Texas CTE

Architecture and Construction (2010): Grade 9

Adopted 2010

Principles of Architecture and Construction

(1) The student performs mathematical operations to complete tasks such as estimating materials and supplies. The student is expected to:

(A) use appropriate geometric formulas and calculations to determine areas and volumes of various structures and estimate materials and supplies;

(B) use appropriate formulas and calculations to determine percentages and decimals and use percentages and decimals to perform measurement tasks;

(C) use appropriate formulas and calculations to determine ratios, fractions, and proportion measures and use ratios, fractions, and proportion measures to perform measurement tasks; and

(D) use dimensions, spaces, and structures calculations to estimate materials and supplies.

(2) The student performs physics skills to work with materials and load applications. The student is expected to:

(A) apply basic concepts of static and loads to planning; and

(B) identify the physical properties present when using common construction materials in order to use the materials safely, effectively, and efficiently.

(3) The student manages chemical materials safely. The student is expected to:

(A) recognize the issues present when mixing compatible and incompatible substances to maintain workplace and job site safety;

(B) differentiate between incompatible and compatible substances;

(C) prevent the mixing of incompatible substances;

(D) describe the chemical process that occurs when using common construction materials to maintain workplace and job site safety;

(E) apply chemical processes in relation to environmental conditions; and

(F) apply chemical processes in relation to construction building materials.

(4) The student reads, understands, and responds to English language technical documents to effectively accomplish assignments. The student is expected to:

- (A) read, interpret, and use technical and workplace documents to accomplish workplace and job site assignments;
- (B) read and understand industry-specific terminology;
- (C) interpret workplace documents;
- (D) use verbal or written processes to report key information;
- (E) use technology to transmit reports;
- (F) use written communications such as written estimates, work orders, and memos; and
- (G) read and follow technical instructions and manuals.

(5) The student writes clear and effective English to prepare information. The student is expected to:

- (A) complete reports and documents to comply with project requirements;
- (B) compose an accurate and organized diary or log of work;
- (C) write reports and documents such as estimates, permits, memos, and technical reports; and
- (D) write reports and work orders that meet industry standards.

(6) The student uses industry-specific verbal and visual skills to accomplish effective communications. The student is expected to:

- (A) match verbal and visual communications to industry-specific situations; and
- (B) use correct terminology to convey verbal and visual communications.

(7) The student listens attentively and speaks clearly to convey information correctly. The student is expected to:

- (A) confirm understanding of verbal and visual instructions;
- (B) ask relevant questions concerning details of instructions; and
- (C) perform assignments as requested.

(8) The student listens to and speaks with a variety of individuals to enhance communications skills. The student is expected to:

- (A) speak succinctly and clearly to convey information;
- (B) speak so that others can understand and carry out information presented;
- (C) provide verbal instructions; and
- (D) listen attentively to spoken messages to respond to information.

(9) The student exhibits public-relations skills to address a variety of situations such as increasing internal and external customer and client satisfaction. The student is expected to:

(A) communicate effectively to develop positive customer and client relationships;

(B) develop and maintain customer relations;

(C) apply relationship skills in a variety of situations;

(D) define customer and client satisfaction; and

(E) evaluate customer and client satisfaction.

(10) The student identifies the relationship between available resources and requirements of a problem to accomplish realistic planning. The student is expected to:

(A) estimate resources and materials required for a specific problem, including time-management, labor-management, job-management, and job-site obligations in order to effectively plan;

(B) estimate correct amount of required resources and materials;

(C) evaluate feasibility of alternative suggestions;

(D) implement appropriate alternatives;

(E) use available resources and materials effectively to complete a project or resolve a problem;

(F) evaluate waste of resources and materials;

(G) evaluate necessity for additional resources and materials;

(H) determine alternative solutions for a specific problem in order to effectively plan;

(I) evaluate feasibility of alternative suggestions; and

(J) implement appropriate alternatives.

(11) The student evaluates and adjusts plans and schedules to respond to unexpected events and conditions. The student is expected to:

(A) incorporate potential job disruptions into planning timelines;

(B) identify potential events and conditions that disrupt the completion of a job;

(C) solve situational problems involved with unexpected events and conditions;

(D) adjust plans and schedules to meet project needs;

(E) modify existing plans to reflect an unexpected change;

(F) modify existing schedules to reflect an unexpected change;

(G) identify and assess critical situations as they arise to resolve issues;

(H) evaluate potential solutions and determine the best solution;

(I) appraise critical situations and implement appropriate responses;

(J) provide a project update to track changes necessitated by unexpected events and conditions; and

(K) present verbal or written status reports on the project.

