



TEXES | Texas Examinations of Educator Standards

Preparation Manual



Copyright © 2006 by the Texas Education Agency (TEA). All rights reserved. The Texas Education Agency logo and TEA are registered trademarks of the Texas Education Agency. Texas Examinations of Educator Standards, TExES, and the TExES logo are trademarks of the Texas Education Agency.

This publication has been produced for the Texas Education Agency (TEA) by ETS. ETS is under contract to the Texas Education Agency to administer the Texas Examinations of Educator Standards (TExES) program and the Certification of Educators in Texas (ExCET) program. The TExES program and the Examination for the Certification of Educators in Texas (ExCET) program are administered under the authority of the Texas Education Agency; regulations and standards governing the program are subject to change at the discretion of the Texas Education Agency. The Texas Education Agency and

ETS do not discriminate on the basis of race, color, national origin, sex, religion, age, or disability in the administration of the testing program or the provision of related services.

PREFACE

The State Board for Educator Certification (SBEC) has developed new standards for Texas educators that delineate what the beginning educator should know and be able to do. These standards, which are based on the state-required curriculum for students—the Texas Essential Knowledge and Skills (TEKS)—form the basis for new Texas Examinations of Educator Standards (TExES™). This initiative will impact all areas of Texas education—from the more than 100 approved Texas educator preparation programs to the more than 7,000 Texas school campuses. This standards-based system reflects the SBEC's commitment to help align Texas education from kindergarten through college. The SBEC's role in this K–16 initiative will ensure that newly certified Texas teachers have the essential knowledge and skills to teach the TEKS to the state's public school students.

This manual is designed to help examinees prepare for the new TExES test in this field. Its purpose is to familiarize examinees with the competencies to be tested, test item formats, and pertinent study resources. Educator preparation program staff may also find this information useful as they help examinees prepare for careers as Texas educators.

If you have any questions after reading this preparation manual or you would like additional information about the new TExES tests or the educator standards, please visit the SBEC Web site at www.sbec.state.tx.us.

KEY FEATURES OF THE MANUAL

List of competencies that will be tested

Strategies for answering test questions

Sample test items and answer key

TABLE OF CONTENTS

SECTION I	THE NEW TExES TESTS FOR TEXAS TEACHERS	1
	Development of the New TExES Tests Taking the TExES Test and Receiving Scores Educator Standards	
SECTION II	USING THE TEST FRAMEWORK	5
	Organization of the TExES Test Framework Studying for the TExES Test Test Framework (Including Proportions of Each Domain)	
SECTION III	APPROACHES TO ANSWERING MULTIPLE-CHOICE ITEMS	23
	Item Formats —Single Items —Items With Stimulus Material	
SECTION IV	SAMPLE ITEMS	29
	Sample Items Answer Key	
SECTION V	PREPARATION RESOURCES	39
	Journals Other Sources Online Resources State-Adopted Instructional Materials	

SECTION I

THE NEW TExES TESTS FOR TEXAS TEACHERS

As required by the Texas Education Code §21.048, successful performance on educator certification examinations is required for the issuance of a Texas educator certificate. Each TExES test is a criterion-referenced examination designed to measure the knowledge and skills delineated in the corresponding TExES test framework. Each test framework is based on standards that were developed by Texas educators and other education stakeholders.

Each newly developed TExES test is designed to measure the requisite knowledge and skills that an entry-level educator in this field in Texas public schools must possess. The tests may include both individual, or stand-alone, test items (questions) and items that are arranged in clustered sets based on real-world situations faced by educators.

Development of the New TExES Tests

Committees of Texas educators and interested citizens guide the development of the new TExES tests by participating in each stage of the test development process. These working committees are comprised of Texas educators from public and charter schools, faculty from educator preparation programs, education service center staff, representatives from professional educator organizations, content experts, and members of the business community. The committees are balanced in terms of position, affiliation, years of experience, ethnicity, gender, and geographical location. The committee membership is rotated during the development process so that numerous Texas stakeholders may be actively involved. The steps in the process to develop the TExES tests are described below.

1. **Develop Standards.** Committees are convened to recommend what the beginning educator should know and be able to do. To ensure vertical alignment of standards across the range of instructional levels, individuals with expertise in early childhood, elementary, middle, or high school education meet jointly to articulate the critical knowledge and skills for a particular content area. Participants begin their dialogue using a "clean slate" approach with the Texas Essential Knowledge and Skills (TEKS) as the focal point. Draft standards are written to incorporate the TEKS and to expand upon that content to ensure that all beginning educators possess the appropriate level of both knowledge and skills to instruct students successfully.
2. **Review Standards.** Committees review and revise the draft standards. The revised draft standards are then placed on the SBEC Web site for public review and comment. These comments are used to prepare a final draft of the standards that will be presented to the SBEC Board for discussion, the State Board of Education (SBOE) for review and comment, and the SBEC Board for approval. Standards not based specifically on the TEKS, such as those for librarians and counselors, are proposed as rule by the SBEC Board; sent to the SBOE for its 90-day review; and, if not rejected by the SBOE, adopted by the SBEC Board.
3. **Develop Test Frameworks.** Committees review draft test frameworks that are based on the standards. These frameworks outline the specific competencies to be measured on the new TExES tests. The TExES competencies represent the critical components of the standards that can be measured with either a pencil-and-paper-based or computer-based examination, as appropriate. Draft frameworks are not finalized until after the standards are approved and the job analysis/content validation survey (see #4) is complete.

4. **Conduct Job Analysis/Content Validation Surveys.** A representative sample of Texas educators who practice in or prepare individuals for each of the fields for which an educator certificate has been proposed are surveyed to determine the relative job importance of each competency outlined in the test framework for that content area. Frameworks are revised as needed following an analysis of the survey responses.
5. **Develop and Review New Test Items.** The test contractor develops draft items that are designed to measure the competencies described in the test framework. Committees review the newly developed test items that have been written to reflect the competencies in the new test frameworks. Committee members scrutinize the draft items for appropriateness of content and difficulty; clarity; match to the competencies; and potential ethnic, gender, and regional bias.
6. **Conduct Pilot Test of New Test Items.** All of the newly developed test items that have been deemed acceptable by the item review committees are then administered to an appropriate sample of candidates for certification.
7. **Review Pilot Test Data.** Pilot test results are reviewed to ensure that the test items are valid, reliable, and free from bias.
8. **Administer New TExES Tests.** New TExES tests are constructed to reflect the competencies, and the tests are administered to candidates for certification.
9. **Set Passing Standard.** A Standard Setting Committee convenes to review performance data from the initial administration of each new TExES test and to recommend a final passing standard for that test. The SBEC considers this recommendation as it establishes a passing score on the test.

