



**CONNECTICUT PREKINDERGARTEN THROUGH GRADE 12
COMPUTER TECHNOLOGY
2001
COMPETENCY STANDARDS FOR STUDENTS**



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Office of Grant Programs and Technology
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Table of Contents

Introduction	page 1
Summary of Grades PreK-12 Competency Standards	page 3
Standard 1: Basic Operations and Concepts	page 4
Standard 2: Social, Ethical and Human Issues	page 5
Standard 3: Technology Productivity Tools	page 6
Standard 4: Technology Communications Tools	page 7
Standard 5: Technology Research Tools	page 8
Standard 6: Technology Problem-Solving and Decision-Making Tools	page 10
Summary of Grades 9-12 Competency Standards for Students Pursuing a Career in the Information Technology Field	page 11
Standard 1: Advanced Operations and Concepts	page 12

Introduction

Today's students find that their education extends beyond the traditional classroom into the realm of cyberspace – a world where information is readily accessible and where “cyber-ready,” “thin client,” and “information technology” are household words. All students must be able to use information and technology effectively to live, learn and work successfully in an increasingly complex and technology-based society.

From an educational perspective, our children need to achieve high academic standards, improve formal and informal learning, increase personal productivity, communicate effectively, enrich their understanding of the world at large and increase their awareness as responsible citizens in an information-rich society. Technology, and the everyday use of technology-enhanced tools, will assist them to do this in a way that is motivating, creative, empowering and fun.

From an economic perspective, our children must be prepared to enter the job market with a basic set of technology competencies for today's jobs as well as the skills required for emerging jobs in an information-based economic climate.

Both nationally and in Connecticut, there has been a renewed call for action to advance the use of technology in our schools:

- In her November 29, 1999, report to Governor Rowland, Lieutenant Governor Jodi Rell made nineteen recommendations on computer education. Implementation of her plan “will take an investment not just in financial terms, but in commitment, vision and planning.” She said:
“Too many classrooms continue to be without computers. Too many schools and classrooms have yet to be wired or connected to computer systems. Too many teachers have not had the opportunity for specialized and sometimes basic, computer training. Too many administrators are frustrated by the lack of resources for technology enhancements and for appropriate support staff. And too few students have ample and properly tutored access to school-based computers and the Internet.”
- The most comprehensive legislation on educational technology in the state was enacted through P.A. 00-187. The central piece in this legislation was the consolidation of effort across the K-16 education system involving all the critical partners in the support of educational technology in schools through the Commission for Educational Technology (CET). Among other initiatives, the legislation called for the State Board of Education to adopt grade kindergarten to grade twelve, inclusive, computer technology competency standards for students.
- Most recently (2000), the U.S. Department of Education released its new educational technology plan, e-learning: Putting a World-Class Education at the Fingertips of All Children. Goal 3 of the plan relates directly to student learning, demonstrating the interrelated nature of information and technology literacy. “Goal 3: All students will have technology and information literacy skills.”

In response to these developments, the Connecticut State Department of Education (CSDE), in cooperation with the CET, has identified prekindergarten - Grade 12 computer technology competency standards that incorporate and are consistent with recognized national and state standards, as described in the following documents:

- National Education Technology Standards (NETS) for Students published in 2000 by the International Society for Technology in Education (ISTE), funded by the U.S. Department of Education, the National Aeronautics and Space Administration (NASA), the Milken Exchange on Education Technology and Apple Computer, Inc;
- Connecticut Learning Resources and Information Technology (LRIT) Curriculum Framework (1998); and
- *Building a Foundation for Tomorrow: Skill Standards for Information Technology* developed by the Northwest Center For Emerging Technologies (NCET).

The six overarching competency standards are adopted from the NETS standards. Within each competency standard is a combination of NETS prekindergarten – Grade 12 performance indicators and the K-12 performance standards related to technology from the LRIT curriculum framework. In addition, there is one competency standard for students wishing to pursue a career in the information technology field, based on the NCET document.

