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**Business Technology Education: Computer Operating Systems and Hardware**

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**The Background:**

Curriculum standards are mandated by Rules, Regulations, and Minimum Standards of the State Board of Education (Section 0520-1-3-.05, Requirement D). The Business Technology Education standards included with this submission are consistent with the national standards and recommendations from business representatives.

The submission of the standards for Computer Operating Systems and Hardware for Business Technology Education will align the Business Technology Education course (currently named Computer Operating Systems) with the previously approved Trade & Industrial Education course of the same name. Additionally, it will align the course title to the same name, Computer Operating Systems and Hardware.

**The Recommendation:**

The Division of Vocational-Technical Education in the State Department of Education recommends the adoption of the standards for Computer Operating Systems and Hardware in the area of Business Technology Education on final reading. The SBE staff concurs with this recommendation.

# Computer Operating Systems and Hardware

Draft 1/03/06

This course is designed to prepare students with work-related skills and for certification in the computer service technician career path. Content provides students the opportunity to acquire knowledge and skill in both theory and practical applications pertaining to troubleshooting, replacing, installing, and upgrading computers. Procedures used in the course may be hardware oriented, software oriented, or programming oriented procedures. Upon completion of the course students will possess a thorough knowledge of modern personal computer hardware and software structure and be able to take the A + Certification exam.

*It is strongly recommended that administration and guidance follow the scope and sequence and course recommendations as listed.*

**Recommended Prerequisite:** Information Technology Foundations

**Recommended Prerequisite or Current with:** Algebra I or Math for Technology II,  
Information Technology Foundations

**Recommended Credits:** 1-2 credits  
1 credit 1-9 standards  
2 credits 10-13 standards

**Grade Level:** 10, 11

# **Computer Operating Systems and Hardware**

**Draft 1/03/06**

## **Standard 1.0**

**Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.**

## **Standard 2.0**

**Student will demonstrate an understanding of basic electronic theory and learn to use basic electrical measuring equipment.**

## **Standard 3.0**

**Students will be able to make, verify, and troubleshoot electrical connections of a computer system.**

## **Standard 4.0**

**Students will perform the necessary steps to identify, install, configure, and upgrade personal computer modules and peripherals.**

## **Standard 5.0**

**Students will perform diagnostic operations of hardware and software.**

## **Standard 6.0**

**Students will demonstrate knowledge of safety and preventive maintenance skills.**

## **Standard 7.0**

**Students will analyze specific terminology, facts, ways, and means of dealing with classifications, categories, and principles of motherboards, processors, and memory in microcomputer systems.**

## **Standard 8.0**

**Students will research printer types, concepts, and components.**

## **Standard 9.0**

**Students will analyze network concepts and terminology.**

## **Standard 10.0**

**Students will analyze underlying DOS (Command prompt functions) in current and emerging operating systems in terms of its functions and structure.**

## **Standard 11.0**

**Students will install, configure and upgrade current and emerging software systems.**

## **Standard 12.0**

**Students will diagnose and troubleshoot common problems relating to current and emerging software systems.**

**Standard 13.0**

**Students will evaluate basic concepts relating to Internet access and generic procedures for system setup.**

## Course Description

*Computer Operating Systems and Hardware* is designed to prepare students with work-related skills and for certification in the computer service technician career path. Content provides students the opportunity to acquire knowledge and skill in both theory and practical applications pertaining to troubleshooting, replacing, installing, and upgrading computers. Procedures used in the course may be hardware oriented, software oriented, or programming oriented procedures. Upon completion of the course students will possess a thorough knowledge of modern personal computer hardware and software structure and be able to take the A + Certification exam. (*This course requires appropriate hardware, peripherals, and software*).

## Standard 1.0

**Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.**

## Learning Expectations

### The student will:

- 1.1 Exhibit positive leadership skills.
- 1.2 Participate in Business Professionals of America (BPA), Future Business Leaders of America (FBLA), or SkillsUSA as an integral part of classroom instruction.
- 1.3 Assess situations and apply problem-solving and decision-making skills to particular client relations in the community and workplace.
- 1.4 Demonstrate the ability to work cooperatively with others in a professional setting.

