and visual representations in print and digital texts and media that perpetuate gender, social class, and racial/ethnic stereotypes.
d. Engage children in the creation and use of visual representations of thinking and learning (e.g., anchor charts; graphic organizers; personal artifacts, such as learning/response journals).

L.3. Literacy Curriculum Design and Assessment

Well-prepared beginning teachers of literacy will:

a. Design or adapt and implement literacy curricula that support literacy learning for whole class, small groups, and individual children in reading, writing, and other forms of communication, including all constructs of literacy.

b. Observe and describe the impact of language on children's social and academic development and emerging identities as readers and writers, and plan and implement instruction accordingly.
c. Identify and value children's multiple ways of communicating, in- and out-of-school discourses, and variations in language expression, and leveraging these to provide appropriate literacy instructional practices and social development of individual children.
d. Demonstrate knowledge and understanding of state standards and competencies applicable to literacy learning PK-3.
e. Provide specific, constructive feedback to children targeted to children's most critical needs during the process of reading, writing, speaking, listening, viewing, and visually representing.
f. Identify reasonable goals and expectations for children that align with their literacy development.
g. Select texts that provide useful material, especially to back up an argument, for rich instruction and discussion, and analyze texts to identify specific learning goals, challenges (e.g., the complexity of the ideas in the text, insufficient information) and affordances.
h. Select texts of varying complexity that align with instructional purposes (e.g., independent practice, study of author's craft and structure, integration of knowledge and ideas).

L.4. Overall Literacy

a. **What it is:** Teacher candidates will learn that literacy processes—reading, writing, speaking, listening, viewing, and visually representing—are inherently connected, and the constructs of literacy identified in this strand of the standards, as well as other constructs of literacy, are related in complex ways. The ultimate goal of literacy is communication.
b. **How it develops:** Teacher candidates will learn that all of the constructs of literacy identified in this strand of standards are integrated in the service of meaningful reading and writing (e.g., to entertain, to persuade, to inform/explain); all constructs can and should be developed throughout elementary education; put another way, we do not, for example, first address phonics and then later address comprehension, but rather address each of these areas, building on their reciprocity.
c. **How to assess it:** Teacher candidates will learn that assessments of individual constructs of literacy identified in these standards can be valuable, but also valuable, and essential, is the understanding and ability to administer and interpret the results of multiple informal and formal assessments that examine the processes of reading and writing in their entirety; that it is important to understand that a child's assessed literacy proficiency, such as reading "level" will vary depending upon a number of factors, including background knowledge related to the topic of a particular text, motivation and engagement at that point in time, and features of the literacy task—thus should be seen as an approximation to inform instructional decision-making, not a definitive judgment or a label; that children may exhibit difficulties within and/or across the many constructs of literacy, and, if warranted, that the teacher should seek assessment and/or instructional support from a specialist, which will vary depending on the type of difficulty.

d. **How to teach it:** Cognizant of each child's experiences, strengths, needs, and interests, well-prepared beginning teachers will learn and be able to select and use research-supported instructional techniques that address multiple constructs of literacy development simultaneously (e.g., a single practice could address phonological awareness, concepts of print, and composition), such as, but not limited to, literacy-enriched dramatic play, storytelling/story acting, interactive read aloud, shared reading, interactive writing, guided oral reading, disciplinary writing, and discussion of ideas with print and digital texts across disciplines.

L.5. Motivation and Engagement

a. **What it is:** Teacher candidates will learn that literacy motivation refers to the beliefs, values, goals, and dispositions that provide energy and direction for behaviors and thoughts of the individual related to literacy and is often conceptualized as intrinsic and extrinsic; that literacy engagement refers to the cognitive, emotional, and social behaviors in academic or out-of-school settings that enable the individual to participate in literacy learning and gain expertise.
b. **How it develops:** Teacher candidates will learn that literacy motivation develops through interactions of the individual with family, friends, teachers, and community members, combined with experiences in various activities in which the person observes and internalizes the literacy motivations and knowledge of significant others and learns from important experiences, such as asking and seeking answers to their own and academic questions; academic and recreational engagement is energized, directed and sustained by children's motivation and interests.
c. **How to assess it:** Well-prepared beginning teachers of literacy will learn and be able to assess literacy motivation and engagement through interviews or questionnaires with the child, which may be supplemented by teacher observation of child affect and actions, writing, logs, or academic work that reveals effort, persistence, care, commitment, and accomplishment.
d. **How to teach it:** Cognizant of each child's experiences, strengths, needs, and interests, well-prepared beginning teachers of literacy will learn and be able to select and use research-supported instructional practices to foster intrinsic literacy motivation, including: setting expectations for classroom participation; assuring opportunities for developing self-efficacy through scaffolding, text and task selection, differentiation, goal-setting and self-monitoring; offering children substantive options, choices and input into learning activities; arranging collaborative activities that foster literacy learning through social interactions; providing a variety of meaningful purposes for academic units and tasks; providing continual encouragement for academic and personal attainment and interests; emphasizing the utility, value, and enjoyment of literacy and literacy tasks (e.g., word play, word inquiry, reading of high-interest texts, critical inquiry); building interpersonal relationships with children that encourage mutual trust and commitment.

L.6. Print Concepts

a. **What it is:** Teacher candidates will learn that print concepts, or concepts of print, are foundational knowledge about how print, in general, and books in particular, "work," such as understanding that print carries meaning, that

print is authored, and that print is permanent; that graphics and print relate; that print is made up of graphemes which are associated with phonemes (alphabetic principle) and includes, but is not limited to, knowledge of parts of texts (e.g., front cover, table of contents, diagrams), where to start reading within a text, directionality, return sweep, alphabetic principle, orientation of letters, concept of word, capitalization, and ending punctuation.

b. **How it develops:** Teacher candidates will learn that concepts of print, like many constructs of literacy, develop through observation, through interactions with others around print, and through explicit instruction. Note that some of these concepts are language-specific, not universal (e.g., English and Arabic have different directionality).
c. **How to assess it:** Well-prepared beginning teachers of literacy will learn and be able to measure concepts of print using observation and/or assessment tools that engage children in demonstrating the concepts in acts of reading and writing.
d. **How to teach it:** Cognizant of each child's experiences, strengths, needs, and interests, well-prepared beginning teachers of literacy will learn and be able to select and use research-supported instructional techniques to develop concepts of print, such as print-referencing read alouds, interactive writing, finger-pointing for print to speech match, literacy-enriched dramatic play and other forums for modelling and explicit instruction.

L.7. Phonological Awareness

a. **What it is:** Teacher candidates will learn that phonological awareness is a set of foundational oral language skills that involve conscious awareness of sounds within the speech stream, and the segmentation and blending of sounds; the difference between phonological awareness and the related terms *phonology, phonics,* and *phonemic awareness;* why phonological awareness, particularly phonemic awareness, is important for development of concepts of print, decoding, and encoding; and its reciprocal relationships with word reading, spelling, and vocabulary.
b. **How it develops:** Teacher candidates will learn the common, yet not rigid, developmental progression of phonological awareness skills, including multiple levels of sounds within words (e.g., syllables, rhyme, onset, rime, initial sounds, and other phonemes), expectations by grade level, and the differences among various phonological manipulations, including identifying, matching, blending, segmenting, deleting, and substituting sounds.
c. **How to assess it:** Well-prepared beginning teachers of literacy will learn and be able to use screening tools and to use diagnostic assessment tools to inform instruction in phonological awareness, and, if warranted by difficulties, to seek assessment and/or instructional support from a specialist whose knowledge base includes, but is not limited to, knowledge of core phonological processing difficulties (dyslexia).
d. **How to teach it:** Cognizant of each child's experiences, strengths, needs, and interests, well-prepared beginning teachers of literacy will learn and be able to select and implement research-supported instructional techniques that foster children's phonological awareness development, particularly phonemic segmenting, blending, and manipulation, by providing explicit instruction, modeling, and scaffolding, fostering awareness of articulatory

features, stretching words, playing with words (e.g., alliteration), sorting words by sounds, encouraging invented or estimated spelling (which also involves phonics), multimodal and/or multisensory activities with letters (which also involves phonics).

L.8. Phonics

a. **What it is:** Teacher candidates will learn that phonics is a connection between individual and groups of graphemes (letter symbols) and phonemes (letter sounds) that, among other things, allows readers to translate written symbols into meaningful words (decoding); the related terms *consonant, vowel, hard c/g, soft c/g, r-controlled vowel, blend, digraph, diphthong, types of syllables,* and *schwa*; to accurately analyze any English word for each of its letter-sound relationships; the problems with phonics generalizations that are too broad to be accurate (e.g., "when two vowels go walking the first one does the talking," which actually applies less than half the time).
b. **How it develops:** Teacher candidates will learn that children generally begin by learning the name, sound(s), and uppercase and lowercase forms of individual letters, followed by learning more complex letter-sound relationships (see Michigan K-2 standards for expectations by grade level), relying in part on a base of phonological awareness skills and developing reciprocally with those skills.
c. **How to assess it:** Well-prepared beginning teachers of literacy will learn and be able to use screening tools and to use diagnostic assessments to inform instruction, cognizant of the language(s) and dialect(s) spoken by the child, including assessments of alphabet knowledge and knowledge of more complex letter-sound relationships, and if warranted by difficulties, to seek assessment and/or instructional support from a literacy specialist.
d. **How to teach it:** Cognizant of each child's experiences, strengths, needs, and interests, well-prepared beginning teachers of literacy will learn and be able to select and use engaging and multimodal research-supported instructional techniques to explicitly teach, model, provide guided practice with, and provide independent practice with letter-sound relationships; using texts that are consistent with the child's knowledge of phonics, with synthesis, analysis, and manipulations of graphemes and morphemes within and across words, with emphasis on application in meaningful reading and writing (see Word Recognition for additional expectations), keeping in mind adaptations of instruction for children with needs in working memory
e. and executive functioning skills, such as attention and processing speed.

L.9. Spelling

a. **What it is:** Teacher candidates will learn that spelling is a connection between individual and groups of phonemes (letters sounds) and graphemes (letter symbols) and morphemes (meaning units) that, among other things, allows readers to translate thoughts into written words (encoding); the related terms *consonant, vowel, hard c/g, soft c/g, r-controlled vowel, blend, digraph, diphthong, types of syllables,* and *schwa*; that spelling instruction enables writing and also improves the specific reading skills of decoding and word reading and whose influences include phonological awareness, orthographic knowledge, and morphological awareness.

b. **How it develops:** Teacher candidates will learn that spelling develops through a series of common, yet not rigid, stages, with phases within each stage; stages are variously named, for example emergent, letter-name alphabetic, within-word, syllables and affixes, derivational relations; spelling development relies particularly on developing phonological awareness, phonics knowledge, morphological knowledge, orthographic knowledge, and vocabulary knowledge.
c. **How to assess it:** Well-prepared beginning teachers of literacy will learn and be able to use screening tools and to use diagnostic assessments to inform instruction, cognizant of the language(s) and dialect(s) spoken by the child, including assessments of alphabet knowledge; knowledge of more complex sound-letter relationships; stage of spelling development; and spelling performance within meaningful writing, recognizing that spelling performance may reveal information about children's phonemic awareness, phonics, morphological, orthographic and vocabulary knowledge, and, if warranted by difficulties, to seek assessment and/or instructional support from a specialist, whose knowledge base includes, but is not limited to, knowledge of dyslexia.
d. **How to teach it:** Cognizant of each child's experiences, strengths, needs, and interests, well-prepared beginning teachers of literacy will learn and be able to select and use engaging and multimodal research-supported instructional techniques including practices that simultaneously address both phonics and spelling, explicitly teaching, modeling, providing guided, and independent practice with, and providing feedback regarding, letter-sound relationships and spelling strategies; involving children in synthesis, analysis, and manipulations of graphemes and morphemes within and across words (e.g. word ladders, word sorting); and providing opportunities for fluent application in meaningful writing, in all cases, keeping in mind adaptations of instruction for children with needs in working memory and executive functioning skills, such as attention and processing speed.