These student computer technology competencies can also serve as a checkpoint for districts to assess whether their students have a full range of opportunities to learn about and use computers in their prekindergarten – Grade 12 educational experience. It is anticipated that these computer skills and competencies will be incorporated into and further articulated in future CSDE publications and programs, particularly those related to the development and implementation of high quality instructional programs in the content areas. Initiatives designed to identify best practices and model tasks using technology are in process and will provide local educators with specific examples of ways to integrate these competencies to improve and enhance student learning.

As students gain proficiency in the computer technology skills and competencies, they are acquiring tools that will increase their potential for academic success and prepare them to work and learn in a world that relies more and more on technology. We thank all those who contributed to this most important endeavor.

PREKINDERGARTEN THROUGH GRADE 12 COMPUTER TECHNOLOGY COMPETENCY STANDARDS FOR STUDENTS

1. Basic Operations And Concepts	<ul style="list-style-type: none"> ❖ Students demonstrate a sound understanding of the nature and operation of technology systems ❖ Students are proficient in the use of technology
2. Social, Ethical and Human Issues	<ul style="list-style-type: none"> ❖ Students understand the ethical, cultural and societal issues related to technology ❖ Students practice responsible use of technology systems, information and software ❖ Students develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits and productivity
3. Technology Productivity Tools	<ul style="list-style-type: none"> ❖ Students use technology tools to enhance learning, increase productivity and promote creativity ❖ Students use productivity tools to collaborate in constructing technology-enhanced models, preparing publications and producing other creative works
4. Technology Communications Tools	<ul style="list-style-type: none"> ❖ Students use telecommunications to collaborate, publish and interact with peers, experts and other audiences ❖ Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences
5. Technology Research Tools	<ul style="list-style-type: none"> ❖ Students use technology to locate, evaluate and collect information from a variety of sources ❖ Students use technology tools to process data and report results ❖ Students evaluate and select new information resources and technological innovations based on the appropriateness to specific tasks
6. Technology Problem-Solving and Decision-Making Tools	<ul style="list-style-type: none"> ❖ Students use technology resources for solving problems and making informed decisions ❖ Students employ technology in the development of strategies for solving problems in the real world

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**PREKINDERGARTEN THROUGH GRADE 12
COMPUTER TECHNOLOGY COMPETENCY STANDARDS FOR STUDENTS
COMPETENCY STANDARD 1: BASIC OPERATIONS AND CONCEPTS**

- ❖ Students demonstrate a sound understanding of the nature and operation of technology systems.
- ❖ Students are proficient in the use of technology.

Prekindergarten Through Grade 12 Performance Standards		
Educational experiences in Grades Pre-K-4 will assure that students:	Educational experiences in Grades 5-8 will assure that students:	Educational experiences in Grades 9-12 will assure that students:
<ul style="list-style-type: none"> ➤ Use input devices (e.g., mouse, keyboard, remote control) and output devices (e.g., monitor, printer) to successfully operate computers, VCRs, audio tapes, and other technologies ➤ Use a variety of media and technology resources for directed and independent learning activities ➤ Communicate about technology using developmentally appropriate and accurate terminology ➤ Use developmentally appropriate multimedia resources (e.g., interactive books, educational software, elementary multimedia encyclopedias) to support learning ➤ Discuss common uses of technology in daily life and the advantages and disadvantages those uses provide 	<ul style="list-style-type: none"> ➤ Apply strategies for identifying and solving routine hardware and software problems that occur during everyday use ➤ Demonstrate an understanding of concepts underlying hardware, software and connectivity, and of practical applications to learning and problem solving • Use keyboards and other common input and output devices (including adaptive devices when necessary) efficiently and effectively • Independently operate school computers and demonstrate ability to use the system's software and special features • Demonstrate the ability to independently use personal productivity software to create products in a wide range of formats (newsletters, budgets, brochures, imported graphics, web pages, etc.) • Describe general criteria used to evaluate and compare different types of computers, peripherals and other technology tools • Demonstrate the ability to use basic features (entering information/data, editing, calculating, manipulating information, saving files) of personal productivity software (word processing, desktop publishing, spreadsheets, databases, etc.) • With assistance, develop strategies for solving common hardware and software problems 	<ul style="list-style-type: none"> ➤ Make informed choices among technology systems, resources and services • Produce a variety of products using the advanced features of personal productivity software

