COMPUTER SCIENCE STANDARDS

Standard I. All teachers use technology-related terms, concepts, data input strategies, and ethical practices to make informed decisions about current technologies and their applications.

Standard II. All teachers identify task requirements, apply search strategies, and use current technology to efficiently acquire, analyze, and evaluate a variety of electronic information.

Standard III. All teachers use task-appropriate tools to synthesize knowledge, create and modify solutions, and evaluate results in a way that supports the work of individuals and groups in problem-solving situations.

Standard IV. All teachers communicate information in different formats and for diverse audiences.

Standard V. All teachers know how to plan, organize, deliver, and evaluate instruction for all students that incorporates the effective use of current technology for teaching and integrating the Technology Applications Texas Essential Knowledge and Skills (TEKS) into the curriculum.

Standard VI. The computer science teacher has the knowledge and skills needed to teach the Foundations, Information Acquisition, Work in Solving Problems, and Communication strands of the Technology Applications Texas Essential Knowledge and Skills (TEKS) in computer science, in addition to the content described in Technology Applications Standards I–V.

Standard VII. *Teachers of computer science are not responsible for this standard.*

Standard VIII. *Teachers of computer science are not responsible for this standard.*

Standard IX. *Teachers of computer science are not responsible for this standard.*

Standard X. *Teachers of computer science are not responsible for this standard.*

Standard XI. *Teachers of computer science are not responsible for this standard.*

Teacher Knowledge: What All Teachers Know	Application: What All Teachers Can Do
Teachers of Students in Grades EC–12	*Teachers of Students in Grades EC–12*
The beginning teacher knows and understands:	The beginning teacher is able to:
1.1k the appropriate use of hardware components, software programs, and their connections;	1.1s demonstrate knowledge and appropriate use of operating systems, software applications, and communication and networking components;
1.2k data input skills appropriate to the task; and	1.2s compare, contrast, and appropriately use various input, processing, output, and primary/secondary storage devices;
1.3k laws and issues regarding the use of technology in society.	1.3s select and use software for a defined task according to quality, appropriateness, effectiveness, and efficiency;
	1.4s delineate and make necessary adjustments regarding compatibility issues, including, but not limited to, digital file formats and cross-platform connectivity;
	1.5s use technology terminology appropriate to the task;
	1.6s perform basic software application functions, including, but not limited to, opening an application program and creating, modifying, printing, and saving documents;
	1.7s explain the differences between analog and digital technology systems and give examples of each;
	1.8s use appropriate terminology related to the Internet, including, but not limited to, electronic mail (e-mail), uniform resource locators (URLs), electronic bookmarks, local area networks (LANs), wide area networks (WANs), World Wide Web (WWW) pages, and Hypertext Markup Language (HTML);
	1.9s compare and contrast LANs, WANs, the Internet, and intranets;
	1.10s use a variety of input devices such as mouse/track pad, keyboard, microphone, digital camera, printer, scanner, disk/disc, modem, CD-ROM, and joystick;

Standard I. All teachers use technology-related terms, concepts, data input strategies, and ethical practices to make informed decisions about current technologies and their applications.

Application: What All Teachers Can Do

Teachers of Students in Grades EC–12 (continued)

1.11s   demonstrate keyboarding proficiency in technique and posture while building speed;

1.12s   use digital keyboarding standards for data input such as one space after punctuation, the use of em/en dashes, and smart quotation marks;

1.13s   develop strategies for capturing digital files while conserving memory and retaining image quality;

1.14s   discuss copyright laws, violations, and issues including, but not limited to, computer hacking, computer piracy, intentional virus setting, and invasion of privacy;

1.15s   model ethical acquisition and use of digital information including citing sources using established methods;

1.16s   demonstrate proper etiquette and knowledge of acceptable use of electronic information and products while in an individual classroom, lab, or on the Internet or an intranet;

1.17s   identify the impact of technology applications on society through research, interviews, and personal observation; and

1.18s   demonstrate knowledge of the importance of technology to future careers, lifelong learning, and daily living for individuals of all ages.

Standard II. All teachers identify task requirements, apply search strategies, and use current technology to efficiently acquire, analyze, and evaluate a variety of electronic information.