Taking the TExES Test and Receiving Scores

Please refer to the current TExES registration bulletin for information on test dates, sites, fees, registration procedures, and policies.

You will be mailed a score report approximately four weeks after each test you take. The report will indicate whether you have passed the test and will include:

- a total test *scaled* score. Scaled scores are reported to allow for the comparison of scores on the same content-area test taken on different test administration dates. The total scaled score is not the percentage of items answered correctly and is not determined by averaging the number of questions answered correctly in each domain.
 - For all TExES tests, the score scale is 100–300 with a scaled score of 240 as the minimum passing score. This score represents the minimum level of competency required to be an entry-level educator in this field in Texas public schools.
- your performance in the major content domains of the test and in the specific content competencies of the test.
 - This information may be useful in identifying strengths and weaknesses in your content preparation and can be used for further study or for preparing to retake the test.
- information to help you understand the score scale and interpret your results.

You will not receive a score report if you are absent or choose to cancel your score.

Additionally, unofficial score report information will be posted on the Internet on the score report mailing date of each test administration. Information about receiving unofficial scores via the Internet, the score scale, and other score report topics may be found on the SBEC Web site at www.sbec.state.tx.us.

Educator Standards

Complete, approved educator standards are posted on the SBEC Web site at www.sbec.state.tx.us.

SECTION II

USING THE TEST FRAMEWORK

The Texas Examination of Educator Standards (TExES) test measures the content knowledge required of an entry-level educator in this field in Texas public schools. This manual is designed to guide your preparation by helping you become familiar with the material to be covered on the test.

When preparing for this test, you should focus on the competencies and descriptive statements, which delineate the content that is eligible for testing. A portion of the content is represented in the sample items that are included in this manual. These test questions represent only a *sample* of items. Thus, your test preparation should focus on the complete content eligible for testing, as specified in the competencies and descriptive statements.

Organization of the TExES Test Framework

The test framework is based on the educator standards for this field.

The content covered by this test is organized into broad areas of content called domains. Each domain covers one or more of the educator standards for this field. Within each domain, the content is further defined by a set of competencies. Each competency is composed of two major parts:

1. the *competency statement*, which broadly defines what an entry-level educator in this field in Texas public schools should know and be able to do, and
2. the *descriptive statements*, which describe in greater detail the knowledge and skills eligible for testing.

The educator standards being assessed within each domain are listed for reference at the beginning of the test framework, which begins on page 8. These are then followed by a complete set of the framework's competencies and descriptive statements.

An example of a competency and its accompanying descriptive statements is provided on the next page.

Sample Competency and Descriptive Statements

Technology Applications 8–12

Competency:

The Technology Applications teacher knows technology terminology and concepts; the appropriate use of hardware, software, and digital files; and how to acquire, analyze, and evaluate digital information.

Descriptive Statements:

The beginning teacher:

- Knows technology terminology and concepts.
- Knows the appropriate use of hardware components (e.g., input, processing, output, primary/secondary storage devices), operating systems, software applications, and networking components.
- Knows how to select, connect, and use a variety of input, output, and storage devices and peripherals (e.g., scanner, voice/sound recorders, touch screen, digital camera, printer).
- Knows how to evaluate software (e.g., graphics, animation, multimedia, video, Web authoring) for quality, appropriateness, effectiveness, and efficiency and how to make decisions regarding its proper acquisition and use.
- Knows how to perform basic application functions (e.g., opening an application program; creating, modifying, saving, and printing documents) and how to access, manage, and manipulate information from secondary storage devices.
- Knows strategies for acquiring information from electronic resources (e.g., encyclopedias, databases, libraries of images, reference software, Internet).
- Knows search strategies (e.g., keyword, Boolean, natural language) for locating and retrieving information in electronic formats (e.g., text, audio, video, graphics).
- Knows how to assess the accuracy and validity of acquired information.
- Knows how to resolve information conflicts through research and comparison of data from multiple sources.
- Demonstrates knowledge of the ethical acquisition (e.g., citing sources using established methods) and acceptable vs. unacceptable use of information (e.g., privacy, hacking, piracy, vandalism, viruses, current laws and regulations).
- Demonstrates knowledge of intellectual property rights and related issues (e.g., copyright laws, fair use, patents, trademarks) when using, manipulating, and editing electronic data.
- Knows how to use online help and other support documentation.
- Knows how to use technical-writing strategies to develop documentation for a variety of communication products.
- Demonstrates knowledge of the impact of Technology Applications on society and the importance of technology to future careers, lifelong learning, and daily living for individuals of all ages.

Studying for the TExES Test

The following steps may be helpful in preparing for the TExES test.

1. Identify the information the test will cover by reading through the test competencies (see the following pages in this section). *Within each domain* of this TExES test, each competency will receive approximately equal coverage.
2. Read each competency with its descriptive statements in order to get a more specific idea of the knowledge you will be required to demonstrate on the test. You may wish to use this review of the competencies to set priorities for your study time.
3. Review the "Preparation Resources" section of this manual for possible resources to consult. Also, compile key materials from your preparation coursework that are aligned with the competencies.
4. Study this manual for approaches to taking the TExES test.
5. When using resources, concentrate on the key ideas and important concepts that are discussed in the competencies and descriptive statements.

NOTE: This preparation manual is the only TExES test study material endorsed by the SBEC for this field. Other preparation materials may not accurately reflect the content of the test or the policies and procedures of the TExES program.

TEST FRAMEWORK FOR FIELD 139: TECHNOLOGY APPLICATIONS 8–12

Domain I Technology Applications Core (approximately 20% of the test)

Standards Assessed:

Technology Applications 8–12 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.

Technology Applications 8–12 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.

Technology Applications 8–12 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.

Technology Applications 8–12 Standard IV:

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

Technology Applications 8–12 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.

Domain II Digital Graphics/Animation and Desktop Publishing (approximately 30% of the test)

Standards Assessed:

Technology Applications 8–12 Standard VII:

The desktop publishing 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 desktop publishing, in addition to the content described in Technology Applications Standards I–V.

Technology Applications 8–12 Standard VIII:

The digital graphics/animation 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 digital graphics/animation, in addition to the content described in Technology Applications Standards I–V.

Domain III Video Technology and Multimedia
(approximately 30% of the test)

Standards Assessed:

Technology Applications 8–12 Standard IX:

The multimedia 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 multimedia, in addition to the content described in Technology Applications Standards I–V.

