

Grades PreK-4

Instructional Technology Standards

The recommended PreK – 12 Instructional Technology Standards fall under three broad categories:

- Standard 1. *Demonstrate proficiency in the use of computers and applications as well as an understanding of concepts underlying hardware, software, and connectivity.*
- Standard 2. *Demonstrate responsible use of technology and an understanding of ethics and safety issues in using electronic media.*
- Standard 3. *Demonstrate ability to use technology for research, problem-solving, and communication. Students locate, evaluate, collect, and process information from a variety of electronic sources. Students use telecommunications and other media to interact or collaborate with peers, experts, and other audiences.*

Standard 1 includes proficiency in basic productivity tools such as word processing, spreadsheet, database, electronic research, e-mail, and applications for presentations and graphics. It also includes conceptual understandings of the nature and operation of technology systems.

Standard 2 relates to the areas of social, ethical, and human issues. It encompasses positive attitudes toward the uses of technology and responsible use of information. Under Standard 3 students will learn to apply a wide range of technology tools to their learning of curriculum concepts.

EXPLORATORY CONCEPTS AND SKILLS FOR GRADES PREK – 4

Although technology opens up exciting avenues to learning, computers should complement rather than replace successful methods that teachers use to help students develop basic skills and understanding. The mathematics framework, for example, stresses the importance of understanding basic arithmetical operations in elementary school.ⁱ The Massachusetts Department of Education encourages the use of a wide range of tools, both traditional and technological, to help students gain those understandings. However, in the PreK – 4 grade span the use of calculators should not supersede a firm grasp of basic mathematical skills.ⁱⁱ

By the same token, as students learn the skills of electronic research, they should still know how to find a book in the library. As students become more fluent on the computer keyboard, they need to continue to develop legible handwriting.ⁱⁱⁱ Throughout their school years students will grow to regard technology as one of the many tools that can be used to help them solve problems and improve productivity. However, in the elementary grades, technology should not replace the manipulatives, pencil-and-paper, and other manual methods through which children acquire basic skills.

Given this context, the instructional technology standards for the earliest grade span allow the teacher flexibility in deciding when students are ready to use technology. Instead of listing “performance indicators,” as in the two higher grade spans, the competencies listed for PreK – 4 are “exploratory concepts and skills.” These are skills that will be introduced in the elementary grades and mastered in middle and high school.

By the end of fourth grade, all students should have had the opportunity to become familiar with the tools they will be expected to use with proficiency later on. Through this exposure they will have gained a positive view of computers as tools for learning. For example, electronic sources such as multimedia encyclopedias or teacher-previewed Web sites can be used to gather information for a report. Additionally, there are many developmentally appropriate applications for young children: interactive books, graphic organizers, and writing assistants, as well as mathematical and scientific tools. Such tools can enhance learning for all children, including those with disabilities; for example, multi-sensory software reinforces literacy skills by providing visual and auditory feedback to early readers. At the teacher’s discretion, these tools can be integrated appropriately in an effective lesson plan.

Instructional Technology Standards

Standard 1. Demonstrate proficiency in the use of computers and applications as well as an understanding of concepts underlying hardware, software, and connectivity.

GRADE LEVEL	EXPLORATORY CONCEPTS AND SKILLS
PREK – 4	<p>1.1 Develop basic skills for using hardware and applications (e.g., open/close a file, navigate using scroll bars, arrow keys, special keys, and mouse).</p> <p>1.2 Use correct terminology for basic components of a computer system (e.g., monitor, keyboard, disk, printer, mouse), and develop understanding of their basic functions.</p> <p>1.3 At district and teacher’s discretion explore and develop keyboarding skills. (The district determines whether students will learn touch typing or simply become familiar with the keyboard functions.)</p> <p>1.4 Explore basic formatting features of a word processing program (at teacher’s discretion).</p> <p>1.5 Explore and understand the basic function and purpose of a database.</p> <p>1.6 Explore and understand the basic function and purpose of a spreadsheet.</p> <p>1.7 Collaborate with classmates to use teacher-selected Web sites.</p> <p>1.8 Collaborate with classmates and teacher to send a class e-mail message (at discretion of district and teacher).</p> <p>1.9 Collaborate with classmates and teacher to create a slide presentation with existing template.</p> <p>1.10 Explore the use of drawing and painting applications for class projects (at teacher’s discretion).</p>

Instructional Technology Standards

Standard 2. Demonstrate responsible use of technology and an understanding of ethics and safety issues in using electronic media.

GRADE LEVEL	EXPLORATORY CONCEPTS AND SKILLS
PREK – 4	<p>2.1 Follow classroom rules for responsible use of computers.</p> <p>2.2 Develop understanding of the school’s rules for safe and ethical Internet use. (Use of Internet in this gradespan is under close supervision and determined by district policy.)</p> <p>2.3 Explore practices for evaluating Web sites (District policy determines Internet use.)^{iv}</p> <p>2.4 Develop understanding of how the computer is a tool for learning.</p> <p>2.5 Explore issues of ergonomics and safety in using computers.</p>

Instructional Technology Standards

Standard 3. Demonstrate ability to use technology for research, problem-solving, and communication. Students locate, evaluate, collect, and process information from a variety of electronic sources. Students use telecommunications and other media to interact or collaborate with peers, experts, and other audiences.