## Student Performance Standards: Evidence Standard Is Met

### The student:

- 1.1 Demonstrates character, leadership, and integrity using creative and critical-thinking.
- 1.2A Applies the points of the creed to personal and professional situations.
- 1.2B Participates and conducts meetings and other business according to accepted rules of parliamentary procedure.
- 1.3 Analyzes situations in the workplace and uses problem-solving techniques to solve the problem.
- 1.4A Participates in a community service project.
- 1.4B Assists with an officer campaign with Tennessee BPA, FBLA, or SkillsUSA.

## Sample Performance Tasks

- ✚ Create a leadership inventory and use it to conduct a personal assessment.
- ✚ Participate in various BPA, FBLA, or SkillsUSA programs and/or competitive events.
- ✚ Evaluate an activity within the school, community, and/or workplace and effects of the project.
- ✚ Implement an annual program of work.
- ✚ Prepare a meeting agenda for a BPA, FBLA, or SkillsUSA monthly meeting.
- ✚ Attend a professional organization meeting.
- ✚ Participate in the BPA Torch Award, FBLA Future, Business, Leader and/or America Award or American Spirit Award competition with SkillsUSA.

## Integration Linkages

*SCANS (The Secretary's Commission on Achieving Necessary Skills)*, National Standards for Business Education, Policy Commission for Business and Economic Education, Business Professionals of America, Future Business Leaders of America, Delta Pi Epsilon, Industry Standards, Business Finance, Mathematics, Computer Science and Language Arts, SkillsUSA, *Professional Development Program*, SkillsUSA, Communications and Writing Skills, Teambuilding Skills, Research, Language Arts, Sociology, Psychology, Math, Technical Math, Applied Communications, Social Studies, Problem Solving, Interpersonal Skills, Employability Skills, Critical-Thinking Skills, Chamber of Commerce, Colleges, Universities, Technology Centers, and Employment Agencies

## Standard 2.0

**Student will demonstrate an understanding of basic electronic theory and learn to use basic electrical measuring equipment.**

### Learning Expectations

#### The student will:






- 2.1 Define the relationship given by Ohm's Law.
- 2.2 Define the relationship given by the formula for electric power.
- 2.3 Describe the significant differences between alternating current (AC) and direct current (DC).
- 2.4 Define the relationship between the individual resistances in a circuit and the total resistance.
- 2.5 Measure voltages, current, and resistance using a digital multi-meter (DMM).
- 2.6 Demonstrate proper soldering techniques.

### Student Performance Standards: Evidence Standard Is Met

#### The student:

- 2.1 Given two of the three quantities found in Ohm's Law, calculates the third.
- 2.2 Given the voltage and current of a circuit, calculates the power being consumed.
- 2.3 Distinguishes between an oscilloscope trace of an AC versus DC signal.
- 2.4A Calculates the total resistance in a circuit of resistors connected in series.
- 2.4B Calculates total resistance in a circuit of resistors connected in parallel.
- 2.5A Measures the voltages and current from a computer power supply.
- 2.5B Measures the resistance of a circuit consisting of resistors wired in series or parallel.
- 2.6 Solders two components together.

### Sample Performance Task

-  Calculate the resistance of a DC circuit, with a given or measured DC voltage and current.
-  Calculate the power being provided by a power supply.
-  Identify the occurrences of AC and DC in the typical desktop computer.
-  Measure input and output voltages from a computer power supply.
-  Solder together an LED and resistor that can be tested with a 9-VDC battery.

## Integration Linkages

SCANS (*The Secretary's Commission on Achieving Necessary Skills*), National Standards for Business Education, Policy Commission for Business and Economic Education, Business Professionals of America, Future Business Leaders of America, Delta Pi Epsilon, Industry Standards, Business Finance, Mathematics, Computer Science and Language Arts, Computer Skills, Internet Navigation Skills, Protocols, Language Arts, Foreign Language, Science, Math, Technical Math, Social Studies, History, Government, Law, Electricity, Electronics, Criminal Justice, Research and Writing Skills, Communication Skills, Teamwork Skills, Leadership Skills SkillsUSA, CompTia, World Wide Web Consortium (W3C), Writers Guild (HWG), A+ Certification

## Standard 3.0

**Students will be able to make, verify, and troubleshoot electrical connections of a computer system.**

### Learning Expectations

#### The student will:




- 3.1 Make, verify, and troubleshoot connections of a computer power supply.
- 3.2 Make, verify, and troubleshoot connections of multimedia components in a computer system.
- 3.3 Make, verify, and troubleshoot connections of data cables in a computer system (e.g., drives, network, USB, serial, printer).
- 3.4 Make, verify, and troubleshoot connections of video cables in a computer system.