Technology Applications 8–12 Standard X:

The video technology 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 video technology, in addition to the content described in Technology Applications Standards I–V.

Domain IV Webmastering
(approximately 20% of the test)

Standards Assessed:

Technology Applications 8–12 Standard XI:

The Web mastering 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 Web mastering, in addition to the content described in Technology Applications Standards I–V.

DOMAIN I—TECHNOLOGY APPLICATIONS CORE

Competency 001

The Technology Applications teacher knows technology terminology and concepts; the appropriate use of hardware, software, and digital files; and how to acquire, analyze, and evaluate digital information.

The beginning teacher:

- Knows technology terminology and concepts.
- Knows the appropriate use of hardware components (e.g., input, processing, output, primary/secondary storage devices), operating systems, software applications, and networking components.
- Knows how to select, connect, and use a variety of input, output, and storage devices and peripherals (e.g., scanner, voice/sound recorders, touch screen, digital camera, printer).
- Knows how to evaluate software (e.g., graphics, animation, multimedia, video, Web authoring) for quality, appropriateness, effectiveness, and efficiency and how to make decisions regarding its proper acquisition and use.
- Knows how to perform basic application functions (e.g., opening an application program; creating, modifying, saving, and printing documents) and how to access, manage, and manipulate information from secondary storage devices.
- Knows strategies for acquiring information from electronic resources (e.g., encyclopedias, databases, libraries of images, reference software, Internet).
- Knows search strategies (e.g., keyword, Boolean, natural language) for locating and retrieving information in electronic formats (e.g., text, audio, video, graphics).
- Knows how to assess the accuracy and validity of acquired information.
- Knows how to resolve information conflicts through research and comparison of data from multiple sources.
- Demonstrates knowledge of the ethical acquisition (e.g., citing sources using established methods) and acceptable vs. unacceptable use of information (e.g., privacy, hacking, piracy, vandalism, viruses, current laws and regulations).
- Demonstrates knowledge of intellectual property rights and related issues (e.g., copyright laws, fair use, patents, trademarks) when using, manipulating, and editing electronic data.
- Knows how to use online help and other support documentation.
- Knows how to use technical-writing strategies to develop documentation for a variety of communication products.
- Demonstrates knowledge of the impact of Technology Applications on society and the importance of technology to future careers, lifelong learning, and daily living for individuals of all ages.

Competency 002

The Technology Applications teacher knows how to use technology tools to solve problems, evaluate results, and communicate information in a variety of formats for diverse audiences.

The beginning teacher:

- Knows how to plan, create, and edit documents using word-processing features (e.g., readable fonts, alignment, page setup, tabs, ruler settings) to solve problems and communicate results.
- Knows how to plan, create, and edit spreadsheets using spreadsheet features (e.g., data types, formulas, functions, charts) to solve problems and communicate results.
- Knows how to plan, create, and edit databases using database features (e.g., defining fields, entering data, horizontal and vertical layouts) to solve problems and communicate results.
- Knows how to integrate two or more objects (e.g., tables, charts, graphs, graphics) into a product.
- Knows how to use productivity tools to create products (e.g., slide shows, posters, multimedia presentations, spreadsheets) for defined audiences.
- Knows how to publish information in a variety of ways (e.g., printed copy, monitor displays, Internet documents and video).
- Knows how to use telecommunications tools (e.g., Internet browsers, video conferencing, distance learning) for a variety of purposes.
- Knows how to use interactive virtual environments (e.g., virtual field trips, instructional simulations).
- Knows how to use collaborative software.
- Knows how to share information through online communication.
- Demonstrates knowledge of issues concerning proper etiquette when communicating using electronic tools.
- Demonstrates knowledge of how to design and implement procedures to track trends, set timelines, and review and evaluate products using technology tools (e.g., database managers, daily/monthly planners, project management tools).
- Knows how to evaluate projects for design, purpose, audience, and content delivery using various criteria (e.g., technology specifications, established criteria, rubrics).
- Knows how to select representative products to be collected and stored in an electronic evaluation tool and how to evaluate products for relevance to the assignment or task.
- Knows how to plan and design communication products that are accessible to learners with diverse needs and abilities.

Competency 003

The Technology Applications teacher knows how to plan, organize, deliver, and evaluate instruction that effectively utilizes current technology for teaching the Technology Applications Texas Essential Knowledge and Skills (TEKS) for all students.

The beginning teacher:

- Knows how to plan applications-based technology lessons using a range of instructional strategies for individuals and small/whole groups.
- Demonstrates knowledge of issues related to the equitable use of technology (e.g., gender, ethnicity, language, disabilities, access to technology).
- Knows how to plan and implement instruction that allows students to use technology applications in problem-solving and decision-making situations.
- Knows how to develop and facilitate collaborative tasks and teamwork among group members.
- Knows how to use technology tools to perform administrative tasks (e.g., attendance, grades, communication).
- Knows how to use a variety of instructional strategies to ensure students' reading comprehension.
- Knows strategies to help students learn how to locate, retrieve, analyze, evaluate, communicate, and retain content-related information.
- Knows how to evaluate student projects and portfolios using formal and informal assessment methods.
- Knows the relationship between instruction and assessment and uses assessment results for gauging student progress and adjusting instruction.
- Identifies resources to keep current with the use of technology in education and issues related to legal and ethical use of technology resources.
- Knows how to use technology to participate in self-directed activities in society and how to participate within electronic communities in a variety of roles (e.g., as collaborator, learner, contributor, teacher/mentor).

DOMAIN II—DIGITAL GRAPHICS/ANIMATION AND DESKTOP PUBLISHING

Competency 004

The Technology Applications teacher demonstrates knowledge of the principles of design and their application to digital graphics/animation products.

