APPENDIX B

 **THE MASSACHUSETTS CURRICULUM FRAMEWORKS:**

 **A SUMMARY**

# 1. English Language Arts Curriculum Framework

The current curriculum framework for English language arts (sometimes referred to as ELA) was promulgated in June of 2001. The guiding principles of the framework are that an effective ELA curriculum should develop thinking and language skills through interactive learning; develop students’ oral language and literacy through challenging learning; draw on literature from many genres, time periods and cultures; and emphasize writing as an essential way to develop, clarify and communicate ideas in persuasive, expository, narrative and expressive discourse. (Ex. 3). Further, an effective ELA curriculum should provide for literacy in all forms of media; provide explicit skill instruction in reading and writing; teach strategies necessary for acquiring academic knowledge, achieving common academic standards, and attaining independence in learning; build on the language, experiences and interests that students bring to school; develop each student’s distinctive writing or speaking voice; and prepare students for responsible participation in the schools and civic life. (Ex. 3).

The ELA curriculum framework has four strands: Language, Reading and Literature, Composition, and Media. (Ex. 3). The Language strand of the framework contains six standards. The first is Discussion, which involves the use of agreed upon rules for informal and formal discussions in small and large groups. Standard 2 is Questioning, Listening and Contributing, in which students pose questions, listen to others’ ideas, and contribute to group discussion in order to acquire new knowledge. Standard 3 is Oral Presentation, in which students must make presentations demonstrating appropriate consideration of audience, purpose and the information to be conveyed. Standard 4 is Vocabulary and Concept Development, in which students must understand and acquire new vocabulary and use it correctly in reading and writing. Standard 5 is Structure and Origins of Modern English, in which students analyze grammar and usage and learn how the English vocabulary has been influenced by other languages. Standard 6 is Formal and Informal English, which students must describe, analyze and appropriately use. (Ex. 3).

The Reading and Literature strand contains twelve standards. Standard 7 is Beginning Reading, in which students must understand the relationship of letters and spelling patterns to the sounds of speech. According to the plaintiffs’ expert on reading, Marilyn Adams, this strand is critical to the acquisition of successful reading skills, and its implementation requires the use of research based materials such as basal readers, decodable books, phonemic awareness materials and manipulatives.

Standard 8 is Understanding a Text, in which students identify the basic facts and main ideas in a text and use them as the basis for interpretation. Standard 9 is Making Connections, in which students deepen their understanding of a literary or non-literary work by relating it to its contemporary context or historical background. Standard 10 is Genre, in which students learn to identify and analyze the characteristics of different genres. Standard 11 is Theme, in which students learn to identify and analyze the theme in a literary work and provide evidence from the text to support their understanding. Standard 15 is Style and Language, in which students identify and analyze how an author’s words appeal to the senses, create imagery, and set mood and tone. Standard 12 is Fiction, Standard 13 is Nonfiction, Standard 14 is Poetry, Standard 16 is Myth, Traditional Narrative and Classical Literature, and Standard 17 is Dramatic Literature. Standard 18 is Dramatic Reading and Performance, in which students plan and present dramatic readings, recitations and performances that demonstrate appropriate consideration of audience and purpose.

The Composition strand of the framework has seven standards. Standard 19 is Writing, in which students learn to write with a clear focus, coherent organization and detail. Standard 20 is Consideration of Audience and Purpose. Standard 21 is Revising, in which students must demonstrate improvement in organization, content, paragraph development, style, tone and diction in their compositions. Standard 22 is Standard English Conventions. Standard 23 is Organizing Ideas in Writing. Standard 24 is Research, in which students learn to gather information from a variety of sources, analyze and evaluate the quality of the information and use it to answer questions. (Ex. 3).

Finally, the Media strand of the framework has two standards. Standard 26 is Analysis of Media, in which students analyze and apply knowledge of the conventions, elements and techniques of film, radio, video, television, the Internet and emerging technologies. Standard 27 is Media Production, in which students must design and create coherent media productions with a clear controlling idea and appropriate consideration of audience, purpose and medium. (Ex. 3).

The ELA curriculum framework details what students in pre-K through grade 12 should know and be able to do with respect to each of the 27 standards. According to Dr. Adams, it also identifies particular resources to which students must have adequate access for effective learning, such as reference and instructional materials, vocabulary materials including dictionaries, thesaurus, usage style books and grammar books, and reading materials such as basal readers, decodable books, phonemic awareness materials and manipulatives. The ELA curriculum includes an appendix of suggested authors, illustrators and works reflecting our common literary and cultural heritage. (Ex. 3).