GRADE LEVEL	EXPLORATORY CONCEPTS AND SKILLS
PREK – 4	<p>3.1 Explore and develop understanding of how to gather information from a variety of electronic sources, including teacher-selected Web sites, CD-ROM encyclopedias, and automated card catalog.^y</p> <p>3.2 Explore the use of application programs (e.g., word processing, database, spreadsheet) for organizing information into charts, tables, and diagrams.</p> <p>3.3 Explore the use of content-specific tools to enhance understanding of curriculum content (e.g., environmental probes, sensors, robotics, simulation software, and measuring devices).</p> <p>3.4 Collaborate with classmates and teacher in creating a multimedia presentation to communicate learning with others.</p> <p>3.5 Collaborate with classmates and teacher to exchange e-mail with another classroom (at discretion of district and teacher).</p>

Appendix 1

How the Massachusetts Standards Compare to the National Educational Technology Standards (NETS)

As a general frame of reference for developing these standards, we used the *Technology Foundation Standards for Students*, developed by the *National Educational Technology Standards (NETS) Project*. NETS is an initiative of the International Society for Technology in Education (ISTE) in collaboration with the U.S. Department of Education.^{vi}

The goal of the NETS Project is to develop national standards for educational technology. The document, *Technology Foundation Standards for Students*, originally published in 1998, describes in detail what students should understand about technology and what they should be able to do with it. The NETS Technology Foundation Standards for Students are:

- Standard 1. basic operations and concepts;
- Standard 2. social, ethical, and human issues;
- Standard 3. technology productivity tools;
- Standard 4. technology communications tools;
- Standard 5. technology research tools; and
- Standard 6. technology problem-solving and decision-making tools.

In order to simplify this document, the Massachusetts Department of Education has collapsed the six NETS standards into three standards. The NETS standards are incorporated into the three standards of *PreK – 12 Instructional Technology Recommended Standards* as follows:^{vii}

RECOMMENDED PREK – 12 INSTRUCTIONAL TECHNOLOGY STANDARDS	CORRESPONDING NETS FOUNDATION STANDARDS
Standard 1	Standard 1, 3
Standard 2	Standard 2
Standard 3	Standards 3, 4, 5, and 6



CPS Instructional Technology Learning Expectations for Kindergarten Exploratory Concepts and Skills

Standard 1 - Demonstrate proficiency in the use of computers and applications as well as an understanding of concepts underlying hardware, software and connectivity.

- 1.1 Develop basic skills for using hardware and applications (open/close file, navigate using scroll bars, arrow keys and mouse).
- 1.2 Use correct terminology for basic components of a computer system (*i.e.* - monitor, keyboard, disk, printer, mouse) and develop understanding of their basic functions.
- 1.3 At district and teacher's discretion, explore and develop keyboarding skills. (The district determines whether students will learn touch-typing or simply become familiar with the keyboard and use of Ultra Keys).
- 1.4 Explore basic formatting features of a word processing program (at teacher's discretion).
- 1.5 Collaborate with classmates to use teacher-selected Web sites.
- 1.6 Collaborate with classmates and teacher to send a class e-mail message (at discretion of district and teacher).
- 1.7 Collaborate with classmates and teacher to create a slide presentation with existing template. Modify with software (ClarisWorks for Kids, Kid Pix, Appleworks 6.0 and lower).
- 1.8 Explore the use of drawing and painting applications for class projects (at teacher's discretion). Modify with software (ClarisWorks for Kids, Kid Pix, Appleworks 6.0 and lower).

Grade K continued

Standard 2 - Demonstrate responsible use of technology and an understanding of ethics and safety issues in using electronic media.

- 2.1 Follow classroom rules for responsible use of computers.
- 2.2 Develop understanding of the school's rules for safe and ethical Internet use (use of Internet in this grade span is under close supervision and determined by Acceptable Use Policy).
- 2.3 Develop understanding of how the computer is a tool for learning.
- 2.4 Explore issues of ergonomics and personal safety in using computers.

Standard 3 - Demonstrate ability to use technology for research, problem-solving and communication. Students locate, evaluate, collect and process information from a variety of electronic sources. Students use telecommunications and other media to interact or collaborate with peers, experts and other audiences.

- 3.1 Explore and develop understanding of how to gather information from a variety of electronic sources, including teacher-selected Web sites and CD-ROMs.
- 3.2 Explore the use of application programs (*i.e.* word processing, painting and drawing).
- 3.3 Collaborate with classmates and teacher in creating a multimedia presentation to communicate learning with others (ClarisWorks for Kids, Kid Pix, Appleworks 6.0).
- 3.4 Collaborate with classmates and teacher to exchange email with another classroom (at discretion of district and teacher).

1

CPS Instructional Technology Learning Expectations for Grade 1 Exploratory Concepts and Skills

Standard 1 - Demonstrate proficiency in the use of computers and applications as well as an understanding of concepts underlying hardware, software and connectivity.

- 1.1 Develop basic skills for using hardware and applications (open/close file, navigate using scroll bars, arrow keys and mouse).
- 1.2 Use correct terminology for basic components of a computer system (*i.e.* - monitor, keyboard, disk, printer, mouse) and develop understanding of their basic functions.
- 1.3 At district and teacher's discretion, explore and develop keyboarding skills. (The district determines whether students will learn touch-typing or simply become familiar with the keyboard and use of Ultra Keys).
- 1.4 Explore basic formatting features of a word processing program (at teacher's discretion).
- 1.5 Collaborate with classmates to use teacher-selected Web sites.
- 1.6 Collaborate with classmates and teacher to send a class e-mail message (at discretion of district and teacher).
- 1.7 Collaborate with classmates and teacher to create a slide presentation with existing template. Use software (ClarisWorks for Kids, Kid Pix, Appleworks 6.0 and lower) to modify.
- 1.8 Explore the use of drawing and painting applications for class projects (at teacher's discretion). Use software such as (ClarisWorks for Kids, Kid Pix, Appleworks 6.0 and lower) to modify.

Grade 1 continued

Standard 2 - Demonstrate responsible use of technology and an understanding of ethics and safety issues in using electronic media.