### Student Performance Standards: Evidence Standard Is Met

#### The student:

- 3.1A Connects 110V to a power supply.
- 3.1B Connects DC power cables to the motherboard and to the drives in a computer system.
- 3.1C Identifies and replaces a defective power supply in a computer system.
- 3.2A Connects audio and video cables between multimedia devices (e.g., CD-drive, DVD drive, sound card, speakers, microphones, web cams, DV camcorder).
- 3.2B Recognizes and remedies video and audio connection problems.
- 3.3A Connects data drive cables to motherboard and other I/O devices.
- 3.3B Connects communications cables to the computer system (e.g., network card, modem).
- 3.3C Connects peripheral devices to the computer system (e.g., printer, scanner, mouse, keyboard).
- 3.4A Connects video monitor cables to the computer system.
- 3.4B Connects 110V to a video monitor.

### Sample Performance Tasks

-  Reconnect cables following a motherboard change.
-  Reconnect all peripheral components to a computer system.
-  Replace a power supply in a computer system.

## Integration/Linkages

SCANS (*The Secretary's Commission on Achieving Necessary Skills*), National Standards for Business Education, Policy Commission for Business and Economic Education, Business Professionals of America, Future Business Leaders of America, Delta Pi Epsilon, Industry Standards, Business Finance, Mathematics, Computer Science and Language Arts, Computer Skills, Internet Navigation Skills, Protocols, Foreign Language, Science, Math, Technical Math, Social Studies, History, Government, Law, Electricity, Electronics, Criminal Justice, Research and Writing Skills, Communication Skills, Teamwork Skills, Leadership Skills, Secretary's Commission on Achieving Necessary Skills (SCANS), SkillsUSA, CompTia, World Wide Web Consortium (W3C), Writers Guild (HWG), A+ Certification

## Standard 4.0

**Students will perform the necessary steps to identify, install, configure, and upgrade personal computer modules and peripherals.**

### Learning Expectation

#### The student will:

- 4.1 Comprehend terms, concepts, and functions of system modules.
- 4.2 Demonstrate basic procedures for adding and removing field replaceable modules for both desktop and portable systems.
- 4.3 Identify available IRQ, Direct Memory Access (DMA), and I/O addresses and procedures for device installation and configuration.
- 4.4 Evaluate common peripheral ports, associated cabling, and connectors.
- 4.5 Analyze proper procedures for installing and configuring IDE/EIDE devices.
- 4.6 Evaluate proper procedures for installing and configuring small computer system interface (SCSI) devices.
- 4.7 Evaluate procedures for installing and configuring peripheral devices.
- 4.8 Explore hardware methods of upgrading system performance, procedures for replacing basic subsystem components, unique components and when to use them.

### Student Performance Standards: Evidence Standard Is Met

#### The student:

- 4.1 Discusses concepts and functions of system modules using correct technical terminology.
- 4.2A Performs procedures for adding modules to computers.
- 4.2B Performs procedures for removing field replacements modules from computers.
- 4.3A Follows rules for IRQ setup and use in a system.
- 4.3B Creates and runs background applications.
- 4.3C Activates DMA channels.
- 4.3D Defines the I/O address and interrupts for multiple occurrences of devices in use today.
- 4.4A Demonstrates and reads a voltmeter to perform tests of power supply.
- 4.4B Inspects cabling and connectors.
- 4.5 Installs and configures IDE/EIDE devices.
- 4.6 Comprehends SCSI chains, IDs, and terminations.
- 4.7 Installs and configures peripheral devices.
- 4.8A Demonstrates methods of upgrading system performance.
- 4.8B Demonstrates when and how to use unique components in system performance.

## Sample Performance Task

- ✚ Establish procedures for system assembly and disassembly of field replaceable modules.
- ✚ Evaluate modules during normal operation and during the boot process.
- ✚ Access memory without using CPU.
- ✚ Explain bus-mastering devices.
- ✚ Conduct power supply tests.
- ✚ Perform basic SCSI repair techniques.
- ✚ Research cost of upgrading system performance.
- ✚ Install and demonstrate unique components.