**PREKINDERGARTEN THROUGH GRADE 12
COMPUTER TECHNOLOGY COMPETENCY STANDARDS FOR STUDENTS
COMPETENCY STANDARD 2: SOCIAL, ETHICAL AND HUMAN ISSUES**

- ❖ Students understand the ethical, cultural and societal issues related to technology.
- ❖ Students practice responsible use of technology systems, information and software.
- ❖ Students develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits and productivity.

Prekindergarten Through Grade 12 Performance Standards

Educational experiences in Grades Pre-K-4 will assure that students:	Educational experiences in Grades 5-8 will assure that students:	Educational experiences in Grades 9-12 will assure that students:
<ul style="list-style-type: none"> ➤ Practice responsible use of technology systems and software ➤ Work cooperatively and collaboratively with peers, family members, and others when using technology in the classroom ➤ Demonstrate positive social and ethical behaviors when using technology <p>Demonstrate an understanding of the appropriate and inappropriate use of technology</p>	<ul style="list-style-type: none"> ➤ Demonstrate knowledge of current changes in information technologies and the effect those changes have on the workplace and society ➤ Exhibit legal and ethical behaviors when using information and technology, and discuss consequences of misuse ➤ Research and evaluate the accuracy, relevance, appropriateness, comprehensiveness, and bias of electronic information sources concerning real-world problems ➤ Discuss basic issues related to responsible use of technology and information and describe personal consequences of inappropriate use <ul style="list-style-type: none"> • Apply established citation standards for giving credit for information or ideas used from electronic resources • Demonstrate an understanding of the concept of ownership of ideas and information by respecting and observing laws and/ or guidelines for using information, hardware and networks 	<ul style="list-style-type: none"> ➤ Identify capabilities and limitations of contemporary and emerging technology resources and assess the potential of these systems and services to address personal, lifelong learning, and workplace needs ➤ Make informed choices among technology systems, resources, and services ➤ Analyze advantages and disadvantages of widespread use and reliance on technology in the workplace and in society as a whole ➤ Demonstrate and advocate for legal and ethical behaviors among peers, family, and community regarding the use of technology and information <ul style="list-style-type: none"> • Observe all ethical and legal restraints in copying or using material from any print, nonprint or electronic resources • Demonstrate an understanding of the process for copyrighting / protecting their original work • Observe local, state and national laws and policies and procedures regarding the use of computers, other technologies and networks

**PREKINDERGARTEN THROUGH GRADE 12 COMPUTER TECHNOLOGY COMPETENCY
STANDARDS FOR STUDENTS
COMPETENCY STANDARD 3: TECHNOLOGY PRODUCTIVITY TOOLS**

- ❖ Students use telecommunications to collaborate, publish and interact with peers, experts and other audiences.
- ❖ Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.

Prekindergarten Through Grade 12 Performance Standards

Educational experiences in Grades Pre-K-4 will assure that students:	Educational experiences in Grades 5-8 will assure that students:	Educational experiences in Grades 9-12 will assure that students:
<ul style="list-style-type: none"> ➤ Use a variety of media and technology resources for directed and independent learning activities ➤ Create developmentally appropriate multimedia products with support from teachers, family members, or student partners ➤ Use technology resources (e.g., puzzles, logical thinking programs, writing tools, digital cameras, drawing tools) for problem solving, communication, and illustration of thoughts, ideas, and stories • Use appropriate software (writing tools, hypermedia, drawing tools, etc.) to organize and present ideas 	<ul style="list-style-type: none"> ➤ Use content-specific tools, software and simulations (e.g., environmental probes, graphing calculators, exploratory environments, Web tools) to support learning and research ➤ Apply productivity / multimedia tools and peripherals to support personal productivity, group collaboration and learning throughout the curriculum ➤ Use general purpose productivity tools and peripherals to support personal productivity, remediate skill deficits, and facilitate learning throughout the curriculum ➤ Use technology tools (e.g., multimedia authoring, presentation, Web tools, digital cameras, scanners) for individual and collaborative writing, communication, and publishing activities to create knowledge products for audiences inside and outside the classroom • Use appropriate software (spreadsheet, database, hypermedia, etc.) to construct, organize, calculate, analyze and interpret ideas and data, and to present conclusions • Create databases, spreadsheets and a variety of graphic presentations to communicate numeric and visual information using applications with varied and more sophisticated features 	<ul style="list-style-type: none"> ➤ Use technology tools and resources for managing and communicating personal / professional information ➤ Investigate and apply expert systems, intelligent agents, and simulations in real-world situations • Create written, oral, numeric and visual communications using appropriate applications (spreadsheet, database, hypermedia, etc.) to construct, organize, analyze and interpret ideas and data, and present conclusion