- 2.1 Follow classroom rules for responsible use of computers.
- 2.2 Develop understanding of the school's rules for safe and ethical Internet use (use of Internet in this grade span is under close supervision and determined by Acceptable Use Policy).
- 2.3 Develop understanding of how the computer is a tool for learning.
- 2.4 Explore issues of ergonomics and personal safety in using computers.

Standard 3 - Demonstrate ability to use technology for research, problem-solving and communication. Students locate, evaluate, collect and process information from a variety of electronic sources. Students use telecommunications and other media to interact or collaborate with peers, experts and other audiences.

- 3.1 Explore and develop understanding of how to gather information from a variety of electronic sources, including teacher-selected Web sites and CD-ROMs.
- 3.2 Explore the use of application programs (*i.e.* - word processing, painting, and drawing).
- 3.3 Collaborate with classmates and teacher in creating a multimedia presentation to communicate learning with others (ClarisWorks for Kids, Kid Pix, Appleworks 6.0).
- 3.4 Collaborate with classmates and teacher to exchange email with another classroom (at discretion of district and teacher).

2

CPS Instructional Technology Learning Expectations for Grade 2 Exploratory Concepts and Skills

Standard 1 - Demonstrate proficiency in the use of computers and applications as well as an understanding of concepts underlying hardware, software and connectivity.

- 1.1 Develop basic skills for using hardware and applications (open/close file, navigate using scroll bars, arrow keys and mouse).
- 1.2 Use correct terminology for basic components of a computer system (*i.e.* - monitor, keyboard, disk, printer, mouse) and develop understanding of their basic functions.
- 1.3 At district and teacher's discretion, explore and develop keyboarding skills. (The district determines whether students will learn touch-typing or simply become familiar with the keyboard and use of Ultra Keys).
- 1.4 Explore basic formatting features of a word processing program (at teacher's discretion).
- 1.5 Collaborate with classmates to use teacher-selected Web sites.
- 1.6 Collaborate with classmates and teacher to send a class e-mail message (at discretion of district and teacher).
- 1.7 Collaborate with classmates and teacher to create a slide presentation with existing template. Use software (ClarisWorks for Kids, Kid Pix, Appleworks 6.0 and lower) to modify.
- 1.8 Explore the use of drawing and painting applications for class projects (at teacher's discretion). Use software such as (ClarisWorks for Kids, Kid Pix, Appleworks 6.0 and lower) to modify.

Grade 2 continued

Standard 2 - Demonstrate responsible use of technology and an understanding of ethics and safety issues in using electronic media.

- 2.1 Follow classroom rules for responsible use of computers.
- 2.2 Develop understanding of the school's rules for safe and ethical Internet use (use of Internet in this grade span is under close supervision and determined by Acceptable Use Policy).
- 2.3 Develop understanding of how the computer is a tool for learning.
- 2.4 Explore issues of ergonomics and personal safety in using computers.

Standard 3 - Demonstrate ability to use technology for research, problem-solving and communication. Students locate, evaluate, collect and process information from a variety of electronic sources. Students use telecommunications and other media to interact or collaborate with peers, experts and other audiences.

- 3.1 Explore and develop understanding of how to gather information from a variety of electronic sources, including teacher-selected Web sites and CD-ROMs.
- 3.2 Explore the use of application programs (*i.e.* - word processing, painting, and drawing) for organizing information into charts, tables and diagrams (*i.e.* Graph Club, Kidspiration).
- 3.3 Collaborate with classmates and teacher in creating a multimedia presentation to communicate learning with others (ClarisWorks for Kids, Kid Pix, Appleworks 6.0).
- 3.4 Collaborate with classmates and teacher to exchange email with another classroom (at discretion of district and teacher).

3

CPS Instructional Technology Learning Expectations for Grade 3 Exploratory Concepts and Skills

Standard 1 - Demonstrate proficiency in the use of computers and applications as well as an understanding of concepts underlying hardware, software and connectivity.

Explore and understand the basic function and purpose of a database and spreadsheet.

- 1.2 Collaborate with classmates to use teacher-selected Web sites.
- 1.3 Collaborate with classmates and teacher to send a class e-mail message (at discretion of district and teacher).
- 1.4 Collaborate with classmates and teacher to create a slide presentation with existing template (*i.e.* HyperStudio, Appleworks 6.0, Kid Pix).
- 1.5 Explore the use of drawing and painting applications for class projects (at teacher's discretion).
- 1.6 Identify components of a computer system, understand their functions and use appropriate terminology in speaking about them (*i.e.* operating system, hard drive, memory, windows, network for saving)
- 1.7 Identify and use basic features of a computer operating system (*i.e.* – turn on, start up, shut down, create folders on local server)
- 1.8 Save a file to the desktop, the hard drive and network.
- 1.9 Select a printer and print a document with appropriate page setup and orientation.
- 1.10 Operate peripheral equipment (*i.e.* scanner, digital camera, camcorder).
- 1.11 Explore efficient keyboard techniques (*i.e.* Ultra Key, hand placement, and basic orientation).
- 1.12 Identify and use editing and formatting features of a word processing program (*i.e.* centering, line spacing, margins, cut and paste, fonts, styles, spelling, page numbers).
- 1.13 Insert images (*i.e.* graphics, clip art) from other files into word-processed document).
- 1.14 Identify and use navigation features of browser (*i.e.* - "Go", "Back", "Forward", "Bookmark").
- 1.15 Identify basic elements of a Web site (*i.e.* - URL, hyperlinks, text fielded, teacher directed).
- 1.16 Using email, create and send a message (student use of email is determined by district policy and at teacher's discretion and may be a class-wide activity).
- 1.17 Create a slide presentation using appropriate applications.
- 1.18 Identify and use drawing and painting applications as appropriate for class projects.
- 1.19 Identify appropriate applications for a classroom project.