L.10. Word Recognition

a. **What it is:** Teacher candidates will learn that word recognition is the ability to translate written words into known words within the lexicon; words may be recognized based on decoding, prediction (for example, through initial letters, syntactic context, and semantic context), analogy, and sight; the ultimate goal is to read each word at sight, meaning automatically, but in order to attain this goal with large numbers of words, each word must be fully analyzed graphophonemically and morphophonemically; this applies to all words, including high- as well as low-frequency words and words that are not spelled as might be expected; the related terms *high frequency word*, *sight word*, and *decodable*.
b. **How it develops:** Teacher candidates will learn that word recognition develops through experience with words and instruction through a series of common, yet not rigid, stages in overlapping waves, for example in Ehri's (2014) terms, from pre-alphabetic to partial alphabetic, to full alphabetic, to consolidated alphabetic, relying particularly on developing phonological and orthographic awareness, phonics knowledge, vocabulary knowledge, and constructing and monitoring for meaning throughout the reading process.

c. **How to assess it:** Well-prepared beginning teachers of literacy will learn and be able to use screening tools and to use diagnostic assessments to inform instruction, including word reading outside of context, with attention to, but not only to, high-frequency words; and word reading in context, with attention to multiple word recognition strategies; if warranted by difficulties, to conduct assessment of phonological awareness and seek assessment and/or instructional support from a literacy specialist.
d. **How to teach it:** Cognizant of each child's experiences, strengths, needs, and interests, well-prepared beginning teachers of literacy will learn and be able to select and use engaging and multimodal research-supported instructional techniques to explicitly teach, model, provide guided practice with, and provide independent practice with phonology, morphology, and word recognition strategies, to fluent application in meaningful reading.

L.11. Morphology

a. **What it is:** Teacher candidates will learn that morphology is an oral and written language concept comprised of the system by which the smallest units of meaning, called *morphemes* (bases and affixes), combine to form complex words; morphological/structural analysis and synthesis are important to both decoding and encoding and are related to vocabulary development and reading comprehension.
b. **How it develops:** Teacher candidates will learn that much of children's early acquisition of morphology is a natural part of oral language learning; over time, children learn to analyze the morphemic structure of words for spelling, word reading, and comprehension of written texts; to understand and use academic language, including academic root words, children are likely to carry out deliberate analysis of the morphemic composition of words.
c. **How to assess it:** Well-prepared beginning teachers of literacy will learn and be able to use word reading and spelling assessments that include multi-morpheme words and, if warranted by difficulties, to seek assessment and/or instructional support from a specialist (e.g., literacy specialist, speech and language pathologist).
d. **How to teach it:** Cognizant of each child's experiences, strengths, needs, and interests, well-prepared beginning teachers of literacy will learn and be able to select and use engaging and multimodal research-supported instructional techniques including providing a language-rich classroom; promoting curiosity about words, word structure, and word meaning; including morphologically complex words in word reading, spelling, and vocabulary lessons from the earliest grades; explicitly teaching, modelling, providing guided practice with, and providing independent practice with morphemes; and engaging children in activities that include synthesis, analysis, and manipulations of morphemes within and across words and that include application in meaningful reading and writing; such activities should take into account children's working memory and executive functioning skills, such as attention and processing speed.

L.12. Syntax

a. **What it is:** Teacher candidates will learn that syntax is an oral and written language concept comprised of a set of principles that govern phrase and sentence structure; in English syntax, these principles specify the relation of

word order and meaning; the grammar of the language indicates how words are combined to convey meanings; understanding syntax involves knowledge of parts of speech (e.g., verb, noun, adverb) and word order (which may vary from children's home language); phrases and sentences vary in complexity (simple, compound, complex, compound/complex); analysis of syntax helps to link structure and meaning.

b. **How it develops:** Teacher candidates will learn that young children begin to develop an understanding of syntax through listening and speaking in home and school in languages and dialects that may differ by setting; in oral and written academic texts, their attention is directed to the relation of word order and sentence structure and meaning; they acquire facility in manipulating word order to convey particular meanings or to place emphasis on particular words or ideas.
c. **How to assess it:** Well-prepared beginning teachers of literacy will learn and be able to use observational checklists and rubrics for oral and written language samples (including miscue analysis), and, if warranted by difficulties, to seek assessment and/or instructional support from a specialist (e.g., speech and language therapist and/or ESL/ELL/EL/DLL/ENL specialist).
d. **How to teach it:** Cognizant of each child's experiences, strengths, needs, and interests, well-prepared beginning teachers of literacy will learn and be able to select and use research-supported instructional techniques such as modeling, sentence framing, sentence expanding, and sentence combining; to provide authentic opportunities during reading and writing to examine how specific syntactic constructions function in texts and their own writing.

L.13. Reading Fluency

a. **What it is:** Teacher candidates will learn that fluency entails accuracy, automaticity, and prosody; its role in reading development; and reciprocal relationships with, among other constructs, background knowledge, motivation, orthographic knowledge, morphological awareness, word recognition, syntax and reading comprehension (although strong fluency does not guarantee reading comprehension).
b. **How it develops:** Teacher candidates will learn that fluency development entails progression in phonological awareness, rapid processing and aspects of expression including volume, phrasing, smoothness, and appropriate pace (which, for good readers, will vary based on what is being read, the purpose for reading, and other factors) within and across texts.
c. **How to assess it:** Well-prepared beginning teachers of literacy will learn and be able to assess each dimension of reading fluency (accuracy, automaticity, and prosody), orally and silently (for automaticity); this can best be accomplished by using tasks that also incorporate an evaluation of reading comprehension (for example, through comprehension questions and dialogic conversations about the reading).
d. **How to teach it:** Cognizant of each child's experiences, strengths, needs, and interests, well-prepared beginning teachers of literacy will learn and be able to select and use research-supported instructional techniques to build reading fluency, such as repeated reading, partner reading, echo reading, reading while listening to recorded books and other models of fluent reading and a large volume of silent and/or oral reading, in coordination with

techniques that build word knowledge and skills foundational to fluency (e.g., see the Phonics and Morphology sections).

L.14. Vocabulary

a. **What it is:** Teacher candidates will learn that vocabulary is an oral and written language construct that is central to everyday and academic language and involves general and discipline-specific vocabulary; knowledge of word meanings and the conceptual knowledge that underlies them; it includes understanding multiple meanings across contexts, figurative language, and morphological structure of words; it is central to oral language, academic language, reading comprehension, and written composition.
b. **How it develops:** Teacher candidates will learn that vocabulary develops through oral and written language exposure, inquiry, experiences, and explicit and implicit instruction (including explicit instruction in word meanings, vocabulary strategies [e.g., looking for a possible synonym in the sentence], and deliberate analysis of the morphemic composition of words), with particular complexity for children whose home language is not the language of instruction.
c. **How to assess it:** Well-prepared beginning teachers of literacy will learn and be able to examine children's breadth and depth of vocabulary knowledge, recognizing that children may have knowledge of vocabulary not in the language of instruction, and learning through use of observational checklists and rubrics for oral and written language samples, assessments of vocabulary that have been taught, and, if warranted by difficulties, to seek assessment and/or instructional support from a specialist.
d. **How to teach it:** Cognizant of each child's experiences, strengths, needs, and interests, well-prepared beginning teachers of literacy will learn and be able to select and use research-supported instructional techniques to develop vocabulary, including for children whose home language is not the language of instruction, through a large volume of oral and written language exposure (e.g., through conversation, read aloud, audio books, silent reading, and inquiry); selecting appropriate words for instruction; providing accessible, explicit explanation of the meaning of words, including, as appropriate, examples and non-examples, visual supports such as video, photo, or props, movement, analogies, and other comparisons; producing the word for children orally; having children repeat the word; providing a visual representation of the word once children are reading conventionally; providing multiple exposures to target words in different contexts over time; explicitly teaching morphology and etymology; and other techniques.

L.15. Handwriting

a. **What it is:** Teacher candidates will learn that handwriting is formation of letters in written text by hand, the legibility of which affects judgment and communicativeness of writing and the fluency of which affects written composition quality.
b. **How it develops:** Teacher candidates will learn that handwriting develops in the context of graphomotor development more broadly and through a series of common, yet not rigid, stages.

c. **How to assess it:** Well-prepared beginning teachers of literacy will learn and be able to assess handwriting through observation, the use of rubrics, and, if warranted by difficulties, seek formal assessments administered by a specialist (e.g., occupational therapist).
d. **How to teach it:** Well-prepared beginning teachers of literacy will learn and be able to select and use research-supported instructional techniques to develop handwriting, including pencil grip and letter formation, through modeling, teaching explicitly, in a multisensory manner, and providing application opportunities.

L.16. Comprehension

a. **What it is:** Teacher candidates will learn that comprehension is the ability to extract and construct meaning through interaction and involvement with oral, written, and visual language separately or in combination and the ultimate purpose of reading instruction.
b. **How it develops:** Teacher candidates will learn that comprehension of oral, print, and digital texts develops through the integration of many areas including language development (e.g., morphological knowledge and awareness, vocabulary depth and breadth), world knowledge development, and, in the case of written language, development in fluency, written textual knowledge, comprehension strategies, metacognition, and attitudes specific to written and visual language (e.g., a disposition to read actively to make sense of text), and working memory and executive functioning skills, such as attention and processing speed; not all reading comprehension difficulties have the same cause nor require the same instructional responses.
c. **How to assess it:** Well-prepared beginning teachers of literacy will learn and be able to assess reading comprehension through tasks including questioning, retelling, dialogic conversations, summarizing, and application tasks (e.g., carrying out a procedure while reading a procedural text) that, collectively, involve the three categories of comprehension in the National Assessment of Educational Progress: locate and recall, integrate and interpret, and critique and evaluate; if warranted by difficulties, to seek assessment and/or instructional support from an appropriate specialist.
d. **How to teach it:** Cognizant of each child's experiences, strengths, needs, and interests, well-prepared beginning teachers of literacy will learn and be able to select and use research-supported instructional techniques to develop comprehension, including instruction in many of the other areas in this strand of the standards (e.g., phonics, fluency) and daily time for children to read in motivating and engaging contexts for the purposes of building disciplinary knowledge and/or advancing personal interests; comprehension strategy instruction; modeling and guiding children to be metacognitive while reading; instruction in text search, navigation, and evaluation; focused, high-quality discussion of the meanings of text; text structure and feature instruction; and application tasks (e.g., building an argument from textual evidence) that, collectively, involve the three categories of comprehension in the National Assessment of Educational Progress: locate and recall, integrate and interpret, and critique and evaluate; to select and analyze texts for their affordances and challenges, including for specific disciplinary contexts.

L.17. Composition

a. **What it is:** Teacher candidates will learn that composition is the process of conveying meaning through oral, written (print or digital), visual language separately or in combination in many types of text (e.g., opinion, informative/explanatory, narrative) and is important to active citizenship, many professions, and daily life; and requires applications of writing conventions to construct clear and coherent writing in which the development, organization, and style are appropriate for specific tasks, purposes, and audiences across disciplines.
b. **How it develops:** Teacher candidates will learn that written composition develops through a series of common, yet not rigid, stages, including writing through drawing, writing through scribbling, writing through letter-like forms, writing through letter strings, writing through estimated/invented spelling, and writing through conventional spelling, in a manner that may vary across disciplines, genres, and modes of communication, and may be influenced by a child's home language(s) or dialect(s), and integrates many areas including language development (e.g., morphological knowledge and awareness, vocabulary depth and breadth), world knowledge, textual knowledge, and knowledge of composition strategies, working memory and attitudes specific to written and visual language; not all composition difficulties have the same cause nor require the same instructional responses.
c. **How to assess it:** Well-prepared beginning teachers of literacy will learn and be able to assess overall quality of a composition (the effectiveness of a specific piece of writing for a specific purpose and audience), print or digital, through observation, checklists, rubrics, and other tools and to use intermediary outcomes toward overall quality of a composition, including writing output, mechanics, vocabulary, sentence structure, organization, ideation, voice, and genre (or text) elements and, if warranted by oral and/or written language difficulties, to seek assessment and/or instructional support from an appropriate specialist.
d. **How to teach it:** Cognizant of each child's experiences, strengths, needs, and interests, well-prepared beginning teachers of literacy will learn and be able to select and use research-supported instructional techniques to develop written composition abilities including interactive writing (PK to grade 1); daily time for children to write across disciplines in motivating and engaging contexts; instruction in writing processes and strategies, particularly those involving researching, planning, revising, and editing writing in print and digital contexts; opportunities to study models and non-models of and write a variety of texts for a variety of purposes and audiences, with scaffolding and with attention to disciplinary context; and explicit instruction in capitalization, punctuation, sentence construction, keyboarding, word processing, and additional areas addressed in this strand of the standards (e.g., handwriting, spelling).