**PREKINDERGARTEN THROUGH GRADE 12
COMPUTER TECHNOLOGY COMPETENCY STANDARDS FOR STUDENTS
COMPETENCY STANDARD 4: TECHNOLOGY COMMUNICATIONS TOOLS**

- ❖ Students use telecommunications to collaborate, publish and interact with peers, experts and other audiences.
- ❖ Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.

Prekindergarten Through Grade 12 Performance Standards

Educational experiences in Grades Pre-K-4 will assure that students:	Educational experiences in Grades 5-8 will assure that students:	Educational experiences in Grades 9-12 will assure that students:
<ul style="list-style-type: none"> ➤ Use technology resources (e.g., puzzles, logical thinking programs, writing tools, digital cameras, drawing tools) for problem solving, communication, and illustration of thoughts, ideas and stories ➤ Gather information and communicate with others using telecommunications, with support from teachers, family members or student partners 	<ul style="list-style-type: none"> ➤ Design, develop, publish, and present products (e.g., Web pages, videotapes) using technology resources that demonstrate and communicate curriculum concepts to audiences inside and outside the classroom ➤ Collaborate with peers, experts, and others using telecommunications and collaborative tools to investigate curriculum-related problems, issues, and information, and to develop solutions or products for audiences inside and outside the classroom ➤ Use technology tools (e.g., multimedia authoring, presentation, Web tools, digital cameras, scanners) for individual and collaborative writing, communication and publishing activities to create knowledge products for audiences inside and outside the classroom ➤ Use telecommunications efficiently and effectively to access remote information, communicate with others in support of direct and independent learning, and pursue personal interests ➤ Use telecommunications and online resources (e.g., e-mail, online discussions, Web environments) to participate in collaborative problem-solving activities for the purpose of developing solutions or products for audiences inside and outside the classroom 	<ul style="list-style-type: none"> ➤ Use technology tools and resources for managing and communicating personal/professional information ➤ Routinely and efficiently use online information resources to meet needs for collaboration, research, publications, communications, and productivity ➤ Select and apply technology tools for research, information analysis, problem-solving and decision-making in content learning ➤ Collaborate with peers, experts and others to contribute to a content-related knowledge base by using technology to compile, synthesize, produce and disseminate information, models and other creative works

**PREKINDERGATEN THROUGH GRADE 12
COMPUTER TECHNOLOGY COMPETENCY STANDARDS FOR STUDENTS
CONTENT STANDARD 5: TECHNOLOGY RESEARCH TOOLS**

- ❖ Students use technology to locate, evaluate and collect information from a variety of sources.
- ❖ Students use technology tools to process data and report results.
- ❖ Students evaluate and select new information resources and technological innovations based on the appropriateness to specific tasks.

