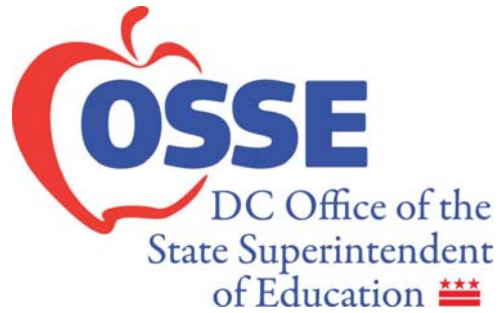




EMBEDDED TECHNOLOGY STANDARDS

READING/ENGLISH LANGUAGE ARTS

HEALTH

MATHEMATICS

PHYSICAL EDUCATION

SCIENCE

ARTS

SOCIAL STUDIES

WORLD LANGUAGES

Lisa Raymond, President, State Board of Education
Kerri Briggs, Acting State Superintendent of Education

May 1, 2009

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Introduction

The District of Columbia Office of the State Superintendent of Education (OSSE) developed high quality learning standards for Reading/English Language Arts, Mathematics, Science, Social Studies, Health, Physical Education, The Arts, and World Languages. These standards identify what students should know and be able to do at the end of each grade level or course. Embedded in the standards are standards that encourage the use of technology. The urgency to incorporate more technology into our classrooms has been articulated in many of the recent educational reform agendas. Technology use in the 21st century is not an “extra” but an essential. As the integration of technology into our everyday life expands, the need to infuse computer applications into K-12 curriculum becomes more urgent.

The International Society for Technology in Education: National Educational Technology Standards for Students (NETS*S) identified six standards that students should know and be able to do to learn effectively and live productively in an increasingly digital world. They are:

1. Creativity and Innovation
2. Communication and Collaboration
3. Research and Information Fluency
4. Critical Thinking, Problem Solving and Decision Making
5. Digital Citizenship
6. Technology Operations and Concepts

The embedded technology standards from each of the content areas presented in this document will provide opportunities for integration with the NETS*S and highlight gaps to be addressed as standards are revised during the cyclical review process.

Students need to develop a repertoire of learning strategies that they consciously practice and apply in increasingly diverse and demanding contexts. Multimedia, television, radio, film, Internet, and videos are prominent modes of communication in the 21st Century. Each of these media has its unique characteristics, and proficient students apply the critical techniques learned in the study of the content areas. The standards necessitate that students acquire a firm grasp of reasoning and practice in inquiry and research. Students must learn how to frame and test hypotheses, distinguish logical from faulty reasoning, frame reasoned options and arguments, and grasp reflective thinking and evaluation.

When properly used, technology can help students develop the skills and insight necessary to meet rigorous content standards and prepare for the world beyond school. For example, technology – in particular calculators and computers- can help promote students' understanding of mathematical concepts, quantitative reasoning, and achievement when used as a tool for solving problems, testing conjectures, accessing data, and verifying solutions.

Technology Standards Embedded into other Content Standards

Content Area	Embedded Technology Standards
Reading/English Language Arts	5.R.1 – Research Apply steps for obtaining and organizing information from a variety of sources, documenting, and presenting research in individual and group projects. 6.R.1 – Research Apply steps for obtaining and organizing information from a variety of sources, documenting, and presenting research in individual and group projects. 12.R.1- Research Formulate original, open-ended questions to explore a topic of interest; design and carry out research. 10.W-E.4 – Writing Write content-based research reports that organize and record information on charts, maps, and graphs for use as visuals, employing appropriate technology. 1.M.1 – Media Identify techniques used in television to present commercials and other information (animation, close-ups, sound effects, music, and graphics). 2.M.1 – Media Identify differences between information presented in a commercial for a product and the product itself (e.g., check for facts vs. misleading information). 3.M.1 – Media Identify techniques used in television (sound effects, music, graphics, close-ups), and use knowledge of these techniques to distinguish between commercials and other information.