(12) The student synthesizes and reports conditions to keep the organization appraised of progress and potential problems. The student is expected to:

(A) provide a project update to keep stakeholders up to date; and

(B) present a verbal or written status report on the project.

(13) The student uses technology tools specific to architecture and construction to access, manage, integrate, and create information. The student is expected to:

(A) manage personal schedule and contact information;

(B) create a tasks list;

(C) manage daily, weekly, and monthly schedules using an application;

(D) manage personal and professional contact information;

(E) create memos and notes;

(F) create personal reminders;

(G) create and send notes, informal memos, and reminders using applications; and

(H) use electronic mail applications.

(14) The student uses email to communicate within and across organizations. The student is expected to:

(A) access an email system using login and password functions;

(B) access email messages received;

(C) create email messages in accordance with established business standards such as grammar, word usage, spelling, sentence structure, clarity, and etiquette;

(D) practice email etiquette;

(E) send email messages;

(F) use email to share files and documents;

(G) access email attachments;

(H) attach documents to messages;

(I) save email messages and attachments; and

(J) practice contamination protection strategies for email.

(15) The student uses Internet applications. The student is expected to:

(A) search for information and resources;

(B) select appropriate search engines;

(C) select appropriate search procedures and approaches;

(D) locate information using search engines and Boolean logic;

(E) navigate websites using software functions;

(F) access and evaluate Internet resources;

(G) access business and technical information using the Internet;

(H) access commercial, government, and education resources; and

(I) evaluate Internet resources for accuracy of information.

(16) The student uses writing and publishing applications. The student is expected to:

(A) prepare simple documents and other business communications;

(B) retrieve existing documents;

(C) create documents such as letters, memos, and reports using existing forms and templates;

(D) safeguard documents using name and save functions;

(E) format text using basic formatting functions; and

(F) employ word processing utility tools such as spell check, grammar check, and thesaurus.

(17) The student uses spreadsheet applications. The student is expected to:

(A) create, retrieve, edit, save, and print spreadsheets;

(B) perform calculations and analysis on data;

(C) group worksheets;

(D) create charts and graphs from a spreadsheet;

(E) perform calculations using simple formulas; and

(F) input and process data using spreadsheet functions.

(18) The student uses database applications. The student is expected to:

(A) manipulate data elements;

(B) enter data using a form;

(C) locate and replace data using search and replace functions; and

(D) process data using database functions such as structure, format, attributes, and relationships.

(19) The student uses collaborative applications. The student is expected to:

(A) facilitate group work through management of shared schedule and contact information;

(B) manage daily, weekly, and monthly schedules using an application; and

(C) maintain a shared database of contact information.

(20) The student uses computer operations applications. The student is expected to:

(A) manage computer operations;

(B) apply basic commands of operating system software;

(C) employ desktop operating skills;

(D) manage file storage;

(E) apply appropriate file and disk management techniques;

(F) differentiate between files and directories;

(G) determine file organization; and

(H) use system utilities for file management.

(21) The student uses computer-based equipment containing embedded computers or processors used to control electromechanical devices. The student is expected to:

(A) operate computer-driven equipment and machines;

(B) secure needed supplies and resources;

(C) follow power-up and log-on procedures;

(D) respond to system messages using a console device;

(E) run applications in accordance with processing procedures;

(F) follow log-off and power-down procedures;

(G) use installation and operation manuals;

(H) access needed information using appropriate reference materials;

(I) troubleshoot computer-driven equipment and machines and access support as needed;

(J) test a system using diagnostic tools and software;

(K) repair or replace malfunctioning hardware;

(L) reinstall software as needed;

(M) recover data files; and

(N) restore system to normal operating standards.

(22) The student complies with governmental regulations and applicable codes to establish a legal and safe environment. The student is expected to:

(A) identify occupation-specific governmental regulations and national, state, and local building codes to establish appropriate regulations and codes;

(B) follow governmental regulations and building codes;

(C) use information given in regulations and codes correctly;

(D) pass job inspections and comply with regulations at all times;

(E) monitor activities to comply with governmental and other applicable safety regulations such as the Environmental Protection Agency and Occupational Safety and Health Administration;

(F) read and discuss information on Occupational Safety and Health Administration, Environmental Protection Agency, and other safety regulations;

(G) pass safety inspections and comply with regulations at all times;

(H) use Material Safety Data Sheet information to manage and dispose of hazardous materials;

(I) identify environmental hazards to promote safety; and

(J) follow safe practices relating to environmental hazards.