L.18. Speaking and Listening*

* These are skills distributed throughout the PK-3 standards, particularly in vocabulary, but addressed as a separate section in the grades 3-6 standards.

Mathematics

In addition to knowing the mathematics their children learn, well-prepared beginning teachers need specialized mathematical knowledge for teaching — mathematics not taught in the PK-3 grades but essential for *teaching*. They need an understanding of the concepts behind the mathematics and how mathematical ideas and skills develop in children, as well as the mathematical work they will do as a teacher. For example, teachers need to recognize mathematical patterns in children's strategies and model the standard algorithm for subtraction in a way that makes each step clear. These are demanding activities that require knowledge different from simply knowing the mathematics children are learning.

These standards are organized into two broad topics, Standards for Mathematics-Specific Teaching Practices and Standards for Mathematical Knowledge for Teaching Grades PK-3. The first section details teaching practices in mathematics that all beginning teachers should be able to perform regardless of topic, while the second section details specific mathematics topics for grades PK-3 and corresponding pedagogical concerns. Often, the teacher candidate is presented with broad coverage of all mathematics topics that arise in elementary school curriculum. Additionally, limited time for teacher education leads to a cursory coverage of elementary mathematics. To achieve greater depth and better prepare teachers for their work, these standards for mathematics do three things:

1. Identify mathematics topics that are high-leverage for PK-3 teaching, as detailed in Michigan's Early Childhood Standards of Quality for Prekindergarten and the Michigan K-12 Standards for Mathematics for this grade band.
2. Identify pedagogical tasks that come up frequently in mathematics teaching, matter for children's learning, and are mathematically demanding to perform.
3. Identify mathematical competencies that teachers need for the pedagogical tasks identified in #2 when teaching the mathematics topics that are high-leverage.

This approach provides foundational understanding for teaching, assures greater focus, relevance, and usefulness of the mathematics taught to and learned by teacher candidates, and positions teachers to continue to learn mathematics teaching beyond the scope of their pre-service preparation.

I. Standards for Mathematics-Specific Teaching Practices

In addition to knowing mathematical knowledge for teaching, well-prepared elementary teachers extend general teaching practices to address the unique requirements and opportunities presented by the teaching of mathematics.

Mathematics-Specific Teaching Practices
• Build and draw on *relationships* with children, caregivers, and communities in ways that support children's mathematics learning. • *Plan* mathematics lessons and sequences of lessons. • Use formative and summative mathematics *assessment* to gauge children's learning and to make instructional decisions.

- *Enact* instruction that allows all children to engage with significant mathematics and develop productive dispositions.

The following standards for these four mathematics-specific teaching practices attend to children, mathematics, and issues of equity.

M.1. Build and draw on *relationships* with children, caregivers, and communities in ways that support children's mathematics learning.
Well-prepared beginning teachers of mathematics are able to:

a. Hear children's mathematical thinking and engage with curiosity, interest, and understanding in ways that build rapport, provide information about children's interests, strengths, and needs, and inform instruction.
b. Communicate with caregivers about mathematics and their child in relation to current standards and the school's curriculum, supporting caregivers in fostering their child's success with mathematics in and out of school.
c. Use knowledge of children, their caregivers, and their communities to create mathematical learning environments that provide children, in particular children historically marginalized in mathematics classrooms, with access to significant mathematics and engagement in mathematical activities that are both culturally and instructionally appropriate.
d. Attend to and build children's positive mathematical identities, disrupting patterns of marginalization that reinforce inequities and exclusion.

M.2. *Plan* mathematics lessons and sequences of lessons.
Well-prepared beginning teachers of mathematics are able to:

a. Consider who children are as learners of mathematics and design ways to interest children and to use their resources and affinities to build access and participation, including taking stock of the mathematical capacities children bring to lessons, anticipating common patterns of mathematical thinking, looking for opportunities to include play in mathematics and mathematics in play, and planning for the mathematical participation of particular children.
b. Analyze the mathematics content in instructional resources, referencing standards and progression documents to clarify learning goals and to identify connections among mathematical concepts and across grade levels.
c. Solicit broad participation in mathematical work (for instance, by choosing activities and planning activities that provide children with multiple entry points and ways of being successful), make children's thinking central to the lesson, provide opportunities for play, and give children opportunities to show their thinking and see value in the contributions they make.

M.3. Use formative and summative mathematics *assessments* to gauge children's learning and to make instructional decisions.
Well-prepared beginning teachers of mathematics are able to:

a. Elicit children's thinking and solution strategies in multiple forms in writing, through speaking, in drawings, etc. Identify evidence of understanding in children's thinking and strategies and use this information to make in-the-moment instructional decisions.

b. Understand the meanings and purposes of summative assessment and the process of formative assessment in mathematics. Interpret the results of assessments and use the interpretations in ways that respond to children's needs, promote learning, and improve instruction.
c. Consider the language, format, and context of mathematics assessments (and assessment questions) for demonstrating children's thinking and consider how formative and summative mathematics assessments are used and the consequences for children, both intended and unintended.
d. Distinguish between superficial and deeper evidence about children and attend to key aspects of children's understanding, skill, and engagement, as well as ignore irrelevant aspects.
e. Use assessment data to plan next steps for instruction, understanding that evidence of children's learning (vs. topic coverage) is necessary for moving on from a topic.

M.4. *Enact* instruction that allows all children to engage with significant mathematics and to develop productive dispositions toward mathematics.
Well-prepared beginning teachers of mathematics are able to:

a. Support children, in particular children historically marginalized in mathematics classrooms, in identifying themselves as mathematical thinkers and design instruction that helps children to recognize their own and other children's mathematical strengths.
b. Use a variety of participation structures and instructional routines, including whole class, small group, and independent lesson formats, both play and formal instruction, and a variety of materials. Foster children's talk about mathematics, with particular attention to disrupting patterns of over and under participation that reinforce inequities and exclusion.
c. Develop classroom organizational routines and strategies that allow children access to mathematical tools and ensure the effective use of manipulatives and resources.
d. Develop strategies for creating a classroom culture that values productive struggle, challenging mathematical ideas, constructing mathematical meanings together, and enjoyment of mathematics.

II. Standards for Mathematical Knowledge for Teaching Grades PK-3

Four criteria guide the identification of a *high-leverage mathematics topic*.

- It underlies and is foundational to the school mathematics curriculum.
- It occupies significant space in the school curriculum and is taught in some form across several grade levels.
- It is fundamental for children's learning and often leads to persistent difficulty when not taught well.
- It is often known only superficially by beginning teachers or requires significant unpacking of beginning teachers' established mathematical knowledge.

For instance, for teachers of grades PK-3, four mathematics topics meet all four criteria.

Topics of Mathematics High-Leverage for the Mathematical Preparation of Grades PK-3 Teachers
• **Attribution** • **Counting** and whole number representation • Early **fraction** representation • **Whole** number operation

Strategic tasks of mathematics teaching

To identify mathematical knowledge for teaching these topics, it is necessary to look at the work teachers do and identify strategic tasks of teaching — tasks that, when carried out skillfully, significantly advance the likelihood children learn mathematics, and when badly executed, put children's mathematics learning at risk. Five criteria guide the identification of a strategic task of teaching.

- It centrally shapes instructional interactions among children and teacher.
- It centrally affects equitable access to mathematics instruction.
- It is learnable by beginning teachers.
- It is broad enough to use to organize mathematical knowledge for teaching and specific enough to direct the mathematical preparation of teachers.
- It has significant mathematical demands.

In addition, a set of teaching tasks needs to work together to meet these criteria. Together, they need to span much of teaching and include its most mathematically intensive aspects. Four tasks of mathematics teaching meet these criteria and provide a useful organization of the mathematical knowledge crucial to beginning teachers.

Tasks of Mathematics Teaching Strategic for the Mathematical Preparation of Teachers
• Unpack mathematical **content** and identify mathematical **competence** • Talk (perform) mathematical explanations and support children's mathematical **explanations** • Choose, interpret, and talk (perform) with **representations** • Elicit, interpret, support, and extend **children's mathematical thinking**

Mathematical competencies needed for performing strategic tasks when teaching high-leverage topics.

The high-leverage topics and strategic tasks together provide a context for identifying essential mathematical competencies for teaching. It is important to note that these are mathematical competencies, not pedagogical competencies — they isolate a mathematical skill that assists in carrying out a task of mathematics

teaching without becoming that task of teaching. For instance, gaining skill in solving mathematics problems in multiple ways, which requires only mathematical competence, serves as a resource for anticipating different ways children may solve problems, but anticipating what children will do requires also considering children and instructional design.

Five criteria guide the identification of a mathematical competency for teaching.

- It is central to carrying out a strategic task of teaching a high-leverage mathematics topic.
- It is an appropriate goal for a mathematics content course taught by a professional who may or may not have experience with PK-12 teaching and it is not expressed in terms of children, classrooms, or instruction, instead isolating a focused mathematical skill.
- It is broad enough to use to organize mathematical knowledge for teaching and specific enough to direct the mathematical preparation of teachers.
- It is formulated to capture productive ways of mathematically developing and assessing beginning teachers in teacher education programs, in particular suggesting activities and instructional units appropriate for mathematics content and methods courses.

In addition, a set of mathematical competencies needs to work together to meet these criteria, spanning different aspects of mathematics teaching and different mathematics topics.

M.5. Unpack mathematical *content* and identify mathematical *competence* for *attribution*.

Well-prepared beginning teachers of mathematics are able to:

a. Identify mathematical affordances in tasks and play situations for noticing, naming, and describing attributes of two- and three-dimensional shapes and spatial relationships, paying attention to the precision of examples.
b. Identify opportunities to introduce mathematical language and precision into other's talk and play that draw attention to patterns, features, and compositions of shapes and objects, for instance, suggesting words such as tall, short, or wide when someone says, "my building is big" or asking questions about how many blocks or what shapes were used or about which blocks are on the bottom.
c. Recognize and rewrite mathematical tasks involving spatial reasoning, composing and decomposing shapes, equal partitioning, or comparing or analyzing shapes to make them easier or harder, or to include multiple entry points, without undermining the intended mathematical focus — including recognizing the influence on the task when choosing specific side lengths, angles, spatial orientations, and the absence or presence of parallel or perpendicular lines.
d. Generate examples and non-examples of shapes (such as triangles, rectangles, and others) that draw attention to defining features and help to build mathematical definitions, namely examples that fit common expectations and ones that do not.

M.6. Perform mathematical *explanations* and support children's mathematical explanations for *attribution*.

Well-prepared beginning teachers of mathematics are able to:

a. Formulate questions that distinguish whether a number or element of a series fits a pattern or definition.
b. Unpack, understand, and develop mathematical justifications using definitions when comparing and analyzing two- and three-dimensional shapes.
c. Use clear and precise language to name and describe two- and three-dimensional shapes, (e.g., distinguishing between cones and triangles, sides and faces, and sides and edges; recognizing changes in orientation; and identifying transformations).
d. Compare and contrast different explanations of the methods for generating numerical or geometrical patterns.

M.7. Choose, interpret, and talk with *representations* for *attribution*.