	3.M.2 – Media Identify formal and informal language used in advertisements read, heard, or seen. 3.M.3 – Media Create audio recordings of poems and/or stories. 4.M.1 – Media Compare stories in print with their filmed adaptations, describing the similarities and differences in the portrayal of characters, plot, and settings. 4.M.2 – Media Create presentations using audio recordings of poems and/or stories. 5.M.1 – Media Identify and analyze the persuasive techniques (promises, dares and flattery, glittering generalities, logical fallacies) used in media messages. 5.M.2 – Media Create presentations, including graphics, using computer technology. 6.M.1 – Media Identify persuasive and propaganda techniques used in television; identify false and misleading information. 6.M.2 – Media Analyze media for ways they provide information or entertainment. 6.M.3 – Media Create multimedia presentations using computer technology, including graphics and animation. 7.M.1 – Media Interpret and evaluate the various ways visual image makers (graphic artists, illustrators, news photographers) represent meaning.
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	7.M.2 – Media Create multimedia presentations using word-processing skills and principles of design (e.g., margins, tabs, spacing, columns, page orientation, and graphics). 8.M.1 – Media Analyze the effect of images, text, and sound in electronic journalism on the viewer, distinguishing the techniques used in each to achieve these effects. 8.M.2 – Media Create multimedia presentations and written reports on the same subject, and compare the differences in effects of each medium. 9.M.1 – Media Compare and contrast how media genres (nightly news, newsmagazines, documentaries, Internet) cover the same event. 9.M.2 – Media Analyze visual or aural techniques used in a media message for a particular audience and evaluate their effectiveness. 9.M.3 – Media Analyze the use of rhetorical devices for their intent and effects (cadence, repetitive patterns, use of onomatopoeia). 9.M.4 – Media Apply and adapt the principles of written composition in the creation of media presentations that effectively use graphics, images, and/or sound. 10.M.1 – Media Identify strategies used by media to inform, persuade, or entertain. 10.M.2 – Media Analyze the effect on the reader's or viewer's emotions of text and image in print journalism, and images, sound, and text in electronic journalism, distinguishing techniques used in each to achieve these effects.
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	10.M.3 – Media Identify the aesthetic effects of a media presentation, and evaluate the techniques used to create them (e.g., compare the state production of Shakespeare’s <i>Henry V</i> to Kenneth Branagh’s 1990 film version). 10.M.4 – Media Create media presentations that effectively use graphics, images, and/or sound to present a distinctive point of view on a topic. 11.M.1 – Media Analyze the possible effects of media on elections, images of leaders, and public attitudes, using evidence directly from the media or from the writings of commentators on the media. 11.M.2 – Media Analyze the techniques used in media messages for a particular audience, and evaluate their effectiveness (e.g., Orson Welles’ radio broadcast of “War of the Worlds”). 11.M.3 – Media Recognize how visual and sound techniques or design (such as special effects, camera angles, and music) carry or influence messages in various media. 11.M.4 – Media Create coherent media presentations that synthesize information from several sources. 12.M.1 – Media Evaluate the aural, visual, and written images and other special effects used in television, radio, film productions, and the Internet for their ability to inform, persuade, and entertain (e.g., anecdote, expert witness, vivid detail, tearful testimony, humor). 12.M.2 – Media Examine the intersections and conflicts between the visual (such as media images, painting, film, and graphic arts) and the verbal.
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	12.M.3 – Media Create coherent multimedia presentations that combine text, image, and sound, synthesizing information from a wide range of sources, test audience response, and revise the presentation accordingly.
Mathematics	7.PRA.8 – Patterns, Relations, and Algebra Use linear equations to model and analyze problems involving proportional relationships 8.PRA.8 – Patterns, Relations, and Algebra Explain and analyze both quantitatively and qualitatively, using pictures, graphs, charts, and equations – how a change in one variable results in a change in another variable in functional relationships. AI.P.14 – Algebra I Solve everyday problems (e.g., compound interest and direct and inverse variation problems) that can be modeled using linear or quadratic functions. Apply appropriate graphical or symbolic methods to the solution. AI.P.15 – Algebra I Solve everyday problems (e.g., mixture, rate, and work problems) that can be modeled using systems of linear equations or inequalities. Apply algebraic and graphical methods to the solution. AI.P.10– Algebra II Solve everyday problems that can be modeled using polynomial, rational, exponential, logarithmic, and step functions; absolute values; and square roots. Apply appropriate graphical, tabular, or symbolic methods to the solution. Include compound interest, exponential growth and decay, and direct and inverse variation problems.
Science	2.2.1 – Science and Technology Give examples of how our lives would be different without such technologies as automobiles, computers, and electric motors. 3.1.8 – Science and Technology Appropriately use simple tools – such as clamps, rulers, scissors, and hand lenses, as well as other technology (e.g., such as calculators and computers) – to help solve problems.