Prekindergarten Through Grade 12 Performance Standards

Educational experiences in Grades Pre-K-4 will assure that students:	Educational experiences in Grades 5-8 will assure that students:	Educational experiences in Grades 9-12 will assure that students:
<ul style="list-style-type: none"> ➤ Use technology resources (e.g., puzzles, logical thinking programs, writing tools, digital cameras, drawing tools) for problem solving, communication, and illustration of thoughts, ideas and stories • Use Internet resources and other electronic information resources with assistance • Describe ways technology can be used to organize and reorganize information • Perform simple key word searches • Use simple menus to locate information from electronic media • Select and use appropriate tools and technology resources, with assistance, to accomplish a variety of tasks and solve problems 	<ul style="list-style-type: none"> ➤ Use content-specific tools, software, and simulations (e.g., environmental probes, graphing calculators, exploratory environments, Web tools) to support learning and research ➤ Design, develop, publish and present products (e.g., Web pages, videotapes) using technology resources that demonstrate and communicate curriculum concepts to audiences inside and outside the classroom ➤ Collaborate with others using telecommunications and collaborative tools to investigate curriculum-related problems, issues and information and to develop solutions or products for audiences inside and outside the classroom ➤ Use telecommunications and online resources (e.g., e-mail, online discussions, Web environments) to participate in collaborative problem-solving activities for the purpose of developing solutions or products for audiences inside and outside the classroom ➤ Use technology resources (e.g., calculators, data collection probes, videos, educational software) for problem-solving, self-directed learning and extended learning activities ➤ Determine when technology is useful and select the appropriate tool(s) and technology resources to address a variety of tasks and problems 	<ul style="list-style-type: none"> ➤ Evaluate technology-based options, including distance and distributed education, for lifelong learning ➤ Routinely and efficiently use online information resources to meet needs for collaboration, research, publications, communications and productivity ➤ Select and apply technology tools for research, information analysis, problem-solving, and decision-making in content learning ➤ Investigate and apply expert systems, intelligent agents and simulations in real-world situations ➤ Collaborate with peers, experts, and others to contribute to a content-related knowledge base by using technology to compile, synthesize, produce and disseminate information, models and other creative works • Determine the best tool for locating information and use key word descriptors and Boolean logic (when appropriate) to perform advanced on-line and CD-ROM searches (e.g., field searches) • Demonstrate the ability to solve problems by collecting, analyzing and interpreting data through the use of data management software (database, spreadsheets, etc.)

Prekindergarten Through Grade 12 Performance Standards

Educational experiences in Grades Pre-K-4 will assure that students:	Educational experiences in Grades 5-8 will assure that students:	Educational experiences in Grades 9-12 will assure that students:
	<ul style="list-style-type: none"> • Determine key words and use Boolean logic (when appropriate) to search electronic and Internet-based databases • Demonstrate the ability to navigate through a variety of software menus to access information • Search, find, sort and evaluate database information from computers, CD-ROM and on-line resources and know how to apply established specific features of different search engines • Demonstrate the ability to identify and use a variety of features to locate information using an Internet search engine or directory • Develop and apply criteria for evaluating Internet resources • Use a variety of technology tools to organize and manipulate data to solve problems 	<ul style="list-style-type: none"> • Independently select and use an appropriate search engine or directory related to a specific task • Use technology tools to generate findings and organize results for presentation

**PREKINDERGATEN THROUGH GRADE 12
COMPUTER TECHNOLOGY COMPETENCY STANDARDS FOR STUDENTS
COMPETENCY STANDARD 6: TECHNOLOGY PROBLEM-SOLVING AND DECISION-MAKING TOOLS**

- ❖ Students use technology resources for solving problems and making informed decisions.
- ❖ Students employ technology in the development of strategies for solving problems in the real world.