The beginning teacher:

- Knows concepts and terminology related to digital graphics (e.g., pixels, resolution, file types).
- Demonstrates knowledge of the rules of visual composition (e.g., rule of thirds, golden section) and how they relate to harmony and balance.
- Knows how to apply basic design principles (e.g., proportion, balance, variety, emphasis, harmony, symmetry, unity) in type, color, size, line thickness, shape, and space.
- Demonstrates knowledge of the use of repetition (e.g., shape, texture, spatial relationships, line thickness, size) to develop organization and strengthen the unity of a product.
- Demonstrates knowledge of the use of perspective (e.g., background, light, shade/shadow, scale) to capture a focal point and create depth.
- Knows how to create three-dimensional effects using foreground, middle-distance, and background images.
- Demonstrates knowledge of the use of pictorial qualities in a design (e.g., shape and form, space and depth, pattern and texture) to create visual unity and desired effects.
- Uses fundamental concepts of graphic design (e.g., composition and lighting, point of interest, attributes that determine prominence and support the subject) to analyze and evaluate digital graphic and animation products.
- Identifies and selects appropriate uses for process color, spot color, and black and white.
- Identifies and distinguishes between RGB and CMYK color formats.
- Demonstrates knowledge of color mixing theories and knows how to apply these theories to create new colors in digital format.
- Knows how to apply a variety of color schemes (e.g., monochromatic, analogous, complementary, and cool and warm colors; primary/secondary triads; split complements) to digital designs.
- Knows how to apply color principles to communicate the mood of a product for a specific audience.

Competency 005

The Technology Applications teacher demonstrates knowledge of principles of typography and page design and knows how to use technology tools to create desktop publishing products.

The beginning teacher:

- Knows concepts and terminology related to desktop publishing (e.g., leading and kerning, widows and orphans, text wrap, automatic text flowing into linked columns).
- Knows digital keyboarding standards (e.g., the use of em- and en-dashes, smart quotation marks).
- Identifies the tasks in a project and knows how to use the tools (e.g., word processing, pagination, utility, indexing, graphics, drawing) necessary to complete those tasks.
- Knows how to integrate information from productivity tools (e.g., text, database, spreadsheet, graphic files) into desktop publishing products.
- Knows how to import and export text and other elements from one program to another and understands editing operations and functions (e.g., cut, copy, paste).
- Applies the basics of type measurements for inches and picas.
- Demonstrates knowledge of the appropriate use of type (e.g., font, size, style, alignment, category) for a specific task.
- Knows how to use type techniques (e.g., drop cap, decorative letters, embedded-text frames) as graphic elements.
- Distinguishes between typefaces and recognizes and resolves conflicts that occur from combined usage.
- Identifies the parts and kinds of pages (e.g., inside and outside margins, gutter, title page, inside pages).
- Knows how to use a variety of strategies (e.g., varying line widths and patterns; manipulation tools to stretch, bend, screen, rotate, follow a path, and mirror type) to create effective designs.
- Knows how to use styles (i.e., style sheets), including a variety of type specifications (e.g., typeface, size, alignment, indents, tabs, paragraph formatting).
- Knows how to create a master template to include page specifications and other repetitive information and tasks.
- Knows how to incorporate the elements of page design (e.g., text, graphics, headlines, alignment) into a desktop publishing document using basic design principles (e.g., balance, contrast, dominant element, use of white space, consistency, repetition, alignment).

Competency 006

The Technology Applications teacher knows how to use graphics, animation, and desktop publishing software to produce products that convey a specified message to an intended audience.

The beginning teacher:

- Analyzes appropriate applications of bitmapped and vector graphics.
- Knows how to work in bitmapped and vector modes to create graphical images (i.e., backgrounds, characters, and other objects).
- Knows how to use a variety of editing tools to modify graphic files.
- Knows concepts and terminology related to computer animation (e.g., storyboarding, timeline, color depth, layers, animated GIFs, frames, keyframes, tweening, object behaviors).
- Uses appropriate applications of path- and cel-animation techniques.
- Uses appropriate scripting languages to create an animation or movie.
- Identifies and defines the design attributes and requirements of products created for a variety of purposes (e.g., posters, billboards, business cards, stationery, brochures, magazines, multimedia, Web pages).
- Demonstrates knowledge of design and printing requirements as they relate to purpose, audience, and final output and knows how to create technology specifications for tasks.
- Knows how to use content selection and presentation to ensure that products are appropriate for the defined audience and communication purpose.
- Knows how to synthesize information from data gathered from interviews and print and electronic resources.
- Knows how to use proximity and alignment to create visual connection with other elements and how to use lighting techniques (e.g., shadows/shading) to create an effect.
- Knows how to use a variety of printing options (e.g., tiling, color separations, collation, previewing) and demonstrates knowledge of issues related to publishing information in a variety of formats.
- Knows how to evaluate desktop publishing, digital graphics, and animation products for design, content delivery, purpose, and audience.
- Demonstrates knowledge of the impact of desktop publishing on society, including concepts related to persuasiveness, marketing, and point of view.

DOMAIN III—VIDEO TECHNOLOGY AND MULTIMEDIA

Competency 007

The Technology Applications teacher knows how to produce and distribute digital video and multimedia products.

The beginning teacher:

- Knows the roles and jobs of a production crew for digital video projects (e.g., executive producer, producer, director, engineer, script writer, editor, camera operator, presenter, audio technician).
- Knows the roles and jobs of a production crew for multimedia projects (e.g., project manager, lead programmer, writer, art director, editor, sound engineer, researcher, animator, presenter).
- Knows how to address issues related to the planning and preproduction stages (e.g., storyboarding, script writing, producing, contracting, scheduling, site surveying, obtaining necessary permits and release forms) of a video project.
- Demonstrates knowledge of issues related to creating video products for a variety of purposes and audiences.
- Applies strategies of script writing to create a visual communication product.
- Knows how to use productivity tools and programs (e.g., word processor, database, spreadsheet, draw/paint, utility) in creating, modifying, and solving problems in digital video and multimedia products.
- Knows how to use camera perspective, content selection, presentation, and graphic design (e.g., font attributes, color, white space, graphics) in digital video and multimedia products appropriate for the defined audience and purpose.
- Knows how to evaluate video technology projects for design, content delivery, purpose, and audience.
- Knows how to publish using a variety of video technologies (e.g., Internet, television, CD-ROM, DVD, videotape).
- Knows how to determine the best method of distribution, the number of finished copies needed, and the most appropriate method for promoting a video technology or multimedia product.

Competency 008

The Technology Applications teacher demonstrates knowledge of strategies and techniques used in the preproduction, production, and postproduction of video products.