(23) The student examines the roles and responsibilities of technicians and professionals to complete a project. The student is expected to:

(A) plan, organize, schedule, and manage a project or job to optimize workflow sequence;

(B) report results of the project or job;

(C) use time-management skills to schedule a project or job;

(D) identify a timeline required to complete a project or job;

(E) evaluate efficiency and effectiveness of a project or job;

(F) recognize relationships between technicians and professionals to facilitate smooth workflow;

(G) coordinate work between various occupations;

(H) incorporate job functions in the reporting chain of supervision; and

(I) evaluate the safety issues and responsibilities managed by each level of supervision.

(24) The student examines all aspects of the built environment and systems to complete project planning. The student is expected to:

(A) align and incorporate the built environment and its systems to complete the project;

(B) label all systems on a set of construction documents;

(C) discuss the interrelationship of the systems in the built environment; and

(D) use a sequential method such as the critical path method so that work progresses efficiently.

(25) The student applies industry standards and practices to ensure quality work. The student is expected to:

(A) identify current industry standards and practices in order to incorporate quality into projects;

(B) document how quality improves profitability;

(C) report on issues that affect quality;

(D) use industry standards and practices to enhance appreciation for quality workmanship; and

(E) perform work that meets or exceeds the quality standards of the industry.

(26) The student observes rules and regulations to comply with personal and occupational health and safety standards. The student is expected to:

(A) align appropriate safety standards to ensure a safe environment;

(B) practice safety rules and regulations;

(C) identify safety precautions and hazards to ensure a safe environment;

(D) use appropriate safety practices and equipment;

(E) select, inspect, and use personal protective equipment such as respiratory protection and fall protection equipment to ensure a safe environment;

(F) inspect personal protective equipment to ensure safety;

(G) report defects found in personal protective equipment;

(H) wear appropriate personal protective equipment;

(I) employ hierarchy and workflow of the site to ensure safety;

(J) perform site safety procedures at all times; and

(K) use various safety barriers.

(27) The student establishes specific goals to manage project assignments in a timely manner. The student is expected to:

(A) establish project goals in order to meet project specifications and deadlines; and

(B) organize work teams to effectively manage assignments.

(28) The student works as an individual and as a team member to accomplish assignments. The student is expected to:

(A) use human relations skills to work cooperatively with coworkers representing different cultures, genders, and backgrounds;

(B) track team goals to contribute constructively and positively to the team;

(C) match team members to appropriate activities;

(D) manage skills to effectively accomplish assignments;

(E) effectively use conflict resolution skills with coworkers to maintain a smooth workflow; and

(F) use mentoring skills to inspire and motivate others to achieve and enhance performance.

(29) The student exhibits personal accountability, integrity, and responsibility to enhance confidence among coworkers. The student is expected to:

(A) apply the professional and ethical standards of the industry to personal conduct;

(B) practice professional and ethical standards;

(C) maintain personal integrity;

(D) promote personal and professional integrity in coworkers; and

(E) recognize integrity in others.

(30) The student reads regulations and contracts to ensure ethical and safety elements are observed. The student is expected to:

(A) study regulations and codes to identify those applicable to the local area;

(B) locate and implement regulations and codes applicable to tasks and projects;

(C) comply with local, state, and federal agencies and model code-setting organizations;

(D) read and explain the various aspects of service contracts to ensure compliance;

(E) evaluate and follow service contracts;

(F) recognize the relationship between the various parties to a contract in order to interpret responsibilities;

(G) fulfill contractual roles and responsibilities;

(H) recognize the definition of specialized words or phrases to fully understand documents and contracts;

(I) use industry jargon or terminology appropriately;

(J) use industry acronyms correctly;

(K) use words with multiple meanings correctly in context; and

(L) use ethical and legal standards to avoid conflicts of interest.

(31) The student recognizes legal and ethical relationships between employees and employers to establish workplace and job site rules, regulations, and guidelines. The student is expected to:

(A) access appropriate resources to identify the roles, rights, and responsibilities of an employee and an employer; and

(B) examine insurance documentation to determine liability issues associated with a job.

(32) The student recognizes a positive work ethic to comply with employment requirements. The student is expected to:

(A) exhibit behaviors showing reliability and dependability;

(B) recognize appropriate dress for the work environment; and

(C) recognize the required employment forms and documentation such as I-9, work visa, W-4, and licensures to meet employment requirements.

(33) The student recognizes requirements for career advancement to plan for continuing education and training. The student is expected to:

(A) identify opportunities for career advancement to formulate career goals;

(B) identify a career ladder;

(C) develop a career advancement plan;

(D) implement a career advancement plan;

(E) review progress of a career advancement plan;

(F) maintain positive interpersonal skills to enhance advancement potential;

(G