Well-prepared beginning teachers of mathematics are able to:

a. Choose and display accurate representations of regular and irregular two- and three-dimensional shapes in a variety of orientations that highlight defining and non-defining attributes.
b. Coordinate images, talk, and gestures such as pointing when comparing and analyzing components of composite two- and three-dimensional shapes.
c. Generate multiple representations and make connections among different representations for composite shapes in drawings and other models (e.g., blocks, building materials, and other manipulatives).
d. Interpret idiosyncratic representations of two- and three- dimensional shapes and recognize their mathematical strengths and weaknesses (e.g., noticing the potential for confusion in using a piece of pie to represent a triangle).

M.8. Elicit, interpret, support, and extend *others' mathematical thinking* for *attribution*.

Well-prepared beginning teachers of mathematics are able to:

a. Pose mathematically appropriate questions to probe and elicit others' thinking about two- and three-dimensional shapes, including differences among shapes, equally partitioning shapes, and iterating a part to create a whole.
b. Interpret, critique, and develop claims about others' thinking, language, and gestures about quantity, shapes, and relationships between two-dimensional and three-dimensional shapes.
c. Clarify and accurately record others' mathematical thinking as they compare and analyze attributes and two- and three-dimensional shapes.

M.9. Unpack mathematical *content* and identify mathematical *competence* for *counting* and whole number representation.

Well-prepared beginning teachers of mathematics are able to:

a. Identify mathematical affordances in tasks and play situations for counting objects and exploring early number concepts (i.e., cardinality, one-to-one correspondence, subitizing, hierarchical inclusion, and conservation, as well as counting on and counting back).

b. Formulate questions about quantity based on correct or incorrect responses in order to develop or assess thinking around early number concepts when engaging with a set of objects.
c. Analyze addition and subtraction tasks for opportunities to address ideas about number, including composing and decomposing, anchor numbers of 5 and 10, and counting all and counting on, and adapt tasks, if necessary, for specific instructional goals.
d. Identify the mathematical goals, conditions and challenges of tasks and play situations designed to address place value relationships.
e. Recognize multiple strategies for composing and decomposing numbers, their dependence on place value relationships, and connections among these strategies as indicators of mathematical competence.

M.10. Perform mathematical *explanations* and support children's mathematical explanations for *counting* and whole number representation.
Well-prepared beginning teachers of mathematics are able to:
a. Formulate questions to uncover others' strategies for determining if a count is correct, such as counting on, counting all, or counting back, as objects are added, removed, or combined; or using understandings of the base-ten structure.
b. Perform clear mathematical explanations connecting new terminology (e.g., ones, tens, hundreds) to objects and coordinating different strategies of composing and decomposing, for instance showing that 345 ones is equivalent to 34 tens and 5 ones and to 3 hundreds and 5 tens minus 5 ones with language that correctly and clearly references objects and symbols in meaningful ways.
c. Generate multiple explanations for counts and for addition and subtraction based on base-ten number representation, 5s and 10s, convenient decompositions, and counting on or back.

M.11. Choose, interpret, and talk with *representations* for *counting* and whole number representation.
Well-prepared beginning teachers of mathematics are able to:
a. Identify affordances and limitations of representations for iterating units and composing and decomposing numbers.
b. Identify affordances and limitations of different representations (e.g., materials, manipulatives, drawings, and symbols) for base-ten numbers and addition and subtraction (e.g., groupable, ungroupable, non-proportional, etc.) in relation to tasks or play situations and pedagogical goals.
c. Accurately interpret and represent connections and mathematical progressions among representations of addition, subtraction and multiplication (e.g., open number lines, arrays, etc.).

M.12. Elicit, interpret, support, and extend *others' mathematical thinking* for *counting* and whole number representation.
Well-prepared beginning teachers of mathematics are able to:
a. Pose questions to elicit particular ways of thinking about composing and decomposing numbers both less than 10 and greater than 10 when thinking is not transparent.
b. Formulate claims about others' mathematical understanding of counting

based on evidence from their performance on counting activities, in particular understandings of quantity, the ability to count on and back by place value units starting at a number other than 0 or 1, and flexible use of structure in base-ten numbers.
c. Record others' approaches to tasks involving the bundling of groups of 10 into a unit and interpret what is understood about the base-ten number system.
d. Observe, assess and identify developing understandings of early number concepts (i.e., cardinality, one-to-one correspondence, subitizing, hierarchical inclusion, and conservation, as well as counting on and counting back) and formulate appropriate follow-up questions.

M.13. Unpack mathematical *content* and identify mathematical *competence* for early *fraction* representation.

Well-prepared beginning teachers of mathematics are able to:

a. Formulate questions that meaningfully reveal and challenge understanding of the magnitude of fractions and support flexible ways of comparing and ordering fractions.
b. Recognize mathematical competence in others' approaches to and explanations for fraction problems using multiple representations involving different interpretations.
c. Observe or participate in a group that is engaged in comparing or combining fractions and provide a description of this mathematical work.

M.14. Perform mathematical *explanations* and support others' mathematical explanations for early *fraction* representation.

Well-prepared beginning teachers of mathematics are able to:

a. Recognize whether or not an explanation for comparing or combining two or more fractions uses the standard definition of a fraction.
b. Perform clear, elaborated explanations, attuned to an audience, of the meaning of a fraction $\frac{a}{b}$ for different interpretations of fractions in different representational environments.
c. Interpret and contrast various approaches to compare or combine fractions and determine whether those approaches, use of models, and explanations are mathematically consistent and correct and, if not, how they might be adapted.

M.15. Choose, interpret, and talk with *representations* for early *fraction* representation.

Well-prepared beginning teachers of mathematics are able to:

a. Identify affordances and limitations of different materials, manipulatives, and drawings as representations of fractions.
b. Use appropriate representations, including geometric and linear models, for supporting the solving of tasks involving fraction quantities.
c. Use unmarked or partially marked number lines to interpret and compare fractions, attending carefully to the unit interval as the conventional whole, the role of unit fractions and iteration, and estimation of magnitudes.

M.16. Elicit, interpret, support, and extend *others' mathematical thinking* for early *fraction* representation.

Well-prepared beginning teachers of mathematics are able to:

a. Pose questions to elicit particular ways of thinking about comparing or combining two or more fractions when that thinking is not transparent.
b. Formulate claims about mathematical understanding based on evidence from performance on comparing or combining fractions.
c. Clarify and record others' approaches to solving tasks involving comparing or combining fractions.
d. Identify incorrect reasoning about comparing or combining fractions, including reasoning about their magnitude and formulating counter-speculations for that reasoning.
e. Identify which key aspects of a given fraction interpretation are present or absent in others' talk or work (for instance, noticing when a child's explanation shifts from a part-whole interpretation to a part-of-a-set interpretation).

M.17. Unpack mathematical *content* and identify mathematical *competence* for whole number *operations.*

Well-prepared beginning teachers of mathematics are able to:

a. Recognize and articulate potential goals and conditions and identify mathematical affordances in tasks and play situations and sequences of tasks that can be solved by direct modeling; counting; derived facts; operations of addition, subtraction, multiplication, or division; or approaches that integrate these.
b. Identify mathematical affordances in questions that can be asked regarding composition and decomposition and their role in representing numbers with drawings or materials, for example, when using ten frames or base-ten blocks, asking "What number is this? Show me 7. Show me 7 in a different way. How might we show 1000 with this drawing or material?"
c. Provide a narrative of the mathematical work to be done to solve a task involving any of the four operations, or that is being done or has been done to solve it.
d. Recognize and analyze differences in the mathematics content for math tasks for any of the four operations when wording, context, or structures are modified.
e. Generate and recognize multiple approaches to mathematics tasks involving addition, subtraction, multiplication, and division, including geometric interpretations of each and connections among them.

M.18. Perform mathematical *explanations* and support children's mathematical explanations for whole number *operations.*

Well-prepared beginning teachers of mathematics are able to:

a. Explain what is similar and different for tasks modeled by the same computation, for instance identifying which involve the same and which involve different meanings of the operations, describing those differences, and explaining why the computation correctly models both.
b. Recognize the difference between explanations that describe computational procedures with and without explicit mathematical connections to the place value meanings and to the meaning of operations.

c. Perform explicit and elaborated explanations that unpack the structure of and mathematically justify algorithms.
d. Interpret and contrast alternative or novel approaches to computations, determining whether approaches, use of models, and explanations are mathematically consistent and correct and, if not, how they might be adapted to be.

M.19. Choose, interpret, and talk with *representations* for whole number *operations.*

Well-prepared beginning teachers of mathematics are able to:

a. Recognize whether or not drawings and their implied use accurately model identified operations, including whether drawings (e.g., geometric interpretations) are consistent with specific meanings of operations.
b. Recognize affordances and limitations of different representations for modeling composing and decomposing numbers as well as operations (e.g., ten-frames, bundling sticks, base-ten blocks, arithmetic rack, money, arrays, number lines, and area models), for instance, ways in which units are visible or not in groups of units and distinctions between grouping and trading models.
c. Choose and use materials, drawings, and symbols to model a variety of computational strategies based on place value, properties of operations, or relationships between operations, for instance, reasoning about addition and subtraction as reverse operations or division as repeated subtraction, and contrast and connect solutions that use different representations.
d. Use materials, drawings, and symbols to model child-constructed and conventional algorithms, attending carefully to language, making connections among representations, matching the steps in each representation, and coordinating the talk with the use of the representations when explaining solutions to the problems.

M.20. Elicit, interpret, support, and extend *others' mathematical thinking* for whole number *operations.*

Well-prepared beginning teachers of mathematics are able to:

a. Formulate claims about mathematical understanding based on evidence from performance on computational tasks, addressing issues of conceptual understanding, procedural fluency, and adaptive reasoning.
b. Recognize which among a set of partially expressed ideas about the solution to a task involving whole numbers and operations is most germane to a given mathematical focus, such as an interpretation of subtraction as comparison or the role of place value in computational algorithms.
c. Clarify and record others' approaches to solving whole-number tasks involving operations.
d. Examine the meaning of operations and method for solving a computational task as exemplified in others' talk or work, and then apply the approach on different tasks.

Science

The science standards for PK-3 elementary teachers reflect a vision for classrooms where children in grades PK-3 make sense of the world by engaging in 3-Dimensional science and engineering learning, as defined in the Framework for K-12 Science Education (i.e., science and engineering practices, disciplinary core ideas, and crosscutting concepts). This framework provides detailed research-based knowledge of how people learn science and what Michigan classrooms can look like. Science learning at the PK-3 level should be focused on reasoning and arguing from evidence, making thinking public and critiquing the thinking of others, creating and interpreting increasingly complex text and participating in and supporting a culture of talk. By leveraging literacy and mathematics connections, well prepared beginning teachers can engage all children in grades PK-3 in complex and age-appropriate problems and the investigation of natural and designed phenomena. The classroom in which this type of science learning takes place is led by a knowledgeable and prepared teacher. To meet this expectation, preservice teachers must engage in multiple science learning experiences that mirror these expectations and reflect on those experiences as beginning teachers.

Engaging Children in 3-Dimensional (3D) Science Learning

S.1. Scientific Phenomena

Well-prepared beginning teachers of science are able to:

a. Articulate the role of scientific phenomena in three-dimensional science teaching and learning.
b. Identify, evaluate, and use productive scientific phenomena for children's science learning including everyday noticings of the world (for example, a puddle disappearing over time).[3]

S.2. Engaging children in *Science and Engineering Practices (SEPs)* as Identified in the Framework

Well-prepared beginning teachers of science are able to:

a. Articulate the nature and importance of scientific and engineering practices, giving priority at this grade band to the practices of asking questions and defining problems, planning and carrying out investigations, analyzing and interpreting data, and constructing explanations and designing solutions.
b. Identify grade appropriate elements of scientific and engineering practices, including developing and using models and engaging in argument from evidence.