The beginning teacher:

- Knows basic concepts of video filming (e.g., composition, ratio of image to frame, position in frame, line of gaze, pan/tilts, movement, perspective).
- Knows a variety of basic camera techniques (e.g., zoom, focus, iris control, white balance, filters).
- Applies lighting techniques (e.g., key, fill, backlight) and knows how to use incident/reflected light, color temperatures, and filters.
- Understands basic video-shot vocabulary (e.g., long shot, medium shot, extreme close).
- Identifies and knows how to create and use a variety of video objects (e.g., text, image, video, audio, animation).
- Knows how to use audio techniques to create, edit, and integrate digital sounds.
- Demonstrates knowledge of compression schemes for outputting a variety of file types (e.g., MPEG, AVI, MOV), and knows strategies to conserve memory and retain image quality.
- Knows basic concepts and terminology related to video technology (e.g., analog, digital, codec, drop-frame, resolution).
- Knows differences and similarities between linear and nonlinear editing.
- Knows a variety of input devices related to video technology, and knows how to output digital video to analog and analog video to digital.
- Demonstrates knowledge of techniques used in postproduction (e.g., editing and creating control and/or time-coded tracks; creating transitions, captions, and titles; setting audio levels; adding background music and special sound effects; applying 2-D and 3-D animation effects).

Competency 009

The Technology Applications teacher knows how to design, produce, and distribute multimedia products.

The beginning teacher:

- Knows basic concepts and terminology related to multimedia (e.g., flowcharts, morphing, anti-aliasing).
- Knows how to use a variety of multimedia programs and tools (e.g., linear/nonlinear authoring, image/video editing, draw/paint/text creation).
- Knows the appropriate use of digital imaging, video integration, and sound in a multimedia product and knows how to import a variety of file types (e.g., sound, graphic).
- Knows how to implement methods to create interactivity in a multimedia project.
- Differentiates among and knows how to appropriately use 3-D modeling, animation, and rendering software.
- Knows how to import video into digital format and how to digitize analog audio using different sound rates, resolutions, and channels.
- Knows the appropriate use of animation and multimedia software components (e.g., control panel, stage, score, cast, timeline).
- Knows how to use path- and cel-animation modules and applies appropriate scripting language to create a multimedia sequence.
- Differentiates among types of audio input, and knows how to use a variety of techniques to edit, manipulate, and change sounds (e.g., adding effects, manipulating waveforms).
- Knows how to format a multimedia project according to defined output specifications (e.g., target audience, viewing environment), and knows how to publish a multimedia product in a variety of formats.

DOMAIN IV—WEBMASTERING

Competency 010

The Technology Applications teacher demonstrates knowledge of strategies and techniques for Web site administration.

The beginning teacher:

- Knows concepts and terminology related to Web administration (e.g., URL, IP addresses, HTML, data transfer).
- Demonstrates knowledge of similarities and differences among networks (e.g., LAN, WAN, the Internet, intranet).
- Knows methods for navigating and for accessing information from networks (e.g., LAN, WAN, the Internet, intranet).
- Demonstrates knowledge of the technical requirements for a Web server and resolves issues relating to compatibility (e.g., file formats, cross-platform connectivity).
- Knows the historical development and characteristics of a variety of network protocols and knows methods of accessing information on the Internet (e.g., HTTP, FTP, TCP/IP, Telnet, Gopher, WAIS).
- Knows issues related to network security and knows how to select and implement methods to protect a Web server from unauthorized use and negative intentions.
- Knows how to establish a folder/directory hierarchy for storage of Web pages and their related files.
- Knows how to control access to a Web site via password controls and global access/deny controls.

Competency 011

The Technology Applications teacher knows principles of Web page design and uses a variety of tools and techniques to design and troubleshoot Web pages for a diverse audience.

The beginning teacher:

- Knows how to create Web pages using text-based and graphical-based editing programs.
- Knows how to integrate information from productivity tools (e.g., database, spreadsheet, graphics files) into Web pages.
- Demonstrates knowledge of issues related to incorporating graphics, video, audio, and multimedia sequences into a Web page.
- Demonstrates knowledge of Web site concepts and issues relating to usability (e.g., color scheme, site organization, navigation, frame size, type of file).
- Demonstrates knowledge of design principles (e.g., size of graphics, font size and color, backgrounds, ratio of text to white space) and page elements (e.g., hyperlinks, HTML tags, tables) used in creating Web pages.
- Demonstrates knowledge of issues related to displaying Web pages on a variety of browsers and monitors (e.g., color, page size, browser version, plug-ins).
- Knows how to plan and design Web pages that are accessible to diverse audiences (e.g., visually impaired, learning disabled, physically disabled).
- Knows how to identify potential problems with a Web page and applies a variety of troubleshooting techniques to identify and correct problems.

Competency 012

The Technology Applications teacher knows how to use Web pages to communicate and interact effectively with others.

The beginning teacher:

- Knows how to format digital information for appropriate and effective communication (e.g., appropriate use of hyperlinks, use of high-impact graphics versus text-only pages, designing content for a specific audience).
- Knows how to implement methods for creating interactivity in Web pages.
- Knows how to synthesize and generate new information from data gathered from electronic and telecommunications sources.
- Knows how to create instructions for student tasks and rubrics to evaluate a communication project.
- Knows how to extend teaching and learning in the local environment to the worldwide community through the creation and sharing of Web documents.
- Demonstrates knowledge of strategies for extending the learning environment beyond the classroom through the creation and sharing of electronically formatted and published documents via electronic networks.
- Knows the effects of the World Wide Web on society (e.g., information sharing, distance learning, the commercial sector).

SECTION III

APPROACHES TO ANSWERING MULTIPLE-CHOICE ITEMS

The purpose of this section is to describe multiple-choice item formats that you may see on the TExES test in this field and to suggest possible ways to approach thinking about and answering the multiple-choice items. However, these approaches are not intended to replace familiar test-taking strategies with which you are already comfortable and that work for you.

The Technology Applications 8–12 test is designed to include 80 scorable multiple-choice items and approximately 10 nonscorable items. Your final scaled score will be based only on scorable items. The nonscorable multiple-choice items are pilot tested by including them in the test in order to collect information about how these questions will perform under actual testing conditions. Nonscorable test items are not considered in calculating your score, and they are not identified on the test.

All multiple-choice questions on this test are designed to assess your knowledge of the content described in the test framework. The multiple-choice questions assess your ability to recall factual information **and** to think critically about the information, analyze it, consider it carefully, compare it with other knowledge you have, or make a judgment about it.

When you are ready to answer a multiple-choice question, you must choose one of four *answer choices* labeled A, B, C, and D. Then you must mark your choice on a separate answer sheet.

Item Formats

You may see the following two types of multiple-choice questions on the test.

- Single items
- Items with stimulus material

You may have two or more items related to a single stimulus. This group of items is called a cluster. Following the last item of a clustered item set containing two or more items, you will see the graphic illustrated below.



This graphic is used to separate these clustered items related to specific stimulus material from other items that follow.