Teacher Knowledge: What All Teachers Know	Application: What All Teachers Can Do
Teachers of Students in Grades EC–12	*Teachers of Students in Grades EC–12*
The beginning teacher knows and understands:	The beginning teacher is able to:
2.1k a variety of strategies for acquiring information from electronic resources; 2.2k how to acquire electronic information in a variety of formats; and 2.3k how to evaluate acquired electronic information.	2.1s use strategies to locate and acquire desired information from collaborative software and on networks, including the Internet and intranets; 2.2s apply appropriate electronic search strategies in the acquisition of information, including keyword and Boolean search strategies; 2.3s identify, create, and use files in various appropriate formats such as text, bitmapped/vector graphics, image, video, and audio files; 2.4s access, manage, and manipulate information from secondary storage and remote devices; 2.5s use on-line help and other documentation; 2.6s determine and employ methods to evaluate electronic information for accuracy and validity; 2.7s resolve information conflicts and validate information by accessing, researching, and comparing data from multiple sources; and 2.8s identify the source, location, media type, relevancy, and content validity of available information.

Standard III. All teachers use task-appropriate tools to synthesize knowledge, create and modify solutions, and evaluate results in a way that supports the work of individuals and groups in problem-solving situations.

Teacher Knowledge: What All Teachers Know	Application: What All Teachers Can Do
Teachers of Students in Grades EC–12	*Teachers of Students in Grades EC–12*
The beginning teacher knows and understands:	The beginning teacher is able to:
3.1k how to use appropriate computer-based productivity tools to create and modify solutions to problems;	3.1s plan, create, and edit word processing documents using readable fonts, alignment, page setup, tabs, and ruler settings;
3.2k how to use research skills and electronic communication to create new knowledge; and	3.2s plan, create, and edit spreadsheet documents using all data types, formulas and functions, and chart information;
3.3k how to use technology applications to facilitate evaluation of work, including both process and product.	3.3s plan, create, and edit databases by defining fields, entering data, and designing layouts appropriate for reporting;
	3.4s demonstrate proficiency in the use of multimedia authoring programs by creating linear or nonlinear projects incorporating text, audio, video, and graphics;
	3.5s plan, create, and edit a document using desktop publishing techniques including, but not limited to, the creation of multicolumn or multisection documents with a variety of text-wrapped frame formats;
	3.6s differentiate between and demonstrate the appropriate use of a variety of graphic tools found in draw and paint applications;
	3.7s integrate two or more productivity tools, including, but not limited to, tables, charts and graphs, graphics from paint or draw programs, and mail merge, into a document;
	3.8s use interactive virtual environments, appropriate to grade level, such as virtual reality or simulations;
	3.9s use technical writing strategies to create products such as a technical instruction guide;

	Standard III. All teachers use task-appropriate tools to synthesize knowledge, create and modify solutions, and evaluate results in a way that supports the work of individuals and groups in problem-solving situations.

	Application: What All Teachers Can Do
	Teachers of Students in Grades EC–12 (continued)
	3.10s use subject matter foundation and enrichment curricula in the creation of products;
	3.11s participate in electronic communities as a learner, initiator, and contributor;
	3.12s complete tasks using technological collaboration such as sharing information through on-line communications;
	3.13s use groupware, collaborative software, and productivity tools to create products;
	3.14s use technology in self-directed activities to create products for and share products with defined audiences;
	3.15s integrate acquired technology applications, skills, and strategies and use of the word processor, database, spreadsheet, telecommunications, draw, paint, and utility programs into the foundation and enrichment curricula;
	3.16s design and implement procedures to track trends, set time lines, and review/ evaluate progress for continual improvement in process and product; and
	3.17s resolve information conflicts and validate information through research and comparison of data from multiple sources.

Standard IV. All teachers communicate information in different formats and for diverse audiences.