# 2. Mathematics Curriculum Frameworks

The current mathematics curriculum framework was promulgated in November of 2000. According to the plaintiffs’ expert witness in mathematics, Margaret Bonderew, the math framework emphasizes oral and writing communication skills and furthers the *McDuffy* capabilities concerning preparation for advanced academic courses and ability to compete in the job market, as well as understanding of economic, social and political factors through the statistics and probability strand that teaches students to use and interpret data. The math framework reflects the close connection between technology and mathematics, and according to Dr. Bonderew, successful teaching of the framework requires integration of technology into the curriculum.

The guiding principles of the framework are that mathematical ideas should be explored in ways that stimulate curiosity, create enjoyment of math and develop depth of understanding; that an effective math program focuses on problem solving and requires teachers with a deep knowledge of math as a discipline; that technology is an essential tool in math education; that all students should have a high quality math program; and that assessment of student learning in math should take many forms to inform instruction and learning. (Ex. 6).

The mathematics framework has five strands: Number Sense and Operations; Patterns, Relations and Algebra; Geometry; Measurement; and Analysis, Statistics and Probability. The framework details what students in pre-K through grade 12 should know and be able to do with respect to each strand. According to Dr. Bonderew, implementation of the framework at the elementary levels in particular requires the use of manipulatives such as base 10 blocks, pattern blocks, and cubes.

Number Sense and Operations involves understanding numbers, ways of representing numbers, relationships among numbers, and number systems. Students must learn to compute fluently and make reasonable estimates. (Ex. 6). This strand includes such skills as counting, addition, subtraction, multiplication and division, and number theory concepts such as fractions, ratios, decimals, percentages, prime and composite numbers, exponents, absolute values, irrational numbers, mixed numbers, and scientific notation. (Ex. 6).

 Patterns, Relations and Algebra involves representing and analyzing mathematical situations and structures using algebraic symbols, using mathematical models to represent and understand quantitative relationships, and analyzing change in various contexts. (Ex. 6). This strand uses physical and analytical models to teach concepts such as equality and inequality, slope, and proportion. This strand also uses algebraic expressions and relates them to verbal, tabular and graphical representations, and uses technology to model and analyze problems involving proportional relationships.(Ex. 6). It includes trigonometric, exponential and logarithmic functions. (Ex. 6).

Geometry involves analyzing the characteristics and properties of two and three-dimensional shapes, specifying locations and describing spatial relationships using geometry, applying transformations and using symmetry to analyze mathematical situations, and using spatial reasoning and geometric modeling to solve problems. (Ex. 6). This strand contemplates the use of rulers, compasses, vertex edge graphs, and technology to draw figures and perform translations, reflections and rotations. (Ex. 6).

Measurement involves understanding the measurable attributes of objects and the units, systems and processes of measurement, and applying appropriate techniques, tools and formulas to determine measurements. (Ex. 6). This strand includes use of standard units to measure and compare temperature, length and time; the concepts of perimeter, weight, area and volume; and use of materials such as models, dot paper, coordinate grids, geoboards, protractors, and technology. (Ex. 6).

Analysis, Statistics and Probability involves the ability to formulate questions that can be addressed with data and then collect, organize and display relevant data to answer them; selection and use of appropriate statistical methods to analyze data; development and evaluation of inferences and predictions based on data; and understanding and applying basic concepts of probability. (Ex. 6). This strand includes the concepts of median, mode, maximum and minimum, frequency and range, and the use of regressions and simulations. (Ex. 6). This strand contemplates conducting experiments using spinners, counters and other concrete objects, and the use of graphs, histograms, box plots and scatter plots, and technology. (Ex. 6).

# 3. Science and Technology/Engineering Curriculum Framework

The science and technology/engineering curriculum framework was promulgated in May of 2001. In the opinion of Dr. Gerald Abegg, a witness testifying about science for the plaintiffs, this framework implements several of the *McDuffy* capabilities, including oral and written communications, knowledge of personal, mental and physical wellness, preparation for advanced work in academic and vocational fields, and ability to compete with peers.