	3.2.1 – Science and Technology Define technology as the application of human ingenuity and skill to the solution of practical problems (e.g., typewriter, computer). 4.2.2 – Science and Technology Discuss and give examples how technologies, such as computers and medical X-rays, have improved the lives of people. 4.2.3 – Science and Technology Describe how human beings have made tools and machines, such as X-ray cameras, microscopes, satellites, and computers, to observe and do things that they could not otherwise sense or do at all, or as quickly or efficiently. 5.2.1 – Science and Technology Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving. 5.2.2 – Science and Technology Give examples of advances in technology that have positively and/or negatively affected society. 6.2.1 – Science and Technology Explain that computers have become valuable in science because they speed up and extend people’s ability to collect, store, compile, and analyze data; prepare research reports; and share data and ideas with investigators all over the world. 6.2.2 – Science and Technology Explain that technology is essential to science for such purposes as measurement, data collection, graphing and storage, computation, communication and assessment of information, and access to outer space and other remote locations. 7.2.1 – Science and Technology Explain types of technology that are developed and in use, such as in agriculture, manufacturing, sanitation, medicine,
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	warfare, transportation, information processing, and communication. 7.2.2 – Science and Technology Know how technologies having to do with food production, sanitation, and disease prevention have dramatically changed how people live and work, and have resulted in changes in factories that affect the growth of human population. ES.1.10 – Earth Science Select and use appropriate tools and technology to perform tests, collect data, analyze relationships, and display data B.1.10 – Biology Select and use appropriate tools and technology to perform tests, collect data, analyze relationships, and display data. C.1.10 – Chemistry Select and use appropriate tools and technology to perform tests, collect data, analyze relationships, and display data. P.1.10 – Physics Select and use appropriate tools and technology to perform tests, collect data, analyze relationships, and display data. E.1.10 – Environmental Science Select and use appropriate tools and technology to perform tests, collect data, analyze relationships, and display data.
Social Studies	4.3.5 – U.S. History and Geography Identify the entrepreneurial characteristics of early explorers (e.g., Christopher Columbus, Francisco Vasquez de Coronado) and the technological developments that made sea exploration by latitude and longitude possible, including the exchange of technology and ideas with Asia and Africa. 4.5.3 – U.S. History and Geography Understand the development of technology and the impact of major inventions on business productivity during the early development of the United States.