Grade 3 continued

Standard 2 - Demonstrate responsible use of technology and an understanding of ethics and safety issues in using electronic media.

- 2.1 Follow classroom rules for responsible use of computers.
- 2.2 Develop understanding of the school's rules for safe and ethical Internet use (use of Internet in this grade span is under close supervision and determined by Acceptable Use Policy) and know the consequences of violating that policy.
- 2.3 Develop understanding of how the computer is a tool for learning.
- 2.4 Explore issues of ergonomics and personal safety in using computers.
- 2.5 Explain and demonstrate understanding of classroom rules regarding responsible use of computers (responsible behavior around equipment, respect for other people's work and appropriate collaborative behavior).

Standard 3 - Demonstrate ability to use technology for research, problem-solving and communication. Students locate, evaluate, collect and process information from a variety of electronic sources. Students use telecommunications and other media to interact or collaborate with peers, experts and other audiences.

- 3.1 Explore and develop understanding of how to gather information from a variety of electronic sources, including teacher-selected Web sites and CD-ROMs.
- 3.2 Explore the use of application programs (*i.e.* word processing, database, spreadsheet) for organizing information into charts, tables and diagrams (*i.e.* Graph Club).
- 3.3 Explore the use of content-specific tools to enhance understanding of curriculum content (*i.e.* environmental probes, sensors, robotics, simulation software and measuring devices).
- 3.4 Collaborate with classmates and teacher in creating a multimedia presentation to communicate learning with others.
- 3.5 Collaborate with classmates and teacher to exchange email with another classroom (at the discretion of district and teacher).
- 3.6 In keeping with the research process outlines in Standard 24 of the English Language Arts Curriculum Framework, use appropriate grade level tools (*i.e.* Internet, CD-ROM, online periodical databases). Communicate results of research and learning with others using the most appropriate tools (*i.e.* – desktop-published or word processed report, multimedia presentation).
- 3.7 Manipulate data using charting tools and graphic organizers (*i.e.* concept mapping, flow charting and outlining software – Kidspiration and Inspiration) to connect ideas and organize information.
- 3.8 Under teacher's guidance and at discretion of district, use email to communicate with others (*i.e.* students in other classrooms, experts in a subject, teachers).

4

CPS Instructional Technology Learning Expectations for Grade 4 Exploratory Concepts and Skills

Standard 1 - Demonstrate proficiency in the use of computers and applications as well as an understanding of concepts underlying hardware, software and connectivity.

Explore and understand the basic function and purpose of a database and spreadsheet.

- 1.2 Collaborate with classmates to use teacher-selected Web sites.
- 1.3 Collaborate with classmates and teacher to send a class e-mail message (at discretion of district and teacher).
- 1.4 Collaborate with classmates and teacher to create a slide presentation with existing template (*i.e.* HyperStudio, Appleworks 6.0, Kid Pix).
- 1.5 Explore the use of drawing and painting applications for class projects (at teacher's discretion).
- 1.6 Identify components of a computer system, understand their functions and use appropriate terminology in speaking about them (*i.e.* operating system, hard drive, memory, windows, network for saving)
- 1.7 Identify and use basic features of a computer operating system (*i.e.* – turn on, start up, shut down, create folders on local server)
- 1.8 Save a file to the desktop, the hard drive and network.
- 1.9 Select a printer and print a document with appropriate page setup and orientation.
- 1.10 Operate peripheral equipment (*i.e.* scanner, digital camera, camcorder).
- 1.11 Explore efficient keyboard techniques (*i.e.* Ultra Key, hand placement, and orientation).
- 1.12 Identify and use editing and formatting features of a word processing program (*i.e.* centering, line spacing, margins, cut and paste, fonts, styles, spelling, page numbers).
- 1.13 Insert images (*i.e.* graphics, clip art) from other files into word processed document).
- 1.14 Identify and use navigation features of browser (*i.e.* - "Go", "Back", "Forward", "Bookmark").
- 1.15 Identify basic elements of a Web site (*i.e.* - URL, hyperlinks, text fielded, teacher directed).
- 1.16 Using email, create and send a message (student use of email is determined by district policy and at teacher's discretion and may be a class-wide activity).
- 1.17 Use correct terminology in speaking about electronic communications (*i.e.* browser, search, engine, online).
- 1.18 Create a slide presentation using appropriate applications.
- 1.19 Identify and use drawing and painting applications as appropriate for class projects.
- 1.20 Identify appropriate applications for a classroom project.

Grade 4 continued

Standard 2 - Demonstrate responsible use of technology and an understanding of ethics and safety issues in using electronic media.

- 2.1 Follow classroom rules for responsible use of computers.
- 2.2 Develop understanding of the school's rules for safe and ethical Internet use (use of Internet in this grade span is under close supervision and determined by Acceptable Use Policy) and know the consequences of violating that policy.
- 2.3 Develop understanding of how the computer is a tool for learning.
- 2.4 Explore issues of ergonomics and personal safety in using computers.
- 2.5 Explain and demonstrate understanding of classroom rules regarding responsible use of computers (responsible behavior around equipment, respect for other people's work and appropriate collaborative behavior).
- 2.6 Explain and demonstrate ethical and legal behavior in copying files, applications and media.
- 2.7 Explain potential problem of computer viruses and exercise caution in opening email attachments from unknown sources (use of email is at district discretion).

Standard 3 - Demonstrate ability to use technology for research, problem-solving and communication. Students locate, evaluate, collect and process information from a variety of electronic sources. Students use telecommunications and other media to interact or collaborate with peers, experts and other audiences.