## Integration Linkages

SCANS (*The Secretary's Commission on Achieving Necessary Skills*), National Standards for Business Education, Policy Commission for Business and Economic Education, Business Professionals of America, Future Business Leaders of America, Delta Pi Epsilon, Industry Standards, Business Finance, Mathematics, Computer Science and Language Arts, Computer Skills, Internet Navigation Skills, Protocols, Foreign Language, Science, Math, Technical Math, Social Studies, History, Government, Law, Electricity, Electronics, Criminal Justice, Research and Writing Skills, Communication Skills, Teamwork Skills, Leadership Skills, SkillsUSA, CompTia, World Wide Web Consortium (W3C), Writers Guild (HWG), A + Certification

## Standard 5.0

Students will perform diagnostic operations of hardware and software.

### Learning Expectation

#### The student will:



- 5.1 Research common symptoms and problems associated with each module.
- 5.2 Evaluate troubleshooting procedures.
- 5.3 Elicit problem symptoms from customers.

### Student Performance Standards: Evidence Standard Is Met

#### The student:

- 5.1A Investigates symptoms relating to common problems.
- 5.1B Troubleshoots and isolates problems associated with various modules.
- 5.2A Performs needed repairs indicated by inspection and testing.
- 5.2B Implements strategic diagnostic procedure by verifying the complaint, defining the problem, isolating the problem, validating the problem, making repairs, and testing the repairs.
- 5.3A Communicates with clients to determine symptoms and verifies problems.
- 5.3B Performs needed service or repair indicated by client consultation, inspection, and testing.

### Sample Performance Task

-  Diagnose a customer complaint.
-  Using scenarios, follow strategy-based diagnostic procedure to verify the complaint, define the problem, isolate the problem, validate the problem, make the repair, and test the repair. Complete a repair order using technical writing skills and calculate salary earnings based on the repair order description and manufacturer allowances for each item on the work order. Calculate manufacturer labor operation time used in the diagnostic process.

### Integration Linkages

SCANS (*The Secretary's Commission on Achieving Necessary Skills*), National Standards for Business Education, Policy Commission for Business and Economic Education, Business Professionals of America, Future Business Leaders of America, Delta Pi Epsilon, Industry Standards, Business Finance, Mathematics, Computer Science and Language Arts, Computer Skills, Internet Navigation Skills, Protocols, Foreign Language, Science, Math, Technical Math, Social Studies, History, Government, Law, Electricity, Electronics, Criminal Justice, Research and Writing Skills, Communication Skills, Teamwork Skills, Leadership Skills, SkillsUSA, CompTia, World Wide Web Consortium (W3C), Writers Guild (HWG), A + Certification

## Standard 6.0

**Students will demonstrate knowledge of safety and preventive maintenance skills.**

### Learning Expectation

#### The student will:





- 6.1 Research the purpose of various types of preventive maintenance products and procedures.
- 6.2 Research issues, procedures and devices for protection within the computing environment, including people, hardware and the surrounding workspace.
- 6.3 Evaluate potential hazards to personnel and equipment when working with lasers, high voltage equipment, ESD, and items that require special disposal procedures.

### Student Performance Standards: Evidence Standard Is Met

#### The student:

- 6.1 Demonstrates preventive maintenance procedures and precautions when working on microcomputer systems.
- 6.2 Implements a safe working environment.
- 6.3A Avoids electrostatic discharge.
- 6.3B Researches environmental guidelines for disposal procedures for items.

### Sample Performance Task

-  Research and develop a presentation showing the effects of electrostatic discharge.
-  Present information on how to prevent damage to individuals, equipment and environment by electrostatic discharge and present to school and community audiences.
-  Develop a check list for evaluation of a safe working environment.
-  Develop a check list on proper disposal of equipment and items.

### Integration Linkages

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## Standard 7.0

Students will analyze specific terminology, facts, ways, and means of dealing with classifications, categories, and principles of motherboards, processors, and memory in microcomputer systems.

### Learning Expectation

#### The student will:







- 7.1 Distinguish between the popular CPU chips in terms of their basic characteristics.
- 7.2 Evaluate the categories of RAM (Random Access Memory) terminology, their locations, and physical characteristics.
- 7.3 Analyze the most popular type of motherboards, their components, and their architecture bus structures and power supplies.
- 7.4 Evaluate the purpose of CMOS (Complementary Metal-Oxide Semiconductor), what it contains, and how to change basic parameters.