S.3. Engaging Children in Developing and Using *Disciplinary Core Ideas* (DCIs) as Identified in the Framework

Well-prepared beginning teachers of science are able to:

[3] Boundary: Beginning teachers should not be expected to know how to create driving phenomena for all science and engineering topics.

a. Demonstrate an understanding of and articulate the importance of life, earth and physical science disciplinary core ideas[4] of the K-3 Michigan Science Standards and Early Childhood Standards of Quality for Prekindergarten.
b. Identify grade appropriate elements of the disciplinary core ideas within instructional materials.

S.4. Engaging Children in Developing and Using *Crosscutting Concepts* as Identified in the *Framework*

Well-prepared beginning teachers of science are able to:

a. Articulate the nature of the crosscutting concepts and relate them to 3D learning (giving priority to patterns, cause and effect, and systems and systems models) and identify them within instructional materials.

Children's Sense-making and Science Teaching Pedagogy

S.5. Selecting and modifying instructional materials for 3D learning

Well-prepared beginning teachers of science are able to:

a. Select and modify instructional materials to create learning environments that engage children in using the disciplinary core ideas and science and engineering practices to explore, describe, and explain phenomena.[5]
b. Articulate and incorporate connections between science and other discipline areas (e.g., engagement in measurement, analysis and the cross-cutting concept of patterns within science learning; writing to explain science understanding).

S.6 Children's scientific sense-making

Well-prepared beginning teachers of science are able to:

a. Articulate how children make sense of scientific phenomena, ideas, experiences and data and what scientific sense-making looks like in individuals (e.g., speaking, writing, visually representing, enacting) and whole class interactions (e.g., speaking and listening).
b. Identify instances of sense-making and elicit children's ideas, in individual, small group, and whole class interactions that embrace the complexity and iterative nature of sense-making and move beyond indicating whether the ideas are correct vs. incorrect, accurate vs. misconceptions.

S.7. Pedagogical strategies that support culturally relevant sense-making in 3D learning

Well-prepared beginning teachers of science are able to:

a. Articulate research-based pedagogical strategies that support children's sense-making in grade level and culturally appropriate ways including leveraging children's prior experiences and knowledge, varying activity structures, talk and group work for science. For example, they should be expected to elicit children's thinking, cultural and community connections, and curiosity when making sense of phenomena.

[4] Content

[5] Boundary: Beginning teachers should not be expected to modify entire units, but instead identify opportunities for improving/altering existing lessons to include *Practices and DCIs.*

b. Choose, modify and/or design lessons and lesson sequences and/or assessments to create learning environments that provide opportunities for iterative children's sense-making and explanation building through classroom talk, written words, diagrams and/or movement.[6]
c. Create an inclusive linguistic culture that leverages individual interactions, small group work and whole group talk strategies for eliciting children's ideas and engaging children in sense-making through 3D learning (e.g., partner talk, asking for clarification, asking for evidence and reasoning, asking for others to agree/disagree and asking for contributions to build on one another).[7]
d. Demonstrate initial strategies for navigating tensions between alternative ideas and ways of knowing (which may be derived from various cultures) and canonical science ideas including: referring to evidence, continuing to consider/debate to work through the ideas, focusing on the most important disciplinary/explanatory ideas and understanding when it is appropriate and necessary to create space for children to grapple with alternative ideas.
e. Select or modify formative and summative science assessments (diagrammatic, linguistic) that address 3D learning and reveal children's current sense-making.
f. Recognize and assess children's ideas, life experiences and learning beyond the technical scientific language by evaluating samples of children's work and classroom interactions to determine the nature and depth of children's sense-making and leverage ongoing changes in children's learning to adjust instruction.

S.8 Equity and Access

Well-prepared beginning teachers of science are able to:

a. Identify children's and communities' interests, experiences and resources as assets to their science learning and use these assets to select phenomenon, modify or design lessons, and build on during instruction.
b. Develop strategies for creating a classroom culture that values productive struggle, challenging science ideas, constructing science meaning together, and enjoying science.

[6] Boundary: Beginning teachers should not be expected to have mastered complex talk moves such as sequencing children's ideas.

[7] Boundary: Beginning teachers should not be expected to have mastered skills in navigating whole class conversations. They should be able to provide some opportunities for conversation, and have several strategies to help children express, elaborate and start building on their own and others' ideas.

Social Studies

Candidates demonstrate knowledge, understanding, and application of the major concepts and modes of inquiry (i.e., developing questions and planning inquiries, applying disciplinary tools and concepts, evaluating sources and using evidence; and communicating conclusions and taking informed action) from the social studies disciplines – the integrated study of history, geography, political science and economics – to promote all children's abilities to make informed decisions as engaged citizens to enact change in a culturally diverse, democratic society and interdependent world. Foundational concepts and understandings that children need in order to grow in the content are nurtured through play and children's experiences.

SS.1. Civic Engagement
Well-prepared beginning teachers of social studies will know and demonstrate an understanding of how to teach:

a. The responsibility of public discourse, decision making, and citizen involvement through developing skills for participating in community issues by using representational tools and data to interpret, analyze, and create structured discourse which communicates reasoned positions relative to public issues;
b. Organizational skills for clearly stating a problem as a public policy issue, analyze various perspectives, and generate and evaluate possible alternative resolutions; and
c. Communication skills to generate a reasoned position on a public issue in order to act constructively to further the public good.

SS.2. History
Well-prepared beginning teachers of social studies will know and demonstrate an understanding of how to teach:

a. History as an organizing framework for developing a sense of time and chronology using events from personal experiences and expanding into the events of larger communities and countries;
b. Historical thinking that consists of understanding and evaluating change and continuity over time, and make appropriate use of historical evidence in answering questions and developing arguments about the past.
c. Historical thinking to understand the past in the local community, Michigan, and the United States, as detailed in *Michigan K-3 content standards for social studies* and Early Childhood Standards of Quality for Prekindergarten.

SS.3. Geography
Well-prepared beginning teachers of social studies will know and demonstrate an understanding of how to teach:

a. Geography as an organizing framework to identify and interpret geographic environment using representational tools, spatial perspective, and concepts that explain human needs and wants and their relationship to their environment;

b. Geographic reasoning that consists of using spatial and environmental perspectives, skills in asking and answering questions, and being able to apply geographic representations;
c. Geographic reasoning to understand the geography of the local community, Michigan, the United States, and the world, as detailed in Michigan K-3 content standards for social studies and Early Childhood Standards of Quality for Prekindergarten.

SS.4. Civics and Government

Well-prepared beginning teachers of social studies will know and demonstrate an understanding of how to teach:

a. Civics and Government as an organizing framework for understanding productive civic engagement, the development of individual rights and societal structures, and relationships between these dynamic forces;
b. Civic reasoning that consists of conceptual foundations of governments, applying civic virtues and principles of American constitutional democracy, explaining important rights and how, when, and where American citizens demonstrate their responsibilities by participating in government;
c. Civic reasoning to understand the government and political processes at the local, state, federal, and global levels as detailed in Michigan K-3 content standards for social studies and Early Childhood Standards of Quality for Prekindergarten.

SS.5. Economics

Well-prepared beginning teachers of social studies will know and demonstrate an understanding of how to teach:

a. Economics as an organizing framework for study of the interaction of individual wants, goods, services, and the resulting exchanges in a structured society;
b. Economic way of thinking to identify, analyze, and evaluate the causes and consequences of individual economic decisions and public policy (e.g. all choice involves cost, individuals make economic choices, people respond to incentives in predictable ways, individuals participate in economic systems, all decisions have consequences which lie in the future, trade and labor create wealth);
c. Economic way of thinking to understand economic activities as detailed in as detailed in Michigan K-3 content standards for social studies and Early Childhood Standards of Quality for Prekindergarten.

Appendix to Standards for the Preparation of Teachers of Lower Elementary (PK-3) Education

Glossary

Professional

504 Plan: Section 504 of the Rehabilitation Act of 1973 is the civil rights law that does not allow discrimination on the basis of disability and guarantees individuals with disabilities equal access to an education. The 504 plan is a written plan created for students with disabilities who require support in order to be successful in the classroom. A 504 plan is not an Individualized Education Plan and is not special education. 504 plans provide accommodations, modifications, and/or supplemental services for children with disabilities in typical classroom settings.

Accommodation: An accommodation does not change a learning expectation or modify what a child learns but rather provides an alteration in the environment, equipment, or access to the curriculum addressing how a student with a disability, or any student gains access to the typical learning environment or experience. Accommodations can occur in the general or special education classroom.

Curriculum: The overall design of instruction or opportunities provided for learning. A curriculum may include materials and textbooks, planned activities, lesson plans, lessons, and the total program of formal studies or educational experiences provided by a teacher or school. (*Note*: Definitions of *curriculum* vary widely because of alternative perceptions held by theorists about the nature and organization of formal schooling.)

Individualized Education Program (IEP): Each public school child identified with a disability who receives special education and related services must have an Individualized Education Program, a legal document ensuring access to the general education curriculum and providing a planned program of intervention goals and supports to address the needs of the child. The IEP provides opportunities for teachers, parents, school administrators, related services personnel, and the individual student (when appropriate) to work together to ensure success and improve educational results for the child with disabilities.

Learner-Centered Supports: Instructional tools used to support all students, include differentiated supports, multi-tiered system of supports, personalized learning, aligned curriculum, deeper learning, and feedback for learning.

Multi-tiered System of Supports: A Multi-Tiered System of Supports (MTSS) is a comprehensive framework comprised of a collection of research-based strategies designed to meet the individual needs and assets of the whole child. MTSS intentionally interconnects the education, health, and human service systems in support of successful learners, schools, centers, and community outcomes. The five essential components of MTSS are inter-related and complementary. The MTSS framework provides schools and districts with an efficient way to organize resources to support educators in the implementation of effective practices with fidelity so that all learners succeed.

Motivation to Learn: The goals, values, beliefs, and dispositions that catalyze a willingness to undertake and sustain engagement in a learning activity

Reflective Practices: The ability to reflect on one's actions so as to engage in a process of continuous learning.

Whole Child: A unique learner comprised of interacting dimensions, such as cognitive, physical, behavioral, social and emotional. The whole child lives within multiple and interconnected environments including home, school, and community.

Literacy

Academic language: Language that is used and valued within academic professions and schools. Extending beyond isolated words and phrases, academic language can be contrasted with conversational or vernacular language. These forms serve different purposes and thus make different use of syntax, lexical terms, and forms of organization (e.g., *There appears to be no compelling reason to argue that ___. The data appear to suggest that ___. To foster discussion, I would like to argue that___*.). Academic language is used in the disciplines of math, science, literature, and history.

Affect: Feeling, emotion, or attitude.

Affixes: Morphemes that are attached to a base word or stem to form a new word, affixes include prefixes, suffixes and connecting vowel letters (e.g*., -ness*, *pre-*, *-ed*, *-s*).

Alphabetic principle: The understanding that, in alphabetic written language systems, letters represent sounds and there are systematic and predictable relationships between them.

Articulatory features: A property of a speech sound based on its voicing or on its place or manner of articulation in the vocal tract, such as voiceless consonants (e.g., ch, f, k, p, s, sh, t), bilabial sounds (e.g., b, p, and m), or stop sounds (e.g., t, k, d) used in describing the sound.

Attention: Keeping one's mind closely focused on something to be perceived or understood or the ability to do this; mental concentration.

Attitude (specific to written, spoken, and visual text): Student perspective that can color thinking or feeling about literacy (e.g., a disposition to read actively to make sense of a text).

Authentic purposes: Activities reflecting reading and writing not solely or mainly for the purposes of instruction, at least from students' perspective.

Automaticity: The process of automatically recognizing words quickly and effortlessly during reading (without conscious attention).

Base (-s): A shortened form of the term base element. Each word contains a base element that holds the core of its meaning. Words containing the same base element generally have connected meanings, though sometimes the connection can be more metaphorical than literal. A **free base** element is a word that is capable of standing on its own as a word whereas a **bound base** element requires at least one affix to surface as a word in English.

Blending sounds: Putting together individual sounds or syllables within words.

> **Consonant blend (also called *consonant cluster*):** A group of two or three consonants positioned and pronounced in immediate succession within a syllable (e.g., bl, spl).