- 3.1 Explore and develop understanding of how to gather information from a variety of electronic sources, including teacher-selected Web sites and CD-ROMs.
- 3.2 Explore the use of application programs (*i.e.* word processing, database, spreadsheet) for organizing information into charts, tables and diagrams (*i.e.* Graph Club).
- 3.3 Explore the use of content-specific tools to enhance understanding of curriculum content (*i.e.* environmental probes, sensors, robotics, simulation software and measuring devices).
- 3.4 Collaborate with classmates and teacher in creating a multimedia presentation to communicate learning with others.
- 3.5 Collaborate with classmates and teacher to exchange email with another classroom (at the discretion of district and teacher).
- 3.6 In keeping with the research process outlines in Standard 24 of the English Language Arts Curriculum Framework, use appropriate grade level tools (*i.e.* Internet, CD-ROM, online periodical databases). Communicate results of research and learning with others using the most appropriate tools (*i.e.* – desktop-published or word processed report, multimedia presentation).
- 3.7 Manipulate data using charting tools and graphic organizers (*i.e.* concept mapping, flow charting and outlining software – Kidspiration and Inspiration) to connect ideas and organize information.
- 3.8 Under teacher's guidance and at discretion of district, use email to communicate with others (*i.e.* students in other classrooms, experts in a subject, teachers).

5

CPS Instructional Technology Learning Expectations for Grade 5 Performance Indicators

Standard 1 - Demonstrate proficiency in the use of computers and applications as well as an understanding of concepts underlying hardware, software and connectivity.

- 1.1 Explore and understand the basic function and purpose of a database and spreadsheet.
- 1.2 Collaborate with classmates to use teacher-selected Web sites.
- 1.3 Collaborate with classmates and teacher to send a class e-mail message (at discretion of district and teacher).
- 1.4 Collaborate with classmates and teacher to create a slide presentation with existing template (*i.e.* HyperStudio, Appleworks 6.0, Kid Pix).
- 1.5 Explore the use of drawing and painting applications for class projects (at teacher's discretion).
- 1.6 Identify components of a computer system, understand their functions and use appropriate terminology in speaking about them (*i.e.* operating system, hard drive, memory, windows, network for saving)
- 1.7 Identify and use basic features of a computer operating system (*i.e.* – turn on, start up, shut down, create folders on local server)
- 1.8 Save a file to the desktop, the hard drive and network.
- 1.9 Select a printer and print a document with appropriate page setup and orientation.
- 1.10 Operate peripheral equipment (*i.e.* scanner, digital camera, camcorder).
- 1.11 Explore efficient keyboard techniques (*i.e.* Ultra Key, hand placement, and orientation).
- 1.12 Identify and use editing and formatting features of a word processing program (*i.e.* centering, line spacing, margins, cut and paste, fonts, styles, spelling, page numbers).
- 1.13 Insert images (*i.e.* graphics, clip art) from other files into word-processed document).
- 1.14 Identify and use navigation features of browser (*i.e.* - "Go", "Back", "Forward", "Bookmark").
- 1.15 Identify basic elements of a Web site (*i.e.* - URL, hyperlinks, text fielded, teacher directed).
- 1.16 Using email, create and send a message (student use of email is determined by district policy and at teacher's discretion and may be a class-wide activity).
- 1.17 Use correct terminology in speaking about electronic communications (*i.e.* Browser, search, engine, online).
- 1.18 Create a slide presentation using appropriate applications.
- 1.19 Identify and use drawing and painting applications as appropriate for class projects.
- 1.20 Identify appropriate applications for a classroom project.

Grade 5 continued

Standard 2 - Demonstrate responsible use of technology and an understanding of ethics and safety issues in using electronic media.

- 2.1 Follow classroom rules for responsible use of computers.
- 2.2 Develop understanding of the school's rules for safe and ethical Internet use (use of Internet in this grade span is under close supervision and determined by Acceptable Use Policy) and know the consequences of violating that policy.
- 2.3 Explore practices for evaluating Web sites and explain how media and technology can be misused to distort or exaggerate information (district policy determines Internet use).
- 2.4 Develop understanding of how the computer is a tool for learning.
- 2.5 Explore issues of ergonomics and personal safety in using computers.
- 2.6 Explain and demonstrate understanding of classroom rules regarding responsible use of computers (responsible behavior around equipment, respect for other people's work and appropriate collaborative behavior).
- 2.7 Explain and demonstrate ethical and legal behavior in copying files, applications and media.
- 2.8 Explain potential problem of computer viruses and exercise caution in opening email attachments from unknown sources (use of email is at district discretion).
- 2.9 Explain safe practices for sharing personal information via email and the Internet (use of email is at district discretion).
- 2.10 Explain proper email etiquette (use of email is at district discretion).
- 2.11 Write correct citations for text and images gathered from electronic sources. Understand that use of materials is limited by the fair use rule of copyright law.

Grade 5 continued

Standard 3 - Demonstrate ability to use technology for research, problem-solving and communication. Students locate, evaluate, collect and process information from a variety of electronic sources. Students use telecommunications and other media to interact or collaborate with peers, experts and other audiences.

- 3.1 Explore and develop understanding of how to gather information from a variety of electronic sources, including teacher-selected Web sites and CD-ROMs.
- 3.2 Explore the use of application programs (*i.e.* word processing, database, spreadsheet) for organizing information into charts, tables and diagrams (*i.e.* Graph Club).
- 3.3 Explore the use of content-specific tools to enhance understanding of curriculum content (*i.e.* environmental probes, sensors, robotics, simulation software and measuring devices).
- 3.4 Collaborate with classmates and teacher in creating a multimedia presentation to communicate learning with others.
- 3.5 Collaborate with classmates and teacher to exchange email with another classroom (at the discretion of district and teacher).
- 3.6 In keeping with the research process outlines in Standard 24 of the English Language Arts Curriculum Framework, use appropriate grade level tools (*i.e.* Internet, CD-ROM, online periodical databases). Communicate results of research and learning with others using the most appropriate tools (*i.e.* – desktop-published or word processed report, multimedia presentation).
- 3.7 Manipulate data using charting tools and graphic organizers (*i.e.* concept mapping, flow charting and outlining software – Kidspiration and Inspiration) to connect ideas and organize information.
- 3.8 Under teacher's guidance and at discretion of district, use email to communicate with others (*i.e.* students in other classrooms, experts in a subject, teachers).