 The guiding principles of the science/technology framework are that all students from pre-K through grade 12 should participate in a comprehensive science and technology/engineering program; that an effective program builds students’ understanding of the fundamental concepts of each domain of science, connections across these domains, and connections to basic technology and engineering concepts; that science and technology/engineering are integrally related to math; that investigation, experimentation and problem solving are central to science; that assessment in science and technology/engineering serves to inform student learning and guide instruction; and that implementation of an effective science program requires collaboration with experts, appropriate materials, ongoing professional development, and qualitative and quantitative assessment. (Ex. 8).

The Science curriculum framework is broken into four strands: Earth and Space Science, Life Science (biology), Physical Science (chemistry and physics), and Technology/Engineering, which focuses on applied science. (Ex. 8). The Earth and Space Science strand includes the study of earth’s materials, including the water cycle, air, rocks and soil; the weather and climate; the sun as a source of light and heat; periodic phenomena such as day and night and seasons of the year; rocks and their properties; earth’s structure, history and place in the solar system; and the origin and evolution of the universe. (Ex. 8). The Life Science strand includes the study of the characteristics of living things; reproduction and heredity; evolution and biodiversity; living things and their environment; plant structures and functions; adaptations of living things; energy and living things; classification of organisms; structure and function of cells; ecosystems; and human anatomy and physiology. (Ex. 8).

The Physical Science strand includes the study of observable properties of objects; states of matter; position and motion of objects; electrical, magnetic, sound, light and heat energy; properties of matter; elements, compounds and mixtures; atomic structure; chemical bonding and reactions; periodicity; gases and kinetic molecular theory; solutions, acids and bases; thermochemistry; equilibrium and kinetics; and electrochemistry. (Ex. 8).

Finally, the Technology and Engineering strand includes topics such as materials, tools and machines; engineering design; communication technologies; manufacturing technologies; construction technologies; transportation technologies and bioengineering technologies. (Ex. 8).

The science/technology framework contemplates a hands-on learning experience and specifies the supplies and materials necessary to such an experience. At the elementary school level, these include thermometers, hand lenses, streak plates to examine minerals, weather instruments such as barometers and rain gauges, water and sand tables, magnets, tuning forks, rulers, batteries and light bulbs. At the middle school level, necessary materials include telescopes, maps, glassware, hot plates, chemicals, atomic model kits, and timers. At the high school level, necessary materials include a stream table to study erosion patterns, compound and stereromicroscopes, laboratories with water, gas and a ventilation hood, Bunsen burners and hot plates, balances, periodic tables and chemicals.

# 4. History and Social Science Curriculum Framework

The history and social science curriculum framework was promulgated in October of 2002, but not actually issued in its final form until August of 2003. The goals of the history framework are to give students the knowledge and skills in history, geography, economics and civics and government that are essential to the study of democracy and the development of educated and responsible citizens. (Ex. 7). The framework implements the ERA’s mandate that students learn about the major principles of the Declaration of Independence, the United States Constitution and the Federalist Papers, and understand and respect the contributions made by diverse cultural, ethnic and racial groups to the life of the commonwealth. (Ex. 7).

At the pre-K and kindergarten level, the framework focuses on students’ personal and family history, sense of community, and familiarity with national holidays and important national symbols. (Ex. 7). In first grade, the curriculum focuses on United States leaders, symbols, events and holidays, and folktales, legends and stories from different historical periods of America. (Ex. 7).

In second grade, the curriculum focuses on world history, geography and government by teaching students who Americans are and where they came from. (Ex. 7). In third grade, the framework focuses on New England and the history of Massachusetts, beginning with the pilgrims and including events leading to the American Revolution. Students also learn about local geography, history, and government. (Ex. 7). In fourth grade, the framework focuses on North American history and geography, including immigration in the United States, with an optional world history curriculum focusing on Ancient China, and an optional curriculum for Central America and the Caribbean. (Ex. 7). In fifth grade, the framework focuses on the major pre-Columbian civilizations in the new world, and the political, economic and social development of the English colonies in the 17th and 18th centuries, including the development of democratic institutions and ideas and the American Revolution. (Ex. 7).

In sixth grade, the framework focuses on world geography, including the history, geography, economics and governments of Africa, the Middle East, Central and Southern Asia, Southeastern Asia and Oceania, Northern and Eastern Asia, Europe, and South America. (Ex. 7). In seventh grade, the framework focuses on the ancient and classical civilizations in the Mediterranean through the fall of the Roman Empire. (Ex. 7).