Teacher Knowledge: What All Teachers Know	Application: What All Teachers Can Do
Teachers of Students in Grades EC–12	*Teachers of Students in Grades EC–12*
The beginning teacher knows and understands:	The beginning teacher is able to:
4.1k how to format digital information for appropriate and effective communication;	4.1s use productivity tools, such as slide shows, posters, multimedia presentations, newsletters, brochures, or reports, to create effective document files for defined audiences;
4.2k how to deliver a product electronically in a variety of media; and	4.2s demonstrate the use of a variety of layouts in a database, including horizontal and vertical layouts, to communicate information appropriately;
4.3k how to evaluate communication in terms of both process and product.	4.3s create a variety of spreadsheet layouts containing descriptive labels and page settings;
	4.4s demonstrate appropriate use of fonts, styles, and sizes, as well as effective use of graphics and page design to communicate effectively;
	4.5s match the chart style to the data when creating and labeling charts;
	4.6s publish information in a variety of ways, including, but not limited to, printed copy, monitor displays, Internet documents, and video;
	4.7s design and create interdisciplinary multimedia presentations that include audio, video, text, and graphics for defined audiences;
	4.8s use telecommunication tools, such as Internet browsers, video conferencing, and distance learning, for publishing information;
	4.9s design and implement procedures to track trends, set time lines, and review and evaluate products using technology tools such as database managers, daily/monthly planners, and project management tools;
	4.10s determine and employ technology specifications to evaluate projects for design, content delivery, purpose, and audience and demonstrate that process and product can be evaluated using established criteria or rubrics;

Standard IV. All teachers communicate information in different formats and for diverse audiences.

	Application: What All Teachers Can Do
	Teachers of Students in Grades EC–12 (continued)
	4.11s select representative products to be collected and stored in an electronic evaluation tool; and
	4.12s evaluate products for relevance to the assignment or task.

Standard V. All teachers know how to plan, organize, deliver, and evaluate instruction for all students that incorporates the effective use of current technology for teaching and integrating the Technology Applications Texas Essential Knowledge and Skills (TEKS) into the curriculum.

Teacher Knowledge: What All Teachers Know	Application: What All Teachers Can Do
Teachers of Students in Grades EC–12	*Teachers of Students in Grades EC–12*
The beginning teacher knows and understands:	The beginning teacher is able to:
5.1k planning techniques to ensure that students have time to learn the Technology Applications TEKS in order to meet grade-level benchmark expectations;	5.1s plan applications-based technology lessons using a range of instructional strategies for individuals and small/whole groups;
5.2k where to find and how to utilize technological resources to implement the TEKS, to support instruction, to extend communication, to enhance classroom management, and to become more productive in daily tasks;	5.2s identify and address equity issues related to the use of technology, including, but not limited to, gender, ethnicity, language, disabilities, and student access to technology;
5.3k instructional strategies for teaching the Technology Applications TEKS and integrating them into the curriculum;	5.3s plan, select, and implement instruction that allows students to use technology applications in problem-solving and decision-making situations;
5.4k strategies that students with diverse strengths and needs can use to determine word meaning in content-related texts;	5.4s develop and implement, using technology applications, tasks that emphasize collaboration and teamwork among members of a structured group or project team;
5.5k strategies that students with diverse strengths and needs can use to develop content-area vocabulary;	5.5s provide adequate time for teaching the Technology Applications TEKS;
5.6k strategies that students with diverse strengths and needs can use to facilitate comprehension before, during, and after reading content-related texts;	5.6s identify and use resources to keep current with technology education;
5.7k how to evaluate the effectiveness of technology-based instruction; and	5.7s create project-based learning activities that integrate the Technology Applications TEKS into the curriculum and meet the Technology Applications TEKS benchmarks;
5.8k how to set goals for ongoing professional development in teaching the Technology Applications TEKS and integrating them into the curriculum.	5.8s follow guidelines for the legal and ethical use of technology resources;
	5.9s select and use developmentally appropriate instructional practices, activities, and materials to improve student learning of the Technology Applications TEKS;
	5.10s use a variety of instructional strategies to ensure all students' reading comprehension of content-related texts, including helping students link the content of texts to their lives and connect related ideas across different texts;

Standard V. All teachers know how to plan, organize, deliver, and evaluate instruction for all students that incorporates the effective use of current technology for teaching and integrating the Technology Applications Texas Essential Knowledge and Skills (TEKS) into the curriculum.

	Application: What All Teachers Can Do
	Teachers of Students in Grades EC–12 (continued)
	5.11s teach students how to locate, retrieve, and retain content-related information from a range of texts and technologies;
	5.12s teach students how to locate the meanings and pronunciations of unfamiliar content-related words using appropriate sources, such as dictionaries, thesauruses, and glossaries;
	5.13s use technology tools to perform administrative tasks such as taking attendance, maintaining grade books, and facilitating communication;
	5.14s evaluate appropriately students' projects and portfolios using formal and informal assessment methods;
	5.15s collect observable and measurable data to gauge student progress and adjust instruction in Technology Applications;
	5.16s conduct an ongoing self-assessment of strengths and weaknesses in the knowledge and skills of Technology Applications;
	5.17s develop and implement an individual plan for professional growth in the knowledge and skills of Technology Applications; and
	5.18s incorporate new strategies to improve classroom instruction in Technology Applications.