6

CPS Instructional Technology Learning Expectations for Grade 6 Continue to Address Earlier Skills as Needed

Standard 1 - Demonstrate proficiency in the use of computers and applications as well as an understanding of concepts underlying hardware, software and connectivity.

- 1.1 Identify components of a computer system, understand their functions and use appropriate terminology in speaking about them (*i.e.* operating system, hard drive, memory, windows, network for saving)
- 1.2 Identify and use basic features of a computer operating system (*i.e.* turn on, start up, shut down, create folders on local server)
- 1.3 Save a file to the desktop, the hard drive and network.
- 1.4 Select a printer and print a document with appropriate page setup and orientation.
- 1.5 Operate peripheral equipment (*i.e.* scanner, digital camera, camcorder).
- 1.6 Master efficient keyboard techniques standard 25 wpm (*i.e.* Ultra Key, hand placement, and orientation).
- 1.7 Identify and use editing and formatting features of a word processing program (*i.e.* centering, line spacing, margins, cut and paste, fonts, styles, spelling, page numbers).
- 1.8 Insert images (*i.e.* graphics, clip art) from other files into word processed document).
- 1.9 Describe structure and function of database and identify components (*i.e.* record or field).
- 1.10 Explore an original database, defining field formats (*i.e.* numeric, color, text) and adding new records.
- 1.11 Explore simple operations in a database (*i.e.* browse, sort, search, delete, add data).
- 1.12 Describe structure and function of spreadsheet (*i.e.* cells, rows, columns, formulas) and apply formatting features.
- 1.13 Create an original spreadsheet, entering simple formulas.
- 1.14 Produce simple charts from spreadsheets.
- 1.15 Identify and use navigation features of browser (*i.e.* - "Go", "Back", "Forward", "Bookmark").
- 1.16 Identify basic elements of a Web site (*i.e.* - URL, hyperlinks, text fielded, teacher directed).
- 1.17 Using email, create and send a message (student use of email is determined by district policy and at teacher's discretion and may be a class-wide activity).
- 1.18 Use correct terminology in speaking about electronic communications (*i.e.* Browser, search, engine, online).
- 1.19 Create a slide presentation using appropriate applications.
- 1.20 Identify and use drawing and painting applications as appropriate for class projects.
- 1.21 Identify appropriate applications for a classroom project.

Grade 6 continued

Standard 2 - Demonstrate responsible use of technology and an understanding of ethics and safety issues in using electronic media.

- 2.1 Develop understanding of the school's rules for safe and ethical Internet use (use of Internet in this grade span is under close supervision and determined by Acceptable Use Policy) and know the consequences of violating that policy.
- 2.2 Explain and demonstrate understanding of classroom rules regarding responsible use of computers (responsible behavior around equipment, respect for other people's work and appropriate collaborative behavior).
- 2.3 Explain and demonstrate ethical and legal behavior in copying files, applications and media.
- 2.4 Explain potential problem of computer viruses and exercise caution in opening email attachments from unknown sources (use of email is at district discretion).
- 2.5 Explain safe practices for sharing personal information via email and the Internet (use of email is at district discretion).
- 2.6 Explain proper email etiquette (use of email is at district discretion).
- 2.7 Validate a Web Site for authenticity (find site sponsor, author and date the site was last updated).
- 2.8 Explain how media and technology can be misused to distort or exaggerate information.
- 2.9 Write correct citations for text and images gathered from electronic sources. Understand that use of materials is limited by the fair use rule of copyright law as outlined at www.copyright.gov (Acceptable Use Policy, Strand 24, Law Use and Web Guidelines).
- 2.10 Develop an awareness of the issue of ergonomics (*i.e.* repetitive stress injuries) and how to use equipment safely.

Standard 3 - Demonstrate ability to use technology for research, problem-solving and communication. Students locate, evaluate, collect and process information from a variety of electronic sources. Students use telecommunications and other media to interact or collaborate with peers, experts and other audiences.

- 3.1 In keeping with the research process outlines in Standard 24 of the English Language Arts Curriculum Framework, use appropriate grade level tools (*i.e.* Internet, CD-ROM, online periodical databases). Communicate results of research and learning with others using the most appropriate tools (*i.e.* desktop-published or word processed report, multimedia presentation).
- 3.2 Use search engines effectively to find relevant, unbiased and current information on a subject (Standard 2 performance indicators apply, *i.e.* evaluate Web sites and write correct citations for sources).
- 3.3 Manipulate data using charting tools and graphic organizers (*i.e.* concept mapping, flow charting and outlining software – Kidspiration and Inspiration) to connect ideas and organize information.

Design Technology Engineering

State Standards for Technology used in Science and Technology Frameworks --- <http://www.doe.mass.edu/frameworks>

7

CPS Instructional Technology Learning Expectations for Grade 7 Continue to Address Earlier Skills as Needed

Standard 1 - Demonstrate proficiency in the use of computers and applications as well as an understanding of concepts underlying hardware, software and connectivity.