	3-5.7 – U.S. History and Geography: Geographic Skills Students trace how changes in technology, transportation, communication, and resources affect the location of economic activities. 6.4.2 World Geography and Cultures Understand the relationships between changing transportation technologies and increasing urbanization. 6.4.7 – World Geography and Cultures Explain how change in communication and transportation technology is contributing to both cultural convergence and divergence. Explain how places and regions serve as cultural symbols (e.g., Jerusalem as a sacred place for Jews, Christians, and Muslims). 7.5.3 – World History and Geography I Identify the uses and significance of bronze-making technology. 7.9.8 – World History and Geography I Describe the legacies of Roman art and architecture, technology and science (e.g., roads, bridges, arenas, baths, aqueducts, central heating, plumbing, and sanitation), literature and poetry, language and law. 9.10.4 – World History and Geography I Describe the exchanges of plants, animals, technology, culture, ideas, and diseases among Europe, Africa, Asia, and the Americas in the 15th and 16th centuries and the major economic and social effects on each continent. 9.11.1 – World History and Geography I Describe Chinese power and technology through Zheng He’s voyages (the Ming Dynasty). 10.2.4 – World History and Geography II Describe the rise of industrial economies and their link to imperialism and colonialism (e.g., the role played by national security and strategic advantage; moral issues raised by the search for national hegemony, Social Darwinism, and the missionary impulse; and material issues, such as land, resources, and technology). 10.12.9 – World History and Geography II Outline the postwar economic rise of many Asian countries, including Japan’s adaptation of western technology and
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	industrial growth, China's post-Mao economic modernization under Deng Xiaoping, and India's economic growth through market-oriented reforms as well as the economic growth of Hong Kong, Republic of Korea, Singapore, and Taiwan. 10.13.4 – World History and Geography II Outline the consequences of the Soviet Union's breakup, including the development of market economies, political and social instability, ethnic struggles, oil and gas politics, dangers of the spread of nuclear technology and other technologies of mass destruction to rogue states and terrorist organizations. 11.10.3 – U.S. History and Geography II Describe the effects of technological developments on society and the economy (e.g., the computer revolution, changes in communication, advances in medicine, and improvements in agricultural technology) and the increasing role of TV and mass media on the American home. 11.12.8 – U.S. History and Geography II Identify scientific, technological, and medical advances (e.g., VCR technology, jumbo jets, DNA and genetic engineering, and the first test tube baby). 12.7.2 – Principles of U.S. Government Describe the roles of broadcast, print, and electronic media, including the Internet, as means of communication in American politics. 12.7.3 – Principles of U. S. Government Explain how public officials use the media to communicate with the citizenry and to shape public opinion. 12.DC.14.3 – District of Columbia History and Government Assess the relationships between advancements in transportation technology and the growth of the city and neighborhood development, including the effects of the electric streetcar. 9-12.2 – Historical Chronology and Interpretation Students analyze how change happens at different rates at different times, understand that some aspects can change while others remain the same, and understand that change is complicated and affects not only technology and politics, but also values and beliefs.
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	9-12.2 – Geographic Skills Students use a variety of maps and documents to interpret human movement, including major patterns of domestic and international migration, changing environmental preferences and settlement patterns, the frictions that develop between population groups, and the diffusion of ideas, technological innovations, and goods. Identify major patterns of human migration, both in the past and present. 9-12.4 – Geographic Skills Students evaluate ways in which technology has expanded the capability of humans to modify the physical environment and the ability of humans to mitigate the effect of natural disasters.
Health	1.4.2 – Media and Technological Influences Explain how media advertisements encourage children to want certain types of products (e.g., free prizes) by using cartoon characters, catchy phrases, famous people, or other strategies. 2.4.3 – Media and Technological Influences Describe the positive and negative influences of the media on thoughts, feelings, perceptions, and health behaviors. 3.4.2 – Media and Technological Influences Explain how radio, television, and new forms of technology (i.e., the Internet) give us health and safety information. 4.4.2 – Media and Technological Influences Explain how the media make certain physical traits seem desirable (e.g., extreme thinness, bulky muscles) without regard to the risky behaviors that can cause those traits. 5.4.3 – Media and Technological Influences Analyze how the media send mixed messages about alcohol, tobacco use, and violence. 6.4.2 – Media and Technological Influences Analyze how societal messages from all media, including music, television programs, movies, advertising, and the Internet influence adolescents' perceptions and behaviors related to sexual activity, diet and body image. 7.4.2 – Media and Technological Influences Analyze how societal messages from all media, including music, television programs, movies, advertising, and the

	Internet influence adolescents' perceptions and behaviors related to sexual activity, diet and body image, alcohol, drug use, and violence. 8.4.4 – Media and Technological Influences Describe the ways technology can affect personal health and health behaviors for better and for worse, such as through new, effective medicines; improved exercise equipment; and the availability and nutrient quality of food. L1.4.2 – Media and Technological Influences Describe the role of government agencies in regulating advertising claims related to health that appears in the media and on the Internet. L2.4.2 – Media and Technological Influences Research and evaluate the impact of medical technology on personal, family, and community health.
Physical Education	4.4.2 – Physical Fitness: Concepts Explain how technology can assist in obtaining physical fitness.
Art	5.3.2 – General Music Improvise, compose, and arrange basic rhythmic, melodic and harmonic patterns on classroom instruments and available technology. I-B.3.2 – Instrumental Music Compose a two to four measure melody using available technology and teacher specified rhythms and pitches. I-I.3.2 – Instrumental Music Compose an eight-measure melody using available technology within teacher specified parameters. I-P.3.2 – Instrumental Music Harmonize a teacher specified melody using available technology. I-A.3.2 – Instrumental Music Compose a selection for two or more instruments making use of available technology.