Standard VI. The computer science teacher has the knowledge and skills needed to teach the Foundations, Information Acquisition, Work in Solving Problems, and Communication strands of the Technology Applications Texas Essential Knowledge and Skills (TEKS) in computer science, in addition to the content described in Technology Applications Standards I–V.

Teacher Knowledge: What Teachers of Computer Science Know	Application: What Teachers of Computer Science Can Do
Teachers of Students in Grades 8–12	*Teachers of Students in Grades 8–12*
The beginning teacher of computer science knows and understands:	The beginning teacher of computer science is able to:
Foundations	**Foundations**
6.1k the appropriate use of hardware components, software programs, and their connections;	6.1s use necessary vocabulary related to computer science;
	6.2s differentiate among properties of current programming languages, discuss the use of the languages in other fields of study, and demonstrate knowledge of specific programming terminology and concepts;
	6.3s differentiate among the levels of programming languages, including machine, assembly, high-level compiled, and interpreted languages;
	6.4s identify object-oriented data types and delineate the advantages/disadvantages of object data;
	6.5s demonstrate coding proficiency in contemporary programming languages, including an object-oriented language;
	6.6s survey the issues accompanying the development of large software systems, such as design/implementation teams, software validation/testing, and risk assessment;
6.2k data input skills appropriate to a given task;	
6.3k pertinent laws and issues regarding the use of technology in society;	6.7s investigate measures, such as passwords and virus detection/prevention, to protect computer systems and databases from unauthorized use and tampering;
	6.8s discuss the impact of computer programming on the World Wide Web (WWW) community;
	6.9s code modules for the WWW community;

Standard VI. The computer science teacher has the knowledge and skills needed to teach the Foundations, Information Acquisition, Work in Solving Problems, and Communication strands of the Technology Applications Texas Essential Knowledge and Skills (TEKS) in computer science, in addition to the content described in Technology Applications Standards I–V.

Teacher Knowledge: What Teachers of Computer Science Know	Application: What Teachers of Computer Science Can Do
Information Acquisition	**Information Acquisition**
6.4k a variety of strategies for acquiring information from electronic resources;	6.10s design and document sequential search algorithms for digital information storage and retrieval;
	6.11s construct searching algorithms, including linear and binary searches;
	6.12s construct sorting algorithms, including quadratic algorithms such as selection, bubble and insertion, and more efficient algorithms such as merge, shell, and quick sorts;
	6.13s compare and contrast searching and sorting algorithms for space and time requirements;
6.5k how to acquire electronic information in a variety of formats;	6.14s acquire information in and knowledge about a variety of electronic formats, including text, audio, video, and graphics;
	6.15s use a variety of resources, including foundation and enrichment curricula, together with various productivity tools to gather authentic data as a basis for individual and group programming projects;
6.6k how to evaluate acquired electronic information;	6.16s determine and employ methods to evaluate the design and functionality of information acquisition processes and algorithms, using effective coding, design, and test data;
	6.17s implement methods for the evaluation of acquired information using defined rubrics;

Standard VI. **The computer science teacher has the knowledge and skills needed to teach the Foundations, Information Acquisition, Work in Solving Problems, and Communication strands of the Technology Applications Texas Essential Knowledge and Skills (TEKS) in computer science, in addition to the content described in Technology Applications Standards I–V.**