- 1.1 Identify components of a computer system, understand their functions and use appropriate terminology in speaking about them (*i.e.* operating system, hard drive, memory, windows, network for saving)
- 1.2 Identify and use basic features of a computer operating system (*i.e.* turn on, start up, shut down, create folders on local server)
- 1.3 Save a file to the desktop, the hard drive and network.
- 1.4 Select a printer and print a document with appropriate page setup and orientation.
- 1.5 Operate peripheral equipment (*i.e.* scanner, digital camera, camcorder).
- 1.6 Master efficient keyboard techniques standard 25 wpm (*i.e.* Ultra Key, hand placement, and orientation).
- 1.7 Use editing & formatting features of a word processing program (*i.e.* centering, line spacing, margins, cut and paste, fonts, styles, spelling, page numbers).
- 1.8 Insert images (*i.e.* graphics, clip art) from other files into word processed document.
- 1.19 Describe structure and function of database and identify components (*i.e.* record or field).
- 1.10 Explore an original database, defining field formats (*i.e.* numeric, color, text) and adding new records.
- 1.11 Perform simple operations in a database (*i.e.* browse, sort, search, delete, add data).
- 1.12 Describe structure and function of spreadsheet (*i.e.* cells, rows, columns, formulas) and apply formatting features.
- 1.13 Create an original spreadsheet, entering simple formulas.
- 1.14 Produce simple charts from spreadsheets.
- 1.15 Identify and use navigation features of browser (*i.e.* - "Go", "Back", "Forward", "Bookmark").
- 1.16 Identify basic elements of a Web site (*i.e.* - URL, hyperlinks, text fielded, teacher directed).
- 1.17 Copy an image from a Web site into a file on the desktop; write a correct citation caption in keeping with copyright law.
- 1.18 Using email, create and send a message (student use of email is determined by district policy and at teacher's discretion and may be a class-wide activity).
- 1.19 Open an email attachment and save it to the desktop (district discretion applies).
- 1.20 Use correct terminology in speaking about electronic communications (*i.e.* Browser, search, engine, online).
- 1.21 Create a slide presentation using appropriate applications.
- 1.22 Identify and use drawing and painting applications as appropriate for class projects.
- 1.23 Identify appropriate applications for a classroom project.

Grade 7 continued

Standard 2 - Demonstrate responsible use of technology and an understanding of ethics and safety issues in using electronic media.

- 2.1 Develop understanding of the school's rules for safe and ethical Internet use (use of Internet in this grade span is under close supervision and determined by Acceptable Use Policy) and know the consequences of violating that policy.
- 2.2 Explain and demonstrate understanding of classroom rules regarding responsible use of computers (responsible behavior around equipment, respect for other people's work and appropriate collaborative behavior).
- 2.3 Explain and demonstrate ethical and legal behavior in copying files, applications and media.
- 2.4 Explain potential problem of computer viruses and exercise caution in opening email attachments from unknown sources (use of email is at district discretion).
- 2.5 Explain safe practices for sharing personal information via email and the Internet (use of email is at district discretion).
- 2.6 Explain proper email etiquette (use of email is at district discretion).
- 2.7 Validate a Web Site for authenticity (find site sponsor, author and date the site was last updated).
- 2.8 Explain how media and technology can be misused to distort or exaggerate information.
- 2.9 Write correct citations for text and images gathered from electronic sources. Understand that use of materials is limited by the fair use rule of copyright law as outlined at www.copyright.gov (Acceptable Use Policy, Strand 24, Law Use and Web Guidelines).
- 2.10 Develop an awareness of the issue of ergonomics (*i.e.* repetitive stress injuries) and how to use equipment safely.

Standard 3 - Demonstrate ability to use technology for research, problem-solving and communication. Students locate, evaluate, collect and process information from a variety of electronic sources. Students use telecommunications and other media to interact or collaborate with peers, experts and other audiences.

- 3.1 In keeping with the research process outlines in Standard 24 of the English Language Arts Curriculum Framework, use appropriate grade level tools (*i.e.* Internet, CD-ROM, online periodical databases). Communicate results of research and learning with others using the most appropriate tools (*i.e.* desktop-published or word processed report, multimedia presentation).
- 3.2 Use search engines effectively to find relevant, unbiased and current information on a subject (Standard 2 performance indicators apply, *i.e.* evaluate Web sites and write correct citations for sources).
- 3.3 Manipulate data using charting tools and graphic organizers (*i.e.* concept mapping, flow charting and outlining software – Kidspiration and Inspiration) to connect ideas and organize information.

Design Technology Engineering

State Standards for Technology used in Science and Technology Frameworks --- <http://www.doe.mass.edu/frameworks>

8

CPS Instructional Technology Learning Expectations for Grade 8 Continue to Address Earlier Skills as Needed

Standard 1 - Demonstrate proficiency in the use of computers and applications as well as an understanding of concepts underlying hardware, software and connectivity.