Concepts of print: Print concepts, or concepts of print, are foundational knowledge about how print, in general, and books in particular, "work," such as understanding that print carries meaning, that print is authored, and that print is permanent; that graphics and print relate; that print is made up of graphemes which are associated with phonemes (alphabetic principle) and includes, but is not limited to, knowledge and parts of text (e.g., front cover, table of contents, diagrams), where to start reading within a text, directionality, return sweep, alphabetic principle, orientation of letters, concept of word, capitalization, and ending punctuation.

Concept of word: The understanding that the speech stream is divided into words and that words in print are separated by spaces; with concept of word, one is able to match spoken words with written words when reading.

Consolidated alphabetic: A phase of decoding in which grouping and sequencing of letters in a word become salient, allowing readers to group common letters and sounds as units. Readers in this phase can decode multi-syllable, novel, or nonsense words by analogy.

Consonant: A basic speech sound in which the breath is at least partly obstructed and which can be combined with a vowel to form a syllable.

Decodable: Text written to be readable by students primarily using letter-sound relationships that they have learned to date.

Decoding: Ability to apply the knowledge of letter-sound relationships to correctly pronounce written words.

Deleting sounds: Omitting one or more phoneme(s)/sound(s) within a word and, implied, the ability to identify how a word would sound if one or more sounds were omitted.

Developmentally appropriate: Practices and materials that align with a child's level of development.

Dialogic: Communication between two or more people (e.g., teacher and student or student and student) that involves jointly constructed meaning-making, and is

characterized by purposeful sharing, listening to others' ideas, and building on others' ideas.

Digital text: A text displayed on an electronic device. Single images, short messages, and full-length articles and books can all be presented on electronic devices, either online or offline. Research has indicated that reading these texts requires some of the same skills and some different skills than reading print because of special features available in digital texts, such as hyperlinks, search capability, and various graphic features.

Digraphs: Two letters that represent a single sound. There are consonant digraphs (e.g., *sh*) and vowel digraphs (e.g., *oa*).

> **Tetragraph/Quadgraph:** A sequence of four letters used to represent a single sound (phoneme) (e.g., *ough* in *dough* or *eigh* in *sleigh*).
>
> **Trigraph:** A group of three letters representing one sound (phoneme) (e.g., *tch* in *watch*, *igh* in *high*).

Diphthong: A sound formed by the combination of two vowels or semi-vowels in a single syllable, in which the sound begins as one vowel and moves toward another (e.g., as in *coin*, *shout*).

Directionality: The sequence in which written language is in intended to be read or written, which may vary according to language. For example, in English, print's directionality flows left to right and top to bottom, whereas in Arabic, print's directionality flows from right to left and top to bottom.

Disciplinary context: A situation in which students read, write, speak, and listen in disciplinary ways for purposes consistent with the activities of that discipline, such as in the disciplines of science (e.g., writing a scientific explanation) or history (e.g., reading multiple historical sources to construct an argument).

Diversity: Within the field of education, diversity refers to differences that make a person unique, which may include interests, attitudes, attributes, culture, experience, socioeconomic status, family composition, racial identity, region, and others, bearing in mind that among those who share a certain characteristic (e.g., culture) there will also be diversity (e.g., Everyone from the same region is not the same, though there may be some commonalities among those who live in the same general area).

Dyslexia: A type of specific learning disability that is neurobiological in origin that affects phonological processing. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities.

Echo reading: An instructional strategy designed to help students develop reading fluency (accuracy, automaticity, and prosody). In echo reading, the teacher reads a short segment of text, sometimes a sentence or short paragraph, and the child echoes it back, while looking at the print.

Encoding: The process of using letter/sound knowledge to write, also known as spelling.

Ending punctuation: The punctuation that appears at the end of the sentence and tells the reader the sentence is over and tells the type of sentence it is.

Engaging/Engagement: The behavioral, cognitive, and emotional activities and processes that enable individuals to participate in particular tasks for particular purposes.

Estimated spelling: A writer's approximation of a word's spelling relying exclusively or primarily on the writer's knowledge of sound-letter relationships.

Etymology: The study of the origins of words, including the historical linguistic change in words and word elements; English spellings reflect the varied historical roots of English; these include influences from Anglo-Saxon, Norse, and Norman-French as well as classical Latin and Greek and other languages.

Executive functioning skills: The conscious control of thought and action.

Experiences: What has occurred in a person's life, such as what the person has done or seen; students' experiences are shaped in part by their cultural and linguistic backgrounds.

Explicit instruction: Highly structured, teacher-directed instruction, focused on knowledge or skill outcomes, in which students are told what they are learning and why.

Figurative language: Non-literal language, which includes literary devices, such as metaphor, simile, personification, and hyperbole, that adds imagery and appeal to the five senses. *Figurative language* communicates something, other than literal meaning.

Fluency (handwriting, oral, reading):

> **Handwriting:** The ability to write legibly and efficiently and with automaticity so as to minimally impede the thoughts as they are translated to paper.
>
> **Oral:** The ability to convey ideas clearly, accurately, and with automaticity in speech.
>
> **Reading:** The ability to read with accuracy, automaticity, and prosody.

Full alphabetic: A phase of decoding in which the major sound-symbol relationships are used systemically to decode words. Readers in this phase typically decode words letter by letter. In spelling, developing writers will use real and plausible invented spellings with real letters to represent real words.

Genre: A purpose for language use that has given rise to particular forms and features to achieve that purpose.

Grapheme: One or more letters that represent a phoneme.

Graphomotor: Cognitive, perceptual, and motor skills which enable a person to write.

Grouping strategies: Placing students into pairs, small groups, or large groups for learning activities; students may be grouped according to interest, prior knowledge, or academic skill and these groups may be mixed or homogeneous.

Hard c/g: The /k/ sound represented by the letter c (e.g., *cup*, *cat*) and the /g/ sound represented by the letter g (e.g., goat, gum). Typically, when c or g is followed by an a, o, or u, it represents its hard sound.

High frequency words: Words that occur most frequently in written material, for example, "and," "the", "as" and "it".

Ideation: The creative process of generating, developing, and communicating new ideas; can be for use in oral or written composing.

Identifying sounds: Ability to hear a sound and distinguish whether it is the same or different than another sound.

Implicit instruction: Instruction that is indirectly presented, with students expected to infer the knowledge or skill.

Inquiry table: A strategy used to generate meaningful questions about a topic and organize information from multiple sources.

Interactive writing: An instructional practice in which the teacher and child(ren) cooperatively compose a text, with the teacher in the lead.

Invented spelling (see *Estimated spelling*)

Lexicon: Vocabulary or stock of existing words. A lexicon can consist of all words or all words within a particular domain (e.g., words to describe plant parts, such as *stem, root, leaf*).

Literacies: The distinct written and oral language practices evident across varying social contexts and domains. As such, literacies are plural, with multiple manifestations, that cover various aspects of human life and organization (e.g., school literacy, workplace literacy, science literacy).

Literacy: The ability to use written and oral language practices of reading, writing, speaking, listening, viewing, and visually representing, in varying social contexts and domains to accomplish one's purposes.

Matching sounds: Ability to identify the same sounds (e.g., to recognize that of the words *donut*, *cake*, and *dessert*, *donut* and *dessert* have the same beginning sound: /d/).

Meaningful literacy experiences: Experiences that carry significance for the person/people involved in them.

Mechanics: The conventions of print that do not exist in oral language, including spelling, punctuation, capitalization, and paragraphing. Because they do not exist in oral language, students typically have to consciously learn how mechanics function in written language.

Metacognition: Awareness and control of one's own learning processes.

Modes of communication: The sensory avenues through which communication is produced or received including gesturing, feeling, listening, speaking, reading, writing, viewing, and visually representing.

Morphemes: The smallest meaningful unit in a language (e.g., letter *s* at the end of "dogs" is a morpheme indicating "more than one").

Morphological awareness: The recognition, understanding, and use of word parts that carry significance. For example, one who has strong morphological awareness recognizes that base words, prefixes, suffixes, and grammatical inflections (e.g., -s or –es for plurals) are all morphemes that can be added or taken away from a word to alter its meaning.

Morphology: The study of the smallest meaningful units in words, how they are combined to form words, and their relationship to other words in the same language. It analyzes the structure of words and parts of words, such as stems, base words, prefixes, and suffixes.

Morphophonemically: In terms of the interaction between morphological and phonological or phonetic processes. Morphophonemic analysis considers the sound changes that take place in morphemes when they combine to form words.

Motivation: The willingness to undertake and sustain an activity.

Multimodal techniques: Instruction that integrates multiple modes (see **modes of communication**) such as speaking, gesturing, viewing, writing, and visually representing.

Multisensory techniques: Instruction that engages more than one sense at a time (e.g., Writing letters in the air ["skywriting"] while saying them aloud is a multisensory technique).

Onset: The consonant sounds in a syllable, if any, that precede the vowel, such as *tr* in *trip*, *sk* in *skip*, *h* in *hat*, and *ch* in *chin.*

Oral Language: System through which we use spoken words to express knowledge, ideas, and feelings. Language is influenced by culture and context, and includes the components of form, content, and use.

Orthographic knowledge: The information that is stored in memory that tells us how symbols are used within a writing system.

Pace: Speed or rate at which a particular text is read. This is influenced by what is being read, the purpose for reading, the difficulty of what is being read, the reader's current skill, and other factors.

Partial alphabetic: A stage of decoding in which letter cues are added to context cues to aid in the decoding of print. Students in this phase can identify names and major sounds of most consonants.

Phonemes: Smallest unit of sound that carries meaning which allows us to distinguish one word from another in a particular language (e.g., in English /b/ and /p/ are phonemes as /bat/ and /pat/ are understood to be different words).

Phonemic awareness: A type of phonological awareness that involves conscious attention to the phonemes of spoken language, typically understood to include the ability to distinguish, identify, and manipulate (blend, segment, add, delete, and substitute) phonemes.

Phonics: The connections between graphemes and phonemes in a language. The term used to refer specifically to instruction in these connections, but has come to have a broader meaning. Another term for *phonics* as defined here is *graphophonemic*.

Phonological awareness: Conscious attention to the sounds in spoken language, typically understood to include a broad range of skills that involve distinguishing, identifying, and manipulating units of oral language (words, syllables, onsets and rimes, and phonemes). **Phonemic awareness** is a type of phonological awareness.

Phonology: Study of how phonemes are organized and used in a language or across languages (e.g., the distribution of sounds in a language and the interaction between those sounds).

Pre-alphabetic: In this stage of decoding, words are not decoded in an alphabetic sense, but as icons. Students in this phase may identify a few letter names or distinguish a few phonemes in words.

Print concepts: (see *Concepts of print*)

Print-referencing read alouds: An instructional technique that involves drawing attention to print through verbal and nonverbal cues when reading aloud, such as pointing to letters, words, or pictures, running a finger under the text as it is read, asking questions, noting specific features of print and letters, and counting words.

Processing speed: A measure of cognitive efficiency or cognitive proficiency. It involves the ability to automatically and fluently perform tasks.

Prosody: The patterns of stress and intonation in a language; one defining feature of reading fluency sometimes referred to as *expression.*

R-controlled vowel: When a vowel is followed by an "r," the vowel sound is usually pronounced differently than it otherwise is.

Rapid Processing: Relatively quick processing speed.

Research-supported: Instruction or interventions that have been found to be effective, based on studies that involve the systematic collection and analysis of data.

Return sweep: The phenomenon in which, once a reader reaches the end of a line of text, the next line begins immediately below where the previous line started (rather than reading proceeding in a zig-zag fashion); considered a concept of print that students must develop in order to become conventional readers.

Rime: The part of a syllable that includes the vowel and all subsequent sounds, if any, in the syllable, such as the *ip* in *trip*, *at* in *hat*, and *in* in *chin.*

Schwa: The 'uh' sound found in an unstressed syllable. Every vowel can represent a schwa sound (e.g., a<u>l</u>one, harm<u>o</u>ny, env<u>e</u>lope, <u>u</u>pon, dupl<u>i</u>cate).