Teacher Knowledge: What Teachers of Computer Science Know	**Application: What Teachers of Computer Science Can Do**
Work in Solving Problems	**Work in Solving Problems**
6.7k how to use appropriate computer-based productivity tools to create and modify solutions to problems;	6.18s apply problem-solving strategies such as design specifications, modular top-down design, step-wise refinement, and algorithm development;
	6.19s use visual organizers such as flowcharts and schematic drawings to design solutions to problems;
	6.20s develop sequential and iterative algorithms and code programs in prevailing computer languages to solve practical problems modeled from school and community;
	6.21s demonstrate effective use of predefined input and output procedures for lists of computer instructions, including procedures to protect from invalid input;
	6.22s develop coding with correct and efficient use of expressions and assignment statements, including the use of standard/user-defined functions, data structures, operators/proper operator precedence, and sequential/conditional/repetitive control structures;
	6.23s create and use libraries of generic modular code to be used for efficient programming;
	6.24s identify actual and formal parameters and use value and reference parameters;
	6.25s use control structures such as conditional statements and iterated, pretest, and post-test loops;
	6.26s use sequential, conditional, selection, and repetition execution control structures such as menu-driven programs that branch and allow user input;
	6.27s identify and use structured data types of one-dimensional arrays, records, and text files;

Application: What Teachers of Computer Science Can Do

Work in Solving Problems (Continued)

6.28s   use recursion appropriately and trace program design comparing invariant, iterative, and recursive algorithms;

6.29s   manipulate data structures using string processing;

6.30s   use notation for language definition, such as syntax diagrams and Backus-Naur forms;

6.31s   identify, describe, and use sequential/nonsequential files and multidimensional arrays and arrays of records;

6.32s   create robust programs with increased emphasis on design, style, clarity of expression, and documentation for ease of maintenance, program expansion, reliability, and validity;

6.33s   apply methods for computing iterative approximations and statistical algorithms;

6.34s   define and develop code using the concepts of abstract data types, including stacks, queues, linked lists, trees and graphs and incorporate the use of information hiding and encapsulation;

6.35s   identify and describe the correctness and complexity of algorithms, such as divide and conquer, backtracking, and greedy algorithms;

6.36s   develop software to solve a school or community problem such as customer relations, design, modular programming, documentation, validation, marketing, and support;

Teacher Knowledge: What Teachers of Computer Science Know	Application: What Teachers of Computer Science Can Do
Work in Solving Problems (Continued)	**Work in Solving Problems (Continued)**
	6.37s research advanced computer science concepts such as applied artificial intelligence, expert systems, robotics, depth-first/breadth-first and heuristic search strategies, multitasking operating systems, and computer architecture, such as reduced instruction set computer (RISC) and complex instruction set computer (CISC);
6.8k how to use research skills and electronic communication to create new knowledge;	6.38s participate with electronic communities as a learner, initiator, contributor, and teacher/mentor to solve problems in computer science;
	6.39s extend the learning environment beyond the classroom with digital products created to increase teaching and learning in the foundation and enrichment curricula via electronic networks;
	6.40s participate in relevant, meaningful activities in the larger community and society to create electronic projects;
6.9k how to use technology applications to facilitate evaluation of work, including both process and product;	6.41s design and implement procedures to track trends, set time lines, and review/evaluate programming progress for continual improvement in process and product;
	6.42s use correct programming style, such as spacing, indentation, descriptive identifiers, formatting, comments, and documentation, to enhance the readability and functionality of code;
	6.43s seek and respond to advice from colleagues and other professionals in delineating technological tasks related to computer programming;
	6.44s resolve information conflicts and validate information through accessing, researching, and comparing data;
	6.45s create technology specifications for tasks/evaluation rubrics and demonstrate that computer programming products/product quality can be evaluated against established criteria;

	Application: What Teachers of Computer Science Can Do
	Work in Solving Problems (Continued)
	6.46s demonstrate the ability to read and modify large programs, including the design description and process development;
	6.47s analyze algorithms using "big-O" notation and best, average, and worst-case space techniques;
	6.48s compare and contrast design methodologies including top-down and bottom-up;
	6.49s analyze models used in development of software, including software life cycle models, design objectives, documentation, and support;

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Teacher Knowledge: What Teachers of Computer Science Know	Application: What Teachers of Computer Science Can Do
Communication	**Communication**
6.10k how to format digital information for appropriate and effective communication;	6.50s create interactive documents using modeling, simulation, and hypertext;
6.11k how to deliver a product electronically in a variety of media; and	6.51s publish information in a variety of ways, including, but not limited to, software, Internet documents, and video;
6.12k how to evaluate communication in terms of both process and product.	6.52s write technology specifications for planning/evaluation rubrics documenting variables, prompts, and programming code internally and externally;
	6.53s seek and respond to advice from colleagues and other professionals in evaluating a programming product; and
	6.54s debug and solve problems using reference materials and effective strategies.

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