Prekindergarten Through Grade 12 Performance Standards		
Educational experiences in Grades Pre-K-4 will assure that students:	Educational experiences in Grades 5-8 will assure that students:	Educational experiences in Grades 9-12 will assure that students:
<ul style="list-style-type: none"> ➤ Use technology resources (e.g., puzzles, logical thinking programs, writing tools, digital cameras, drawing tools) for problem solving, communication, and illustration of thoughts, ideas and stories • Select appropriate resources from a variety of media formats, understanding that information is stored and accessed in different ways 	<ul style="list-style-type: none"> ➤ Apply productivity/multimedia tools and peripherals to support personal productivity, group collaboration and learning throughout the curriculum ➤ Use technology resources (e.g., calculators, data collection probes, videos, educational software) for problem-solving, self-directed learning and extended learning activities ➤ Design, develop, publish and present products (e.g., Web pages, videotapes) using technology resources that demonstrate and communicate curriculum concepts to audiences inside and outside the classroom ➤ Demonstrate an understanding of concepts underlying hardware, software and connectivity, and of practical applications to learning and problem solving ➤ Determine when technology is useful and select the appropriate tool(s) and technology resources to address a variety of tasks and problems ➤ Evaluate the accuracy, relevance, appropriateness, comprehensiveness and bias of electronic information sources 	<ul style="list-style-type: none"> ➤ Routinely and efficiently use online information resources to meet needs for collaboration, research, publications, communications and productivity ➤ Investigate and apply expert systems, intelligent agents and simulations in real-world situations ➤ Collaborate with peers, experts, and others to contribute to a content-related knowledge base by using technology to compile, synthesize, produce and disseminate information, models and other creative works • Independently use technology to search for and identify potential work, career or study opportunities

**GRADES 9 – 12 COMPUTER TECHNOLOGY
COMPETENCY STANDARDS FOR STUDENTS
PURSUING A CAREER IN THE INFORMATION TECHNOLOGY FIELD**

1. Advanced Operations and Concepts	❖ Students are proficient in the use of advanced technology as it applies to the Information Technology field
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**GRADES 9-12 COMPUTER TECHNOLOGY COMPETENCY STANDARDS FOR STUDENTS
PURSUING A CAREER IN THE INFORMATION TECHNOLOGY FIELD
COMPETENCY STANDARD 1: ADVANCED OPERATIONS AND CONCEPTS***

❖ Students are proficient in the use of advanced technology as it applies to the Information Technology field.

Performance Standards	Related Skill Cluster Title
Educational experiences in Grades 9-12 will assure that students:	
<ul style="list-style-type: none"> Analyze and design database Develop and implement database Perform administration and maintenance Perform security administration Provide client services 	Database Development & Administration Data Analyst Database Developer Database Administrator Data Architect Database Analyst Data Modeler Knowledge Architect
<ul style="list-style-type: none"> Perform analysis Produce visual and functional design Perform media production and acquisition Implement and test design 	Digital Media Animator Media Specialist 2D/3D Artist Media/Instructional Designer Virtual Reality Specialist Producer Multimedia Author
<ul style="list-style-type: none"> Define customer requirements Determine systems solutions Provide strategic direction for systems configuration and inter-operability Provide high-level technology management implement systems 	Enterprise Systems Analysis and Integration Systems Analyst Data System Designer Systems Integrator Infrastructure Analyst Electronic Commerce Specialist Business Continuity Analyst Electronic Transaction Specialist Chief Information Officer Data Systems Manager
<ul style="list-style-type: none"> Perform analysis and design Perform configuration and implementation Perform testing Perform monitoring and management Perform administration and maintenance 	Network Design and Administration Network Technician Data Communications Analyst Network Engineer Network Architect Network Operations Analyst
<ul style="list-style-type: none"> Perform analysis Develop structure Design/develop program Implement program Test program Validate program 	Programming/Software Engineer Software Engineer Software Development Engineer Software Tester Program/Analyst Software Applications Specialist
<ul style="list-style-type: none"> Perform troubleshooting Provide facilitation and customer service Perform hardware and software installation, configuration and upgrades Perform system operations, monitoring and maintenance 	Technical Support Technical Support Representative PC Support Specialist Customer Service Representative Sales Support Technician Help Desk Technician Maintenance Technical
<ul style="list-style-type: none"> Analyze project requirements Perform Research Design document Develop and write document Publish and package 	Technical Writing Technical Writer Electronic Publications Document Specialist Specialist Technical Publications Manager
<ul style="list-style-type: none"> Perform content and technical analysis Develop web applications/sites Implement application/site design Maintain applications Manage web environment Manage enterprise-wide web activities 	Web Development and Administration Web Page Developer Web Administrator Web Site Developer Web Architect Webmaster

*Source: Northwest Center for Emerging Technologies