### Student Performance Standards: Evidence Standard Is Met

#### The student:

- 7.1 Selects CPU chips for specific functions.
- 7.2 Evaluates different types of RAM packaging.
- 7.3A Comprehends the motherboard's form factor.
- 7.3B Comprehends procedures necessary to remove and replace a motherboard.
- 7.4A Configures and maintains CMOS properly.
- 7.4B Evaluates common reasons for losing CMOS data.

### Sample Performance Task

-  Install RAM properly.
-  Discuss RAM access speed.
-  Access and update data on the CMOS chip.
-  Using CPU Soft menu, set the voltage and multiplier settings on the motherboard for the CPU.
-  Develop a plan of action to prevent losing CMOS data.
-  Develop a check list to assist in adding or replacing a motherboard.

## Integration Linkages

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## Standard 8.0

Students will research printer types, concepts, and components.

### Learning Expectation

#### The student will:





- 8.1 Research basic concepts, printer operations, and printer components.
- 8.2 Analyze care and service techniques for primary printer types.
- 8.3 Evaluate common problems associated with primary printer types.

### Student Performance Standards: Evidence Standard Is Met

#### The student:

- 8.1 Demonstrates an understanding of printer operations and printer components.
- 8.2 Demonstrates proper maintenance and service techniques for each printer type.
- 8.3 Displays a proper approach toward troubleshooting printer problems.

### Sample Performance Task

-  Diagnose common printer problem.
-  Discuss printer operations.
-  Identify common printer components.
-  Perform preventative maintenance for each primary printer type.

### Integration Linkages

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## Standard 9.0

Students will analyze network concepts and terminology.

### Learning Expectation

#### The student will:




- 9.1 Identify basic networking concepts, including how a network works and the ramifications of repairs on the network.

### Student Performance Standards: Evidence Standard Is Met

#### The student:

- 9.1A Evaluates basic networking components.
- 9.1B Demonstrates difference between network topologies.
- 9.1C Examines different ways to network a PC.

### Sample Performance Task

-  Properly install an NIC (Network Interface Card).
-  Discuss difference between full and half duplex communications.
-  Correctly identify coaxial, twisted-pair, and fiber-optic cabling.

### Integration Linkages

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## Standard 10.0

**Students will analyze underlying DOS (Command prompt functions) in current and emerging operating systems in terms of its functions and structure.**

### Learning Expectation







#### The student will:

- 10.1 Compare the following operating system's functions, structure, and major system files to navigate the operating system and get to needed technical information such as:
  - Windows
  - Linux
  - Command Prompt Procedures (Command syntax)
- 10.2 Analyze basic concepts and procedures for creating, viewing and managing files, directories and disks. This includes procedures for changing file attributes and the ramifications of those changes (for example, security issues).

### Sample Performance Task

- 10.1A Navigates all file system structure and Command Prompt Procedures.
- 10.1B Compares and contrasts the difference between the NTFS file system and the FAT or DOS file system.
- 10.2A Demonstrates the ability to create, copy, paste, move, and manage files and directories.
- 10.2B Demonstrates the ability to change file attributes.
- 10.2C Discusses the benefits and disadvantages of each file attribute.
- 10.2D Demonstrates the ability to perform security operating systems.

### Sample Performance Task

-  Use Windows Explorer to navigate the Windows files system.
-  Use the Command Prompt to navigate the DOS file system.
-  Use Windows Explorer to copy, paste, cut, and move files on a disk.
-  Use the Command Prompt to copy, paste, cut, and move files on a disk.
-  Use Windows Explorer to change file attributes.
-  Use the Command Prompt to change file attributes.

### Integration Linkages

SCANS (*The Secretary's Commission on Achieving Necessary Skills*), National Standards for Business Education, Policy Commission for Business and Economic Education, Business Professionals of America, Future Business Leaders of America, Delta Pi Epsilon, Industry Standards, Business Finance, Mathematics, Computer Science and Language Arts, Computer Skills, Internet Navigation Skills, Protocols, Foreign Language, Science, Math, Technical Math, Social Studies, History, Government, Law, Electricity, Electronics, Criminal

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Justice, Research and Writing Skills, Communication Skills, Teamwork Skills, Leadership Skills, SkillsUSA, CompTia, World Wide Web Consortium (W3C), Writers Guild (HWG), A + Certification

## Standard 11.0

Students will install, configure, and upgrade current and emerging operating systems.

### Learning Expectation

#### The student will:

- 11.1 Demonstrate procedures for installing operating systems to bring the software to a basic operational level.
- 11.2 Demonstrate steps to perform an operating system upgrade.
- 11.3 Perform basic system boot sequences and boot methods, including the steps to create an emergency boot disk with utilities installed for each operating system version.
- 11.4 Demonstrate procedures for loading, adding, and configuring application device drivers, and necessary software for certain devices.





### Learning Expectation

#### The student will:

- 11.1 Demonstrates the ability to install successfully the operating system onto the PC's hard disk.
- 11.2 Performs an operating system upgrade.
- 11.3A Comprehends and discusses each operating system's boot sequences.
- 11.3B Creates a bootable emergency restore disk for each operating system version.
- 11.4 Locates, installs, and configures the necessary application device drivers for the PC's installed hardware.

### Student Performance Standards: Evidence Standard Is Met

#### The student:

-  Partition and format the hard disk; then, install the operating system on the PC's hard disk.
-  Perform an operating system service pack; install and upgrade the operating system to the next generation operating system.
-  Create an emergency boot disk with utilities installed for each operating system version.
-  Locate, install, and configure the necessary application device drivers for a system.

### Integration Linkages

SCANS (*The Secretary's Commission on Achieving Necessary Skills*), National Standards for Business Education, Policy Commission for Business and Economic Education, Business Professionals of America, Future Business Leaders of America, Delta Pi Epsilon, Industry Standards, Business Finance, Mathematics, Computer Science and Language Arts, Computer Skills, Internet

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Navigation Skills, Protocols, Foreign Language, Science, Math, Technical Math, Social Studies, History, Government, Law, Electricity, Electronics, Criminal Justice, Research and Writing Skills, Communication Skills, Teamwork Skills, Leadership Skills, SkillsUSA, CompTia, World Wide Web Consortium (W3C), Writers Guild (HWG), A + Certification

## Standard 12.0

**Students will diagnose and troubleshoot common problems relating to current and emerging operating systems.**

### Learning Expectation

#### The student will:






- 12.1 Recognize and interpret the meaning of common error codes and startup messages from the boot sequence, and identify steps to correct the problems.
- 12.2 Analyze common problems and determine how to resolve them.

### Student Performance Standards: Evidence Standard Is Met

#### The student:

- 12.1 Demonstrates the ability to evaluate correctly common error codes and perform the necessary steps to identify and correct the problem.
- 12.2 Demonstrates the ability to troubleshoot common problems related to the PC and determines how resolve the problem.

### Sample Performance Task

-  Identify common BIOS error codes.
-  Identify common BIOS error messages.
-  Identify common system errors.
-  Troubleshoot common PC system errors.
-  Repair common PC errors.

### Integration Linkages

SCANS (*The Secretary's Commission on Achieving Necessary Skills*), National Standards for Business Education, Policy Commission for Business and Economic Education, Business Professionals of America, Future Business Leaders of America, Delta Pi Epsilon, Industry Standards, Business Finance, Mathematics, Computer Science and Language Arts, Computer Skills, Internet Navigation Skills, Protocols, Foreign Language, Science, Math, Technical Math, Social Studies, History, Government, Law, Electricity, Electronics, Criminal Justice, Research and Writing Skills, Communication Skills, Teamwork Skills, Leadership Skills, SkillsUSA, CompTia, World Wide Web Consortium (W3C), Writers Guild (HWG), A + Certification

## Standard 13.0

Students will evaluate basic concepts relating to Internet access and generic procedures for system setup.

### Learning Expectation

#### The student will:





- 13.1 Identify the networking capabilities of operating system software including procedures for connecting to the network.
- 13.2 Identify concepts and capabilities relating to the Internet and basic procedures for setting up a system for Internet access.

### Student Performance Standards: Evidence Standard Is Met

#### The student:

- 13.1 Comprehends installation and configuration of network protocols, clients, and services.
- 13.2A Applies Internet terminology, connection types, and their related speeds to set-up of a system for Internet access.
- 13.2B Configures a dial-up connection.
- 13.2C Configures other types of Internet connections.

### Sample Performance Task

-  Install and configure network protocols, clients, and services.
-  Demonstrate configuration of file and printer sharing, as well as other shared network resources.
-  Configure dial-up connection.
-  Install and configure browsers.

### Integration Linkages

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