For grades 8 through 12, school districts may choose one of 5 pathways, all of which include World History I and II, covering the years 500 to 2001, and U.S. History I and II, covering the years 1763 through 2000. (Ex. 7). World History I includes the emergence and expansion of Islam to 1500, the European medieval period, the conflict between Christianity and Islam to 1500, the origins of European Western expansion and the civilizations of Central and South America, African history to 1800, the Renaissance and Reformation in Europe, and the Scientific Revolution and Enlightenment in Europe. There are also optional curriculum standards for Indian history to 1800 and the history of China, Japan and Korea to 1800. World History II includes the rise of the nation state in Europe; the Industrial Revolution and social and political change in Europe from 1800 to 1914; Asian, African and Latin American history in the 19th and 20th centuries; the Great Wars, 1914-1945; the Cold War era, 1945-1989; and the contemporary world, 1989-2001. (Ex. 7).

U.S. History I includes the American Revolution and the United States Constitution; the formation and framework of American democracy; political democratization, westward expansion and diplomatic developments, 1790-1860; economic growth in the North and South, 1800-1860; social, political and religious change, 1800-1860; and the Civil War and Reconstruction, 1860-1877. (Ex. 7). U.S. History II includes industrial America and its role in international affairs, 1870-1920; Progressivism and the New Deal, 1900-1940; World War II, 1939-1945; the Cold War abroad, 1945-1989, including the Korean and Vietnam wars; Cold War America at home, including the civil rights movement and the women’s rights movements; and contemporary America, 1980-2001. (Ex. 7). The history and social science framework also includes optional curricula for Grade 12 electives in economics and American government. (Ex. 7).

# 5. Comprehensive Health Curriculum Framework

The comprehensive health curriculum framework was promulgated in October of 1999.

According to Dr. Joyce Fetro, an expert witness for the plaintiffs in the field of health, the health framework equips students with sufficient self-knowledge and understanding of their mental and physical well-being, one of the *McDuffy* standards. In addition, the health framework is important to student achievement because research has shown a connection between good health and academic success.

The guiding principles of the health framework are that comprehensive health education teaches students fundamental skills and concepts that foster healthy behaviors and habits through sequential and coordinated instruction at each grade level pre-K through grade 12; teaches students to assess risks, consider potential consequences and make health-enhancing decisions; teaches skills that assist students to understand and communicate health information for self-management and health promotion; and contributes to students’ capacity to work in a positive manner with families, school staff, peers and the community to enhance personal health and create a safe and supportive environment where individual similarities and differences are acknowledged. (Ex. 5).

The health framework has four strands: Physical Health; Social and Emotional Health; Safety and Prevention; and Personal and Community Information.

The Physical Health strand includes growth and development, particularly life cycles and body systems; physical activity and fitness, including motor skill development, fitness and personal and social competency; nutrition, including food choices and growth, nutrition guidelines, food insecurity, chronic disease and a healthy lifestyle; and reproduction/sexuality, focusing on development and wellness, and including puberty, sexual orientation, AIDS and other sexually transmitted diseases, and pregnancy. (Ex. 5).

The Social and Emotional Health strand includes mental health, covering topics such as feelings and emotions, common mental health disorders, identity, self-acceptance, stress management and decision making, and suicide prevention. This strand also covers family life, including functions and purposes, diverse family units, a safe and healthy family environment, family supports, and parenting skills. Finally, this strand covers interpersonal relationships, including communication, peer pressure, prejudice and discrimination, bullying, and romantic relationships with an emphasis on respect, abstinence and limiting sexual behavior. (Ex. 5).

The Safety and Prevention strand covers disease prevention and control, including health maintenance and hygiene, chronic diseases, and symptoms, causes, treatment and prevention of disease such as skin cancer, diabetes, cardiovascular disease and osteoporosis. (Ex. 5). This strand also covers safety and injury protection, including hazard prevention; first aid and emergency intervention; self-defense; emotional, physical and sexual abuse; date rape; motor vehicle safety; fire safety and weapons safety. (Ex. 5). This strand further encompasses tobacco, alcohol and substance abuse prevention, and violence prevention, including domestic violence, child abuse and gangs.