On the following pages, you will find descriptions of these commonly used item formats, along with suggested approaches for answering each type of item. In the actual testing situation, you may mark the test items and/or write in the margins of your test booklet, **but your final response must be indicated on the answer sheet provided.**

SINGLE ITEMS

In the single item format, a problem is presented as a direct question or an incomplete statement, and four answer choices appear below the question. The following question is an example of this type. It tests knowledge of Technology Applications 8–12 competency 006: *The Technology Applications teacher knows how to use graphics, animation, and desktop publishing software to produce products that convey a specified message to an intended audience.*

It is most appropriate to use a vector graphics program rather than a bitmapped graphics program when creating:

- A. images that will be saved in a file format for the Web.
 - B. an image that contains small decorative type.
 - C. images that will be used in print products.
 - D. an image that can be enlarged with no loss of quality.
-

Suggested Approach

Read the question carefully and critically. Think about what it is asking and the situation it is describing. Eliminate any obviously wrong answers, select the correct answer choice, and mark it on your answer sheet.

Computer graphics programs create and store images files in one of two forms: as bitmapped graphics or as vector graphics. Bitmapped graphics programs represent images as an array of closely spaced dots, with each dot corresponding to one or more bits. As a bitmapped image is enlarged, the distance between the individual dots increases and the image begins to appear grainy. Vector graphics programs store images as a collection of mathematical equations. Because of this, each time an image is output either to a monitor or a printer, the image is recalculated. This allows the image to be enlarged without loss of quality. Therefore it is most appropriate to use a vector graphics program when creating an image that can be enlarged without loss of quality (Option D).

Images on the World Wide Web are viewed on a computer monitor. Since a computer monitor is a low resolution output device, no advantage would be gained by creating the graphic using a vector graphics program (Option A). A graphic that contains small decorative type (Option B) would look the same if created using either a bitmapped or a vector graphics program. Images that will be used in print products can be either vector graphics or bitmapped graphics (Option D).

Of the response alternatives offered, creating an image that can be enlarged with no loss of quality is the most appropriate use of a vector graphics program. Therefore, the correct response is Option D.

The following question tests knowledge of Technology Applications 8–12 competency 008: *The Technology Applications teacher demonstrates knowledge of strategies and techniques used in the preproduction, production, and postproduction of video products.*

A videographer is most likely to put a polarizing filter on a video camera in which of the following situations?

- A. Light levels are changing quickly and unpredictably.
 - B. The surface of a lake is producing glare.
 - C. The subject being photographed is in shadows.
 - D. The subject being photographed is standing in front of a window.
-

Suggested Approach

Read the question carefully and critically. Think about what it is asking and the situation it is describing. Eliminate any obviously wrong answers, select the correct answer choice, and mark it on your answer sheet.

Filters are placed on the lens of a video camera to alter the quality or quantity of light reaching the lens. A polarizing filter allows only those light waves having a specific spatial orientation to pass through the filter. Rays of light having an orientation other than that allowed by the polarizing filter are blocked. When light is reflected from a shiny surface such as a lake, the light waves become partially polarized. This means that the light waves are orientated in a specific direction. A polarizing filter can be adjusted to block these polarized light waves and to reduce the amount of reflected light. Since glare is a result of reflected light, Option B is the correct response.

A videographer would not use a polarizing filter for any of the situations described in the other responses. Polarizing filters offer no benefits in situations involving unpredictably changing light levels (Option A) since they are unable to add or subtract light as needed. Polarizing filters tend to reduce the amount of light passing through the lens and would therefore not be helpful in filming a subject in shadows (Option C). A polarizing filter will not be helpful in filming a person standing in front of a window (Option D), since it would remove proportional quantities of light from both the subject and the background.

Option B is therefore the correct response.

ITEMS WITH STIMULUS MATERIAL

Some questions are preceded by stimulus material that relates to the item. Some types of stimulus material included on the test are reading passages, graphics, tables, or a combination of these. In such cases, you will generally be given information followed by an event to analyze, a problem to solve, or a decision to make.

One or more items may be related to a single stimulus. You can use several different approaches to answer these types of questions. Some commonly used approaches are listed below.

Strategy 1 Skim the stimulus material to understand its purpose, its arrangement, and/or its content. Then read the item and refer again to the stimulus material to verify the correct answer.

Strategy 2 Read the item *before* considering the stimulus material. The content of the item will help you identify the purpose of the stimulus material and locate the information you need to answer the question.

Strategy 3 Use a combination of both strategies; apply the "read the stimulus first" strategy with shorter, more familiar stimuli and the "read the item first" strategy with longer, more complex, or less familiar stimuli. You can experiment with the sample items in this manual and then use the strategy with which you are most comfortable when you take the actual test.

Whether you read the stimulus before or after you read the item, you should read it carefully and critically. You may want to underline its important points to help you answer the item.

As you consider items set in educational contexts, try to use that teacher's point of view to answer the items that accompany the stimulus. Be sure to consider the items in terms of only the information provided in the stimulus—not in terms of specific situations or individuals you may have encountered.

Suggested Approach

First read the stimulus (a sample of four sentences each written with a different typeface).

Use the typeface samples below to answer the question that follows.

- A. This is a sample of typeface A.
 - B. This is a sample of typeface B.
 - C. **This is a sample of typeface C.**
 - D. This is a sample of typeface D.
-

Now you are prepared to address the question associated with this stimulus. This question measures the knowledge of Technology Applications 8–12 competency 005: *The Technology Applications teacher demonstrates knowledge of principles of typography and page design and knows how to use technology tools to create desktop publishing products.*

The typefaces above are available for a newsletter. The editor for the project has requested a serif typeface that shows no variation in stroke widths. Which of the following typefaces is most appropriate for the project?

- A. A
 - B. B
 - C. C
 - D. D
-

Read the question carefully and critically. Think about the question that is being asked. Eliminate any of the obviously wrong answers, select the correct answer choice, and mark it on your answer sheet.

The question asks to identify which one of the four sample typefaces given is a serif typeface that shows no variation in the stroke widths. Serifs are small lines that are added to the strokes of a letter. The stroke refers to the fundamental line segments that make up the letter. Now carefully examine each of the four samples.

The letters in Sample A of the stimulus each have small lines attached to the strokes. Hence this typeface has serifs. However, a close inspection of the letters reveals that the stroke width is variable. For example, the diagonal strokes in the uppercase letter "A" each have a different thickness. Hence, the typeface shows variation in stroke width and Option A is incorrect.

The letters in Sample B do not have serifs. In addition, the letters also show variation in width, as can be seen by examining the "y" in the word "typeface." Therefore Option B is incorrect.