Segmenting sounds: Skill of breaking words down into smaller parts (e.g., individual sounds or syllables).

Sentence combining: Merging short, simple sentences into longer, more complex ones.

Sentence construction: Putting together words to form a complete thought in a way that follows the rules of grammar.

Sentence expanding: Adding words, phrases, or clauses to an independent clause (simple sentence) to make sentences more interesting or complex.

Sentence framing: Method of scaffolding that provides portions of a sentence (e.g., I like_____. I agree because _____) for the speaker or writer to use as part of their utterance or sentence.

Sentence structure: How words, phrases, and clauses are arranged in a sentence. A sentence has to include at least one independent clause. For example, sentences with more than one independent clause are *compound*; sentences with an independent clause and one or more dependent clauses are *complex*.

Sight word: Words recognized at sight, with automaticity. Although sometimes erroneously used to label high frequency words, sight words are any word that can be recognized instantly, even long and complex words such as *orthography*.

Soft c/g: The /s/ sound represented by the letter c (e.g., city, cell) and the /j/ sound represented by the letter g (e.g., gym, gem). Typically, when c or g is followed by an i, e, or y, it makes its soft sound.

Specialist: A group of individuals with expertise in a particular area, such as occupational therapists, speech and language pathologists, English learner specialists, and literacy specialists. Within a school context, specialists can be consulted for assessment and/or instructional support.

Substituting sounds: Replacing one sound in a word with another, such as replacing the /m/ with a /b/ to change *mat* to *bat*.

Text complexity: The complexity of text refers to features, such as general readability, levels of meaning, structures, and language clarity. Reader and task variables, in combination with the inherent difficulty of the text, determine complexity.

Text structure: Refers to elements of a text and/or the way a text is organized (e.g., in narrative text, with characters, setting, problem, resolution, and so on; in informational text with sequence, cause/effect, problem/solution, and so on).

Types of syllables: Syllables are a unit of pronunciation organized around one vowel sound, with or without surrounding consonant sounds, that form the whole or a part of a word. There are 6 commonly used types in English:

Closed: A syllable with a short vowel, spelled with a single vowel letter ending in one or more consonants (e.g., *kid*, *match*).

Open: A syllable that ends with a long vowel sound, spelled with a single vowel letter (e.g., the va- in *vapor* is an open syllable).

Vowel-Consonant-E: A syllable with a long vowel, spelled with one vowel + one consonant + silent e (e.g., *rake*, *whale*).

Vowel-team: A syllable with long or short vowel spellings that use two to four letters to spell the vowel (e.g., train); diphthongs ou/ow and oi/oy are included in this category.

Vowel -r: A syllable with er, ir, or, ar, or, ur; vowel pronunciation is often different than when not immediately preceding /r/ (e.g., *bird*, *word*).

Consonant le: An unaccented final syllable that contains a consonant before /l/, followed by a silent e (e.g., the -gle part of beagle).

Vowel: A syllable consisting exclusively of a vowel sound, typically written letters a, e, i, o, u, y, or the letter w if combined with a, e, i, o, or u.

Word recognition: The ability of a reader to readily pronounce a word and associate it with the word's meaning.

Word study: An instructional method that can be performed within and across disciplines that requires analysis, manipulation, and comparing and contrasting

features of words through the incorporation of a variety of literacy constructs (e.g., phonological awareness, morphology, spelling, and word recognition).

World knowledge: Experiential or text-based information such as about topics in science and social studies, or community and family, that can help a reader or listener interpret the meanings of words and sentences.

Working memory: Refers to the use of memory to plan and carry out behaviors. We use working memory to keep information in mind as we are reading and to integrate that information to construct meaning.

Mathematics

Adaptive reasoning: The capacity to think logically about the relationships among concepts and situations and to justify and ultimately prove the correctness of a mathematical procedure or assertion.

Affordances: The properties of objects, systems, institutions, or environments that potentially enable or facilitate particular actions or behaviors.

Algorithm: A process or set of rules that precisely defines a sequence of operations to be followed, such as when performing calculations.

Attribution: A characteristic or feature of objects that allows for sequencing or classifying, such as length, shape, or color.

Composition: The action of putting together or combining of things as parts or elements of a whole, as in adding parts to obtain a number or arranging shapes to form a larger shape.

Conceptual understanding: An integrated and functional grasp of mathematical concepts, operations, and relations.

Counting: The action of finding the number of elements of a finite set of objects.

Decomposition: The action of separating or resolving anything into constituent parts, such as decomposing 456 into 400+50+6 or a hexagon into four triangles.

Fraction: A number expressible in the form $\frac{a}{b}$ where *a* and *b* are integers and *b* is not zero.

Magnitude: The size of a mathematical object; a property which determines whether the object is larger or smaller than other objects of the same kind.

Manipulatives: Objects designed so learners can perceive some mathematical concept by manipulating them. These include but are not limited to:

Bundling sticks: Individual sticks with rubber bands for bundling groups of ten sticks used to understand that a ten is made of 10 ones and that 10 ones can be grouped into a ten. Bundling sticks are a place value model for engaging students in composing and decomposing tens as they represent and reason about numbers.

Ten frames: Two-by-five rectangular frames into which counters are placed to illustrate numbers less than or equal to ten. Accessible to very young

learners, it encourages mental images for numbers 1 to 10 organized by benchmarks of 0, 5 and 10.

Arithmetic rack: The original arithmetic rack, also known as a Rekenrek, consists of two rows of 10 beads, each broken into two sets of five. It encourages children to 'privilege 5' and 'think 10', supporting number sense, math facts, and efficient calculation. Accessible to very young learners, it is used to generate a variety of addition and subtraction strategies.

Base-ten blocks: Blocks used to learn place value, addition, subtraction, multiplication, and division. Base ten blocks consist of cubes (ones place), rods (tens place), flats (hundreds place), and blocks (thousands place). Base ten blocks are a place value model that involves trading to regroup.

Operation: In this context, a binary operation on numbers, namely a calculation that combines two numbers to produce another number, in particular the four operations addition, subtraction, multiplication, division, together with basic associative, commutative, and distributive properties.

Place value: The value of the place of a digit for a number represented in positional notation. For example, the place value of the 3 in 237 is ten.

Procedural Fluency: Knowledge of procedures, knowledge of when and how to use them appropriately, and skill in performing them flexibly, accurately, and efficiently.

Representations: Ways to symbolize, describe, and refer to mathematical entities. They are used to understand, develop, and communicate mathematical features of objects or operations, as well as connections between different properties. Representations may be visible, such as a number sentence, a display of manipulative materials, or a graph, but may also be internal ways of seeing and thinking about a mathematical idea.

Number line: A picture of a line that serves to model real numbers. Every point of a number line is assumed to correspond to a real number and every real number to a point.

Area model: A rectangular diagram that uses an area interpretation of multiplication to model computations, in particular place-value-based algorithms.

Arrays: An arrangement of objects in rows and columns to model multiplication and division of whole numbers.

Science

Activity structures: There are a variety of participation structures that can support dialogue and interactions for scientific sense-making. (Himmele & Himmele, 2017)

Boundary: The limit of the expectation for knowledge for new teachers. Additional learning around the topic may occur in professional development.

Diagrammatic: Information presented as a diagram including sketches, concept maps, graphs and others.

Group work: How to organize groups of students to work together in exploring and

discussing phenomena, data, and explanations (For example, know some initial strategies for sharing student thinking about and experiences related to phenomena (e.g., think/pair/share; whole class).

Linguistic: The study of language, form, meaning, and context.

Prior experiences and knowledge: The experiences, backgrounds, skills, and ideas that students have about a topic.

Scientific phenomena: Natural phenomena are observable events that occur in the universe and that we can use our science knowledge to explain or predict. The goal of knowledge in science is to develop general ideas, based on evidence, that can explain and predict phenomena. Engineering involves designing solutions to problems that arise from phenomena, and using explanations of phenomena to design solutions. In this way, phenomena are the context for the work of both the scientist and the engineer. Additional resources can be found at: https://www.nextgenscience.org/resources/phenomena.

Sense-making: The process by which people give meaning to their collective experiences. In science and engineering, "Sense-making is the proactive engagement in understanding the world by generating, using, and extending scientific knowledge within communities." (Schwarz, Passmore & Reiser, 2017, p. 6) Warren, et al. (2001) describe sense-making as: "encompassing a varied complex of resources, including practices of argumentation and embodied imagining, the generative power of everyday experience, and the role of informal language in meaning making." (p. 532).

Talk (science): Various tools and strategies can facilitate sense-making through talk by: asking students to share their own thoughts, asking students to listen to one another, asking students to deepen their own reasoning, and engaging with others' reasoning. (Michaels & O'Connor, 2012)

Resources

Social Emotional Learning Competencies

In combination with the Michigan Health Education Standards, Social Emotional Learning (SEL) competencies help support a well-rounded education that teaches to the whole child. When caregivers and schools focus on the development of the whole child, utilizing SEL competencies to guide instruction and interactions with children and students, academic achievement improves, as well as the skills needed for college and career readiness. Furthermore, a focus on SEL helps create an environment that enables teachers to teach and students to learn which research shows is necessary for school and life success.

Family Engagement

Family engagement is a collaborative relationship between families, educators, providers, and partners to support and improve the learning, development, and health of every learner.

National Association for the Education of Young Children (NAEYC) Online Learning Modules

NAEYC's online learning modules are created with early childhood educators in mind. The catalogue of modules includes a variety of topics, each designed to provide practical tips and strategies to bring to the classroom. Modules are self-paced, interactive, based on research, and approximately one hour in length.

Early Childhood Standards of Quality for Prekindergarten

Michigan's *Early Childhood Standards of Quality for Prekindergarten* is meant to provide guidance to all early care and education programs for providing all three- and four-year-old children with opportunities to reach essential developmental and educational goals. Carefully developed early learning expectations linked to K-12 expectations can contribute to a more cohesive, unified approach to young children's education. This document includes both *Quality Program Standards for Prekindergarten Programs* and *Early Learning Expectations for Three- and Four-Year-Old Children*. Clear research-based expectations for the content and desired results of early learning experiences can help focus curriculum and instruction. By defining the content and outcomes of young children's early education, the early learning expectations will lead to greater opportunities for preschoolers' positive development.

K-3 Components of Quality for Classroom Environments: A Guide for Elementary Administrators and Teachers

The K-3 Components of Quality for Classroom Environments starts from the premise that professional, program, content, and performance standards

exist, but typically overlook the critical element of success: context standards. Context standards (or, as referred to in this document, context components of quality) are nothing new, but are sometimes hard to categorize and characterize. They might be referred to as "school climate standards," "safe school standards," or "educational equity and opportunity standards"; in general, they are the components that address the physical and psychological conditions that establish a supportive, engaging environment that fosters learning.

The following nine components of quality emerged from this work, covering key topics and developmental domains for administrators, teachers, and other staff in K-3 settings. For each of the components of quality, competencies and supporting practice examples are offered as indicators of success.

1. Mission, Vision, Beliefs, and Guiding Principles
2. Community Collaboration
3. Family Engagement
4. Transitioning into Kindergarten
5. Learning Environment
6. Teaching Practices
7. Qualifications and Professional Development
8. Curriculum
9. Student Assessment and Intervention

Michigan Academic Standards

According to the dictionary, a standard is "something considered by an authority or by general consent as a basis of comparison". Today's world is replete with standards documents such as standards of care, standards of quality, and even standard operating procedures. These various sets of standards serve to outline agreed-upon expectations, rules, or actions which guide practice and provide a platform for evaluating or comparing these practices.

The state academic standards serve to outline learning expectations for Michigan's students and are intended to guide local curriculum development. They should be used as a framework by schools for curriculum development with the curriculum itself prescribing instructional resources, methods, progressions, and additional knowledge valued by the local community. Furthermore, these standards provide a platform for state assessments, which are used to measure how well schools are providing opportunities for all students to learn the content outlined by the standards.