- 1.1 Identify components of a computer system, understand their functions and use appropriate terminology in speaking about them (*i.e.* operating system, hard drive, memory, windows, network for saving)
- 1.2 Identify and use basic features of a computer operating system (*i.e.* turn on, start up, shut down, create folders on local server)
- 1.3 Save a file to the desktop, the hard drive and network.
- 1.4 Select a printer and print a document with appropriate page setup and orientation.
- 1.5 Operate peripheral equipment (*i.e.* scanner, digital camera, camcorder).
- 1.6 Master efficient keyboard techniques standard 25 wpm (*i.e.* Ultra Key, hand placement, and orientation).
- 1.7 Use editing and formatting features of a word processing program (*i.e.* centering, line spacing, margins, cut and paste, fonts, styles, spelling, page numbers).
- 1.8 Insert images (*i.e.* graphics, clip art) from other files into word processed document).
- 1.9 Describe structure and function of database and identify components (*i.e.* record or field).
- 1.10 Explore an original database, defining field formats (*i.e.* numeric, color, text) and adding new records.
- 1.11 Perform simple operations in a database (*i.e.* browse, sort, search, delete, add data).
- 1.12 Describe structure and function of spreadsheet (*i.e.* cells, rows, columns, formulas) and apply formatting features.
- 1.13 Create an original spreadsheet, entering simple formulas.
- 1.14 Produce simple charts from spreadsheets.
- 1.15 Identify and use navigation features of browser (*i.e.* - "Go", "Back", "Forward", "Bookmark").
- 1.16 Identify basic elements of a Web site (*i.e.* - URL, hyperlinks, text fielded, teacher directed).
- 1.17 Copy an image from a Web site into a file on the desktop; write a correct citation caption in keeping with copyright law.
- 1.18 Using email, create and send a message (student use of email is determined by district policy and at teacher's discretion and may be a class-wide activity).
- 1.19 Open an email attachment and save it to the desktop (district discretion applies).
- 1.20 Use correct terminology in speaking about electronic communications (*i.e.* Browser, search, engine, online).
- 1.21 Create a slide presentation using appropriate applications.
- 1.22 Identify and use drawing and painting applications as appropriate for class projects.
- 1.21 Identify appropriate applications for a classroom project.

Grade 8 continued

Standard 2 - Demonstrate responsible use of technology and an understanding of ethics and safety issues in using electronic media.

- 2.1 Develop understanding of the school's rules for safe and ethical Internet use (use of Internet in this grade span is under close supervision and determined by Acceptable Use Policy) and know the consequences of violating that policy.
- 2.2 Explain and demonstrate understanding of classroom rules regarding responsible use of computers (responsible behavior around equipment, respect for other people's work and appropriate collaborative behavior).
- 2.3 Explain and demonstrate ethical and legal behavior in copying files, applications and media.
- 2.4 Explain potential problem of computer viruses and exercise caution in opening email attachments from unknown sources (use of email is at district discretion).
- 2.5 Explain safe practices for sharing personal information via email and the Internet (use of email is at district discretion).
- 2.6 Explain proper email etiquette (use of email is at district discretion).
- 2.7 Validate a Web Site for authenticity (find site sponsor, author and date the site was last updated).
- 2.8 Explain how media and technology can be misused to distort or exaggerate information.
- 2.9 Write correct citations for text and images gathered from electronic sources. Understand that use of materials is limited by the fair use rule of copyright law as outlined at www.copyright.gov (Acceptable Use Policy, Strand 24, Law Use and Web Guidelines).
- 2.10 Develop an awareness of the issue of ergonomics (*i.e.* repetitive stress injuries) and how to use equipment safely.

Standard 3 - Demonstrate ability to use technology for research, problem-solving and communication. Students locate, evaluate, collect and process information from a variety of electronic sources. Students use telecommunications and other media to interact or collaborate with peers, experts and other audiences.

- 3.1 In keeping with the research process outlines in Standard 24 of the English Language Arts Curriculum Framework, use appropriate grade level tools (*i.e.* Internet, CD-ROM, online periodical databases). Communicate results of research and learning with others using the most appropriate tools (*i.e.* desktop-published or word processed report, multimedia presentation).
- 3.2 Use search engines effectively to find relevant, unbiased and current information on a subject (Standard 2 performance indicators apply, *i.e.* evaluate Web sites and write correct citations for sources).
- 3.3 Manipulate data using charting tools and graphic organizers (*i.e.* concept mapping, flow charting and outlining software – Kidspiration and Inspiration) to connect ideas and organize information.

Research Process, Study Skills and use of Technology Resources

Strand 24- Language Arts Framework

Design Technology Engineering

State Standards for Technology used in Science and Technology Frameworks --- <http://www.doe.mass.edu/frameworks>

Footnotes

Instructional Technology

ⁱ Guiding Principle III in the Mathematics Curriculum Framework describes how technology is an essential tool in math education, and "...if properly used, [can] contribute to a rich learning environment for developing and applying mathematical concepts." The framework also stresses that "elementary students should learn how to perform thoroughly the basic arithmetic operations independent of the use of a calculator."

ⁱⁱ According to the Third International Mathematics and Science Study (TIMSS), "U.S. fourth graders use calculators and computers in mathematics class more frequently than do students in most other TIMSS countries. Use of calculators in U.S. fourth-grade mathematics classes is about twice the international average.... In six of the seven nations that outscore the U.S. in mathematics, teachers of 85% or more of the students report that students never (or hardly ever) use calculators in class." (Twenty-six countries participated in the TIMSS study.) National Center for Education Statistics, *Pursuing Excellence: A Study of U.S. Fourth-Grade Mathematics and Science Achievement in International Context*, chapter 2 "Contexts of Learning," accessed June 15, 2000, <http://nces.ed.gov/timss/report/97255-2a.html>.

ⁱⁱⁱ Standard 22.3 of the English Language Arts Curriculum Framework states that children in grades 3 to 4 should "write legibly in cursive, leaving space between letters in a word and between words in a sentence."

^{iv} The Composition Strand of the English Language Arts Curriculum Framework states the benefits of using electronic sources for research and points out that "the greatest challenge these electronic media present may be the sheer volume of data they offer." It stresses the importance of learning criteria for evaluating online information for quality.

^v Standard 24 of the Massachusetts English Language Arts Curriculum Framework (November 2000) outlines the research process. The skills of evaluating electronic information sources and citing them correctly, listed under Instructional Technology Standard 2, apply to all electronic research skills.

^{vi} More information on the NETS project is available at the ISTE Web site, <http://www.iste.org>.

^{vii} Both Standards 1 and 3 contain elements of the NETS Foundation Standard 3.