In Sample C, the letters have serifs. In addition, a close inspection reveals that the stroke width is the same throughout. Consequently Option C is the correct response.

The stroke width in Sample D does not vary but the typeface is sans serif. Therefore Option D is incorrect.

SECTION IV

SAMPLE ITEMS

This section presents some sample test items for you to review as part of your preparation for the test. To demonstrate how each competency may be assessed, each sample item is accompanied by the competency number that it measures. While studying, you may wish to read the competency before and after you consider each sample item. Please note that the competency numbers will not appear on the actual test form.

An answer key follows the sample items. The answer key lists the item number and correct answer for each sample test item. Please note that the answer key also lists the competency assessed by each item and that the sample items are not necessarily presented in competency order.

The sample items are included to illustrate the formats and types of items you may see on the test; however, your performance on the sample items should not be viewed as a predictor of your performance on the actual examination.

Technology Applications 8–12

Competency 001

1. A student would like to perform a search for all of the books published in 1961 that were written by authors whose last name is Smith. Which of the following statements would most efficiently provide this information?
 - A. Smith AND 1961
 - B. Smith OR 1961
 - C. "Smith AND 1961"
 - D. "Smith" OR "1961"

Competency 001

2. Which of the following computer applications would best help a teacher keep records of students' academic information in a format that would allow complex searches using logical operators such as AND, OR, and NOT?
 - A. utility
 - B. database
 - C. spreadsheet
 - D. word processing

Competency 002

3. The use of instructional simulation software would be most appropriate in which of the following situations?
 - A. Students are presenting the results of a student survey at a school assembly.
 - B. Students are investigating systems that have cause-and-effect relationships.
 - C. Students are planning the layout design for a poster on the history of their community.
 - D. Students are compiling and analyzing weather data they have collected.

Competency 003

4. A teacher would like to assess students' skills in using a graphics program to create products. In this situation, one advantage in using an informal assessment process rather than a formal assessment process is that the informal process would allow the teacher to:
- A. evaluate the students' products against a set of objective criteria.
 - B. involve the students in the learning and evaluation process.
 - C. compare the students' performances with those of their grade-level peers.
 - D. measure what the students have learned when their products are finished.

Competency 003

5. A teacher wants to place students in cooperative groups for an upcoming computer project. Which of the following steps would be most effective in facilitating the success of this learning strategy?
- A. forming groups of students with similar levels of ability
 - B. instituting whole-group accountability for the project
 - C. closely directing each step of the group project
 - D. discussing group process skills with students before starting the project

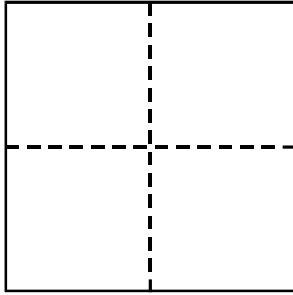
Competency 003

6. A computer science teacher has agreed to work with students in the school district who are engaged in a research project on the impact of computer science on society. The teacher will be communicating with the students via e-mail and chat room to help them refine their choice of topics and guide their research. For the collaboration to be effective, it is most important for the computer science teacher to:
- A. develop a list of topics the students should research.
 - B. know the format in which the students' projects will be presented.
 - C. understand the goals and logistics of the collaboration.
 - D. make sure that the students know appropriate online etiquette.

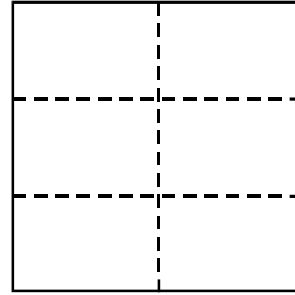
Competency 004

7. A graphic designer is creating the layout for an image. Which of the following grids will best help the designer achieve harmony and balance in the image through the proper placement of the focal point(s)?

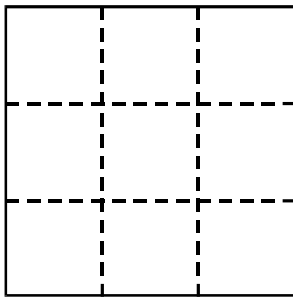
A.



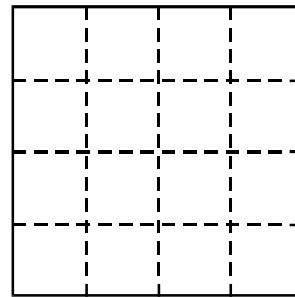
B.



C.



D.



Competency 005

8. The primary advantage of defining styles when creating a word processing document is that they:

- A. allow page breaks to be set automatically.
- B. provide a template for the placement of text and images.
- C. automatically create text boxes and allow text to be wrapped.
- D. facilitate formatting of the text elements in the document.

Competency 006

9. A student wants to create a number of scenes using animation software. For which of the following scenes would it be most effective to record the music for the audio track before the action has been keyframed?
- A. music builds suspense as the main character is exposed to danger
 - B. background music plays as the characters engage in dialogue
 - C. characters at a party dance and move in rhythm to music
 - D. music plays as the credits are listed at the end of the movie

Competency 007

10. A design team is creating an interactive CD-ROM that will provide travel information to tourists. The CD-ROM will be based on HTML code and will be viewed in Web browsers. The designers have decided to use only Web-safe colors. This decision is most likely intended to meet which of the following design criteria?
- A. Colors must be consistent across operating systems and Web browsers.
 - B. The color images on the CD-ROM must be able to be transmitted as attachments in e-mails.
 - C. Reproductions of photographs must include the entire range of colors available in the original.
 - D. Color images on the CD-ROM must take up as little file space as possible.

Competency 008

11. An editor is most likely to use the *pan* feature of video editing software to control which of the following characteristics of an audio track?
- A. overall volume
 - B. relative volume between left and right channels
 - C. reverberation
 - D. relative volume of specific frequencies in the sound

Competency 008

12. In video editing, dropframe timecode is used primarily for which of the following applications?
- A. television
 - B. Web streaming
 - C. animations
 - D. CDs and DVDs

Competency 009

13. A person has created a short animation in which a wagon rolls down a hill. The person placed the wagon at the top of the hill, set a keyframe, moved the wagon to the bottom of the hill, and set another keyframe. Which of the following would result from moving the two keyframes closer together in the timeline?
- A. The wagon's speed would decrease.
 - B. The wagon's speed would increase.
 - C. The distance moved by the wagon would increase.
 - D. The distance moved by the wagon would decrease.