Literacy Essentials

Developed by the Early Literacy Task Force, a subcommittee of the Michigan Association of Intermediate School Administrators (MAISA) General Education Leadership Network (GELN), which represents Michigan's 56 Intermediate School Districts, the *Essentials* are a collection of documents detailing research-supported instructional practices in literacy. There are *Essentials* documents for instructional practices in prekindergarten, kindergarten through grade 3, and grades 4 and 5; for literacy coaching practices; and for school-wide and center-wide literacy practices. The LiteracyEssentials.org website also includes professional learning modules aligned to the *Essentials*.

Michigan's Action Plan for Literacy Excellence (MAPLE)

Michigan's Action Plan for Literacy Excellence serves as a vision for educational leaders and stakeholders to support a P-20 system that will move Michigan to be a Top 10 Education State in 10 years. This plan provides common goals and activities necessary for effective and efficient implementation of the strongest research-validated literacy practices for driving policy, professional learning, instruction, and literacy leadership.

Science and Literacy Instruction in the Early Grades

Developed by a panel of Michigan and nationally recognized experts in science and literacy, this document presents a set of research-informed belief statements about instruction in literacy and science in grades K-3.

Framework for K-12 Science Education

A Framework for K-12 Science Education outlines a broad set of expectations for students in science and engineering in grades K-12. These expectations will inform the development of new standards for K-12 science education and, subsequently, revisions to curriculum, instruction, assessment, and professional development for educators. This book identifies three dimensions that convey the core ideas and practices around which science and engineering education in these grades should be built. These three dimensions are: crosscutting concepts that unify the study of science through their common application across science and engineering; scientific and engineering practices; and disciplinary core ideas in the physical sciences, life sciences, and earth and space sciences and for engineering, technology, and the applications of science. The overarching goal is for all high school graduates to have sufficient knowledge of science and engineering to engage in public discussions on science-related issues, be careful consumers of scientific and technical information, and enter the careers of their choice.

College, Career, and Civic Life (C3) Framework for Social Studies State Standards: Guidance for Enhancing the Rigor of K-12 Civics, Economics, Geography, and History

The result of a three year state-led collaborative effort, the College, Career, and Civic Life (C3) Framework for Social Studies State Standards was developed to serve two audiences: for states to upgrade their state social studies standards and for practitioners — local school districts, schools, teachers and curriculum writers — to strengthen their social studies programs. Its objectives are to: a) enhance the rigor of the social studies disciplines; b) build critical thinking, problem solving, and participatory skills to become engaged citizens; and c) align academic programs to the Common Core State Standards for English Language Arts and Literacy in History/Social Studies.

Phenomenal Science Teacher's Guide

This guide is intended to outline the Core Principles and Key Instructional Strategies for high quality elementary science instruction and describe practical applications with links to resources. Many of these practical instructional strategies are appropriate in all content areas. It also contains the theoretical and research-based underpinnings of these powerful instructional strategies.

Essential Practices in Early Mathematics: Prekindergarten to Grade Three

This document is a tool intended to support educators across Michigan as we work to enhance the ways in which children learn to use, understand, and do mathematics using a strengths-based approach. Research suggests that these eight practices have significant potential to positively affect children's learning of mathematics and the development of their mathematical identities. Essential Instructional Practices 1 through 3 focus on the overall design of the learning environment and general ways of interacting within the learning environment. Essential Instructional Practice 4 focuses on the formative assessment process, a practice that should be intentionally and continually embedded throughout learning. Essential Instructional Practices 5 through 7 focus on the types of mathematical tasks, as well as routines for using these tasks to support deep and meaningful learning of mathematics. Essential Instructional Practice 8 highlights productive and purposeful ways of engaging children's families/caregivers as partners in the learning process.

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PK-3 Mathematics Matrix

Expanded High-Leverage Mathematics Topics for Teaching Grades PK-3

The Michigan initial preparation standards focus the mathematical preparation of beginning teachers on high-leverage aspects of number and operation, but it is expected that relevant aspects of geometry, measurement, and early algebraic thinking will be addressed in the context of number and operation competencies. Within the topic of number and operation, the strategic topics listed below synthesize recommendations of the Conference Board of the Mathematical Sciences (2012) and the Association of Mathematics Teacher Educators (2017).

High-leverage mathematics topics for teaching grades PK-3:

1. Attribution
    a. Attributes of numbers, two and three dimensional shapes, and spatial relationships, including vocabulary and descriptive language.

    b. Composing and decomposing two and three dimensional shapes to explore relationships and attributes, including numerical ones.

    c. Comparing and analyzing shapes and quantities in a variety of representations, including magnitudes.

2. Counting and whole number representation

    a. Counting to indicate cardinality based on one-to-one matching as distinct from listing numbers, invariance of quantity, subitizing, hierarchical inclusion and conservation, as well as flexibility in counting on and counting back by different increments.

    b. Composing and decomposing whole numbers, in a variety of ways and representations.

    c. Coordination of counting with base-ten number representation and elementary addition and subtraction, for instance using 5s and 10s to aid counting and using convenient decomposition and counting on or back to aid addition and subtraction.

    d. Repeated bundling of groups of 10 into a unit and higher-ordered units as the foundation of the place-value number system, with geometric support for visualizing iterated units in developing progressively sophisticated understandings of base-ten structure

3. Early fraction representation

    a. Language of fractions in different contexts and multiple interpretations of fractions in multiple representational environment (portions of groups of objects, portions of areas of shapes, and points or lengths on number lines), with clear reference to the whole.

    b. Definitions of a unit fraction (1/b) as the quantity formed by 1 part when a whole is partitioned into (b) equal parts and a fraction (a/b) as a parts, each of size (1/b), and the use of these definitions to reason about different interpretations of fractions in different representational environments.

c. Explanations of the equivalence of distinct fractions and the comparison of fractions, including understanding the importance of the unit and unit fractions.

4. Whole number operation

a. Different types of problems solved by addition, subtraction, multiplication, and division, and the meanings of the operations illustrated by these problem types, including geometric interpretations of each and connections among them.

b. Composing, decomposing, recomposing of numbers as fundamental to efficient base-ten computation.

c. Different approaches to, comparisons of, and justifications for addition, subtraction, multiplication, and division problems.

Although the meaning of the equals sign and number properties are not explicitly identified above, they are embedded in several of the listed topics. For instance, equivalence of numbers is prominent in several of the topics listed, where teachers' meaningful use of language and notation is expected. Likewise, the number properties are embedded in the equivalence of numbers and the solving of computational problems and associated justifications. These two topics are fundamental for both children and teachers, but run the risk of being trivialized when not serving larger issues such as the equivalence of numbers and computation with numbers.

The sub-topics identified intersect and overlap, but they represent strategic foci for guiding the mathematical preparation of teachers. For instance, 1b and 1d are closely related, but the former emphasizes the structure of the base-ten number system while the latter emphasizes the central role of renaming numbers in the context of computation. Distinguishing these helps prospective teachers deepen and connect their understanding of elementary mathematics to its teaching.

Expanded Tasks of Mathematics Teaching Strategic for the Mathematical Preparation of Teachers

The Michigan initial preparation standards focus the mathematical preparation of beginning teachers on a set of tasks of mathematics teaching that contribute, as a whole, to meeting the following five criteria and to providing a useful organization of mathematical knowledge for teaching.

- Shape instructional interactions among students and teacher.
- Affects equitable access to mathematics instruction.
- Are learnable by beginning teachers.
- Are broad enough to use to organize mathematical knowledge for teaching and specific enough to direct the mathematical preparation of teachers.
- Have significant mathematical demands.

The tasks below are informed by the Council of Chief State School Officers' (2013) Interstate New Teacher Assessment and Support Consortium (InTASC) report and TeachingWorks' high-leverage practices (Davis & Boerst, 2014). When carried out skillfully, these tasks of teaching significantly advance the likelihood that children learn mathematics; badly executed, these tasks put children's mathematics learning at risk.

1. Unpack mathematical **content** and identify mathematical **competence**.
   Well-prepared beginning teachers of mathematics have mathematical knowledge that contributes to seeing the mathematical affordances of problems and the mathematical competence of others engaged in those problems, including those different from themselves — by age, gender, ethnicity, race, language, and class. They can express clearly and accurately the mathematical work involved in solving problems and can identify the many ways in which people can be engaged in and contribute to doing mathematics.
   a. Recognize and use mathematically rich problems, including seeing and saying the mathematical opportunities afforded by a problem and whether it enables multiple approaches and helps make children's thinking visible.
   b. Adapt mathematics problems without undermining their intended mathematical focus, for instance adjusting a problem to be easier or harder or changing the context of a problem, as well as crafting an ancillary problem to assess progress on intended goals.
   c. Recognize and maintain cognitive demand of mathematics activities, including being able to identify concepts and tools for working on a problem that are distinct from — prerequisite to or resources for — the focal work of the problem.
   d. Identify explicitly the goals, conditions, and challenges of mathematics problems, name explicitly what someone is doing mathematically, and narrate mathematical work in ways that articulate what has been accomplished and what remains.
   e. Recognize mathematical competence in broader terms than giving correct answers, for example hearing mathematical competence in emergent thinking, different approaches to mathematical problems, comments about mathematical structure, comments about mathematical generalization and connection, and questions that are mathematically on point.
2. Perform mathematical explanations and support children's mathematical **explanations**.
   Well-prepared beginning teachers of mathematics have mathematical knowledge that contributes to giving clear, explicit explanations attuned to audience and supporting other people's mathematical explanations. They understand the nature of mathematical explanation, are skillful in composing and delivering explanations for different purposes and groups of people, readily hear alternative explanations, and are able to ask questions that draw out and develop other's explanations.
   a. Recognize what does and does not count as an explanation in mathematics and formulate mathematical questions and activities to make explanations clear and compete.
   b. Understand the unpacked nature of mathematical justification — for example, the importance of connecting to the question, using definitions, mathematically warranting steps, and linking language and diagrams to steps of the argument.
   c. Perform mathematical explanations that are explicit and clear, including coordinating thought, language, representation, and action attuned to audience.
   d. Generate multiple explanations, recognize and support others' explanations, and contrast and connect different explanations.

3. Choose, interpret, and talk with **representations**.
   Well-prepared beginning teachers of mathematics have mathematical knowledge that contributes to using representations (objects, drawings, visual models, and symbolic notation) for instructional purposes. They recognize the strengths and limitations of different representations and are able to develop, select, and use representations to further develop mathematical concepts, their own and others, and to record other people's thinking in ways that are consistent with other people's meaning.
   a. Choose, identify affordances and limitations, and justify representations for specific purposes, such as illustrating a mathematical concept or procedure, developing a mathematical explanation, or documenting mathematical work.
   b. Interpret different, idiosyncratic representations, recognize whether they are mathematically correct or not, engage with representations in ways that are consistent with children's meaning and are mathematically appropriate, and adapt representations for clarity and productive use.
   c. Use mathematical representations while simultaneously talking, as a key form of communication, in ways that are explicit and clear and that coordinate thought, language, representation, action, and mathematical ideas.
   d. Generate alternative representations and make connections among multiple representations using careful and precise language, including making clear and explicit connections between conventional and unconventional representations.
4. Elicit, interpret, support, and extend **children's mathematical thinking**.
   Well-prepared beginning teachers of mathematics have mathematical knowledge that contributes to understanding and responding to other people's mathematical thinking. They can elicit other people's mathematical thinking, understand what others express mathematically, and make instructional choices that follow up and extend other people's understanding.
   a. Pose mathematically appropriate questions to draw out children's thinking.
   b. Interpret children's thinking in written and verbal forms, both an individual child's idiosyncratic thinking and patterns of understanding and errors in groups of children, including making claims, supported by evidence, about children's thinking.
   c. Record and re-voice children's mathematical thinking accurately.
   d. Identify key mathematical issues to probe in children's thinking and formulate appropriate follow-up questions and counter-speculations.
   e. Recognize ways of using different student contributions, including apparent errors, to advance mathematical thinking or work on a problem.