
The Development of Massachusetts’ Science and Technology/Engineering Frameworks Since 1995

This *Massachusetts Science and Technology/Engineering Curriculum Framework* is one of seven curriculum frameworks that advance Massachusetts’ educational reform in learning, teaching, and assessment. It was created, and revised several times, with the guidance and input of many educators, including teachers and administrators in pre-kindergarten through grade 12 school districts, college and university professors, engineers and scientists in the various domains, and staff from the Department of Elementary and Secondary Education. This section provides a brief overview of the development of the *Framework* over time.

Development of the Standards

1995: Initial Framework

This *Framework* has its origins in two reform initiatives in Massachusetts: the Education Reform Act of 1993 and Partnerships Advancing the Learning of Mathematics and Science (PALMS). The 1993 legislation provided for the establishment of the initial *Science and Technology Framework* and was part of a process to develop frameworks for all academic subjects. From 1992 to 2002, the PALMS Statewide Systemic Initiative was funded by the National Science Foundation in partnership with the state and the Noyce Foundation. A central goal of these initiatives was to develop, disseminate, and implement curriculum frameworks in science and technology as well as in mathematics. The initial *Science and Technology Curriculum Framework* was approved in 1995 and included standards for inquiry and content and grade spans through high school.

2001: Full Revision of the Framework

Because the Education Reform Act requires that frameworks be reviewed and revised periodically, a revision panel was appointed by the Commissioner and the Board of Education in the summer of 1998. The panel examined the standards in the original *Science and Technology Curriculum Framework*, reviewed comments on them from the field including significant input from educators, and re-assessed their appropriateness in order to devise a more coherent organization of concepts and skills through the grade levels. The panel referred to the *Benchmarks for Science Literacy—Project 2061* (AAAS, 1993), data from the Third International Mathematics and Science Study, the *National Science Education Standards* (NRC, 1996), the *Technology for All Americans* Project (ITEA, 1996), results from the 1998 administration of the MCAS Science and Technology tests, and advances in STE.

This version of the *Framework*, for the first time, articulated standards for full-year high school courses in earth and space science, biology, chemistry, introductory physics, and technology/engineering. The *Framework* identified a subset of “core” standards for each course that was designed to serve as the basis for high school MCAS assessments. This *Framework* also reflected a strong emphasis on engineering and the technological systems upon which our society relies. It emphasized the importance of content, removing inquiry from the standards. This version of the *Framework* was approved in May 2001.

2006: Minor Revision of High School Standards and Framework Update

The revision of the high school standards in 2006 was undertaken in preparation for the inclusion of STE in the state's Competency Determination policy. In particular, the revised content standards presented a single list of content standards for each course with no differentiation between core and non-core standards, making all standards subject to local and state assessment. Also, a two-year integrated science course in grades 9 and 10 was eliminated. No changes were made to standards for pre-K through grade 8.

A number of updates to the *Framework* were also made at the time. Several Guiding Principles were revised, including additions regarding literacy, high expectations, assessment, and districtwide planning. An appendix was added to relate learning standards across all grade spans to broad topics within each strand. Safety practices and legal regulations were researched and detailed. Also, a second appendix presented the Department of Education's (October 2005) Alternative Dissection Policy and resources (see Appendix XII).

2016: Full Revision of the Framework

In the spring of 2009, Massachusetts started a new revision process. After convening a review panel and reviewing current research, assessment information, and resources, the review panel worked to develop a revision of the STE standards. In July 2011, the National Research Council released the *Framework for K–12 Science Education* (NRC, 2012), a critical first step to the development of the Next Generation Science Standards (NGSS). The NRC *Framework* reflected the most current research on science and student learning of science and it identified the science all K–12 students should know from the perspective of scientists and engineers and the educational research community. Massachusetts joined 26 states to develop the NGSS using the NRC *Framework* as a key resource. Educators from across Massachusetts contributed to public comment during NGSS development, which was released in April 2013. The NGSS and our initial state revision had much in common in terms of structure and key features, but not enough (based on public input) to justify Massachusetts' adoption of the NGSS. Instead, the review panel helped adapt NGSS to meet the needs and expectations of our state. The key features of these standards are outlined in earlier sections of this *Framework*; key features include the integration of science and engineering practices with core ideas, presentation of grade-by-grade standards for pre-K through grade 8, maintenance of introductory high school course options, and increased coherence through progressions of learning across grades. The draft revised standards were made public in December 2013, but not advanced for adoption; this gave districts time to work on several other major change initiatives undertaken in the state's Race to the Top grant. This version of the *STE Framework* was adopted in January 2016.

References

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