Finally, the Personal and Community Health Information strand covers consumer health and resource management, including product labeling and advertising; ecological health, including conservation and recycling; and community and public health, including communicable disease. (Ex. 5).

# 6. Arts Curriculum Framework

The arts curriculum framework was promulgated in October of 1999. This framework gives students the *McDuffy* capabilities of knowledge and understanding of the historical and cultural context of the arts, written and oral communication skills, and knowledge and self-awareness. (Rappaport, Tr. 7/25 03, pp. 97-99).

The guiding principles of the arts framework are that an effective arts curriculum provides a sequential program of instruction for all students in preschool through high school; emphasizes development of students’ skills and understanding of creating, performing and responding; promotes knowledge and understanding of the historical and cultural context of the arts; uses a variety of assessment methods to evaluate students; and provides opportunities for students to make connections among the arts, with other disciplines in the core curriculum and with arts resources in the community. (Ex. 2).

The arts framework has two strands: Arts Disciplines and Connections. (Ex. 2). The Arts Disciplines strand covers four disciplines: dance, music, theater, and visual arts. There are five standards in dance. Standard 1 is identifying and demonstrating movement elements and dance skills. Standard 2 is choreography, in which students will create movement compositions based on choreographic principles, processes and forms. Standard 3 is dance as expression, in which students will show an understanding of dance as a way to express and communicate meaning. Standard 4 is performance in dance, in which students will rehearse and stage dance works. Finally, standard 5 is critical response, in which students will describe and analyze their own dances and the dances of others using appropriate dance vocabulary. (Ex. 2).

Music also has five standards. Standard 1 is singing, in which students sing a varied repertoire of music alone and in groups. Standard 2 is reading and notation, in which students will read music written in standard notation. Standard 3 is playing instruments, in which students play instruments alone and with others, to perform a varied repertoire of music. Standard 4 is improvision and composition, in which students improvise, compose and arrange music. Finally, standard 5 is critical response, in which students will describe and analyze their own music and that of others using appropriate music vocabulary. (Ex. 2).

The theater standards include acting, in which students develop acting skills to portray characters who interact in improvised and scripted scenes; reading and writing scripts, in which students read, analyze and write dramatic material; directing, in which students rehearse and stage dramatic works; technical theater, in which students demonstrate skills in using the basic tools, media and techniques of theatrical production; and critical response, in which students describe and analyze their own theatrical work and that of others using appropriate theater vocabulary. (Ex. 2).

Visual arts includes drawing, painting, photography, printmaking, and sculpture; industrial, ceramic, textile, furniture and graphic design; architecture, landscape design, and urban, regional and rural planning; and technologies such as film, holography, video and other electronic forms of image making. (Ex. 2). Standard 1 is knowledge of the media, materials and techniques unique to visual arts. Standard 2 is knowledge of the elements and principles of design. Standard 3 is demonstrating powers of observation, abstraction, invention and expression in a variety of media, materials and techniques. Standard 4 is drafting, revising and exhibiting, in which students demonstrate knowledge of the creative process of drafts, critique, self-assessment, refinement and exhibit preparation. Standard 5 is critical response, in which students describe and analyze their own work and that of others using appropriate visual arts vocabulary. (Ex. 2).

The Connections strand of the arts framework encompasses the purposes of the arts; the roles of artists in communities; concepts of style, stylistic influence and stylistic change; inventions, technology and the arts; and interdisciplinary connections, in which students apply their knowledge of the arts to the study of English language arts, foreign languages, health, history and social science, math, and science and technology/engineering. (Ex. 2).

# 7. The Foreign Languages Curriculum Framework

The board adopted and promulgated the foreign languages curriculum framework in August of 1999. The guiding principles of the framework are that by the time they graduate high school, all students should become proficient in at least one language in addition to English, able to speak, read, write and understand a modern language, or able to read and understand a classical language; that foreign language instruction should begin in elementary school and continue beyond grade 12; that effective foreign language programs should integrate the study of language with the study of culture; and that assessment of student learning is an integral component of effective foreign language instruction. (Ex. 4). The foreign language curriculum has five strands: Communication, in which students use the skills of listening, speaking, reading and writing; Cultures, in which students gain knowledge and understanding of other cultures; Comparisons, in which students develop insight into the nature of language and culture by comparing their own to another; Connections, in which students make connections with other subject areas and acquire information; and Communities, in which students participate in communities at home and around the world in other languages. (Ex. 4).