	I-P.5.S1 – Instrumental Music Research career and vocational options in music using available technology. I-A.5.S2 – Instrumental Music Research career and vocational options in music using available technology. VC-A.3.2 – Vocal/Choral Music Compose a selection for two or more voices making use of available technology. VC-P.5.S2 – Vocal/Choral Music Research career and vocational options in music using available technology. VC-A.5.S2 – Vocal/Choral Music Research career and vocational options in music using available technology. 6.2.4 – Theatre: Theatrical Environments Describe characteristics of theatre technology and equipment, including various sound, lighting, and special effects systems. HSP.2.7 – Theatre: Theatrical Environments Explain how technology has changed American theatre. 6.2.7 – Visual Arts: Production and Creative Expression Use contemporary technology to create original works of art (e.g., color and texture methods on computers, fonts/point systems, animation techniques, video conferencing, and multi-media techniques). HSP.2.5 – Visual Arts: Production and Creative Expression Use electronic technology for reference and for creating original work, including the manipulation of digital imagery (either still or video). 6.5.8 – Visual Arts: Careers and Career-related Skills Access a variety of resources such as books, a CD-ROM or visit a museum website to research an artist or art movement; share new information with classmates, (e.g., National Gallery of Art: www.nga.gov ; The Metropolitan
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	Museum of Art's Timeline of Art History: www.metmuseum.org/toah ; Art Institute of Chicago: www.artic.edu/aic/collections/index.php . 8.5.6 – Visual Arts: Visual Literacy Demonstrate an understanding of the effects of visual communication media (e.g., television, music videos, film, Internet) on various aspects of society. HSP.5.11 – Visual Arts: Visual Literacy Compare and contrast the ways in which different media (television, newspaper, and magazines) cover the same art exhibition. HSA.5.1 – Visual Arts: Connections and Applications Speculate on how advances in technology might change the definition and function of the visual arts. HSA.5.9 – Visual Arts: Connections and Applications Create a game that represents a set of data using a 3-D modeling software program. HSA.5.10 – Visual Arts: Connections and Applications Design a computer-generated image that demonstrates the function of visual arts technology (motion, space and perception). HSA.5.14 – Visual Arts: Career and career-related Skills Investigate and report on the essential features of modern or emerging technologies that affect or will affect visual artists and the definition of the visual arts.
World Languages	J5.2.1 – Modern Languages Exchange information about school events and celebrations in person or via letters, e-mail or video tapes, etc. I.2.3 – Modern Languages Demonstrate understanding of spoken and written language based on new topics that are presented through a variety of media. D.3.1.3 – Classical Languages Explain Latin and/or Greek terminology being used in the fields of literature, medicine, law, social sciences, military,

	technology, sports, and the arts. B.2.1.4 – American Sign Language Recognize and identify the impact technology, education, and laws have had on Deaf culture(s). D.2.1.4 – American Sign Language Recognize, identify, and place in chronological order medical, educational, legal, technological, and mass media practices and perspectives associated to them, and their impact on Deaf culture (s). E.2.1.4 – American Sign Language Analyze and evaluate current medical, legal, educational, technological, and mass media practices and their future impact on Deaf culture(s). B.4.1.4 – American Sign Language Identify differences and similarities in the technological resources to access and exchange information with and within the Deaf community and other auditory communities in the US (e.g., phone/TV access, ring signalers, visual noise, proxemics, eye contact, driving, and use of interpreters, etc.). D.4.1.4 - American Sign Language Compare and contrast experiences of using technology and/or other resources employed by deaf persons, at home and work, and other members of their family and/or work community (e.g., closed captions (CC), TTY and relay, light flashings, vibrating devices, hearing dogs, etc.). E.4.1.4 – American Sign Language Analyze the differences and similarities on future technological advances that affect the deaf, deafness, and American Sign Language, and the rest of the auditory community (e.g., drive-through windows, viewer phones, rear-view captioning) speculating on their financial cost and benefits.
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The Office of Standards, Assessment and Accountability extrapolated the technology standards from the existing content standards to provide a consolidated reference for administrators and teachers to use as they ratchet up the focus on technology standards.

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