Competency 009

14. A video clip is to be compressed and imported into video editing software. The advantage of using a lossless compression scheme rather than a lossy compression scheme is that a lossless compression scheme will:
- A. produce a more compressed video file.
 - B. prevent deterioration of image quality.
 - C. retain all of the clip's original frames.
 - D. maintain the same timecode as the original.

Competency 011

15. Use the HTML code below to answer the question that follows.

```
.  
. .  
. .  
<table border="1" cellspacing="0" cellpadding="4"><tr>  
<th COLSPAN="2" ALIGN="center">Trees Native to the  
Southwest</th></tr>  
<tr><td><A HREF="acacia.html">Acacia</A></td>  
<td><A HREF="cottonwood.html">Cottonwood </A></td></tr>  
<tr><td><A HREF="oak.html">Oak</A></td>  
<td><A HREF="pecan.html">Pecan </A></td></tr>  
</table>  
. . .
```

Which of the following tables is described by the HTML code above?

A.

Trees Native to the Southwest	
<u>Acacia</u>	<u>Cottonwood</u>
<u>Oak</u>	<u>Pecan</u>

B.

Trees Native to the Southwest			
<u>Acacia</u>	<u>Oak</u>	<u>Cottonwood</u>	<u>Pecan</u>

C.

Trees Native to the Southwest	
<u>Acacia</u>	<u>Cottonwood</u>
<u>Oak</u>	<u>Pecan</u>

D.

Trees Native to the Southwest	
<u>Acacia</u>	<u>Cottonwood</u>
<u>Oak</u>	<u>Pecan</u>

Competency 011

16. Which of the following is a function of a plug-in?
- A. allowing a Web browser to execute files that are in formats the Web browser would normally not recognize
 - B. decreasing the amount of time required for a Web browser to display multimedia files
 - C. providing site visitors with greater control over how the files are displayed
 - D. checking multimedia files for viruses before displaying them in the Web browser

Competency 012

17. A person designing a Web page is most likely to use JavaScript for which of the following applications?
- A. to play a sound file when the user clicks on a sound icon
 - B. to allow the user to send an e-mail to the Webmaster
 - C. to print and save information entered in forms by users
 - D. to pause and play video clips and animations

ANSWER KEY

Item Number	Correct Answer	Competency
1	A	001
2	B	001
3	B	002
4	B	003
5	D	003
6	C	003
7	C	004
8	D	005
9	C	006
10	A	007
11	B	008
12	A	008
13	B	009
14	B	009
15	C	011
16	A	011
17	C	012

SECTION V

PREPARATION RESOURCES

The resources listed below may help you prepare for the TExES test in this field. These preparation resources have been identified by content experts in the field to provide up-to-date information that relates to the field in general. You may wish to use current issues or editions to obtain information on specific topics for study and review.

Journals

Converge Online, Center for Digital Education, e.Republic Inc., <http://www.centerdigitaled.com/converge>

Eschool News.com, <http://www.eschoolnews.com>

Journal of Computing in Teacher Education, International Society for Technology in Education, <http://www.iste.org>

Journal of Research on Technology in Education, International Society for Technology in Education, <http://www.iste.org>

Learning & Leading with Technology, International Society for Technology in Education, <http://www.iste.org>

MultiMedia & Internet@Schools, Information Today, Inc., <http://www.infoday.com>

T.H.E. (Technology Horizons in Education) Journal, <http://www.thejournal.com>

Technology and Learning, <http://www.techlearning.com>

Texas Computer Education Association TechEdge and TechNotes, <http://www.tcea.org>

Other Sources

Bitter, G., and Pierson, M. (2004). *Using Technology in the Classroom*. Boston, MA: Allyn and Bacon.

Carroll, J. A., and Witherspoon, T. L. (2002). *Linking Technology and Curriculum*. Upper Saddle River, NJ: Prentice Hall.

Edwards, J., and Roblyer, M. D. (2000). *Integrating Educational Technology into Teaching*. Upper Saddle River, NJ: Prentice Hall.

Goodman, P. S. (Ed.) (2001). *Technology Enhanced Learning: Opportunities for Change*. Mahwah, NJ: Lawrence Erlbaum.

Grabe, M., and Grabe, C. (2004). *Integrating Technology for Meaningful Learning*. New York, NY: Houghton-Mifflin.

- Lever-Duffy, J., and Mizell, A. P. (2002). *Teaching and Learning with Technology*. Boston, MA: Pearson Allyn & Bacon.
- Lockard, J., and Abrams, P. (2003). *Computers for Twenty-First Century Educators*. Boston, MA: Pearson Allyn & Bacon.
- McLoughlin, S. (2001). *Multimedia: Concepts and Practice*. Upper Saddle River, NJ: Prentice Hall.
- Newby, T., Stepich, D., Lehman, J., and Russell, J. (2000). *Instructional Technology for Teaching and Learning: Designing Instruction, Integrating Computers, and Using Media*. Upper Saddle River, NJ: Prentice Hall.
- Roblyer, M. D. (2004). *Integrating Educational Technology Into Teaching*. Upper Saddle River, NJ: Prentice Hall.
- Shuman, J. E. (2001). *Multimedia Concepts*. Boston, MA: Course Technology, Thomson Learning.
- Texas Education Agency. (1998). *Texas Essential Knowledge and Skills (TEKS)*. Austin, TX.
- Williams, R. (2003). *The Non-Designers Design Book*. Berkeley, CA: Peachpit Press.

Online Resources

- Association for Educational Communications and Technology*, <http://www.aect.org>
- Association for Supervision and Curriculum Development (ASCD)*, <http://www.ascd.org>
- Consortium for School Networking (CoSN)*, <http://www.cosn.org>
- International Society for Technology Education*, <http://www.iste.org>
- State Board for Educator Certification (Standards & Testing)*, <http://www.sbec.state.tx.us>
- techLEARNING.com*, <http://www.techlearning.com>
- Technology Applications Teacher Network*, <http://www.techappsnetwork.org>
- Texas Computer Education Association (TCEA)*, <http://www.tcea.org>
- Texas Computer Education Associate (TCEA) Tech-Apps/Computer Science Special Interest Group*, <http://www.tcea.org/SIGs>
- Texas Education Agency, Educational Technology*, <http://www.tea.state.tx.us/curriculum>
- Texas Education Agency, Technology Applications Curriculum*, <http://www.tea.state.tx.us/curriculum>
- U.S. Department of Education*, <http://www.ed.gov>

State-Adopted Instructional Materials

- <http://www.tea.state.tx.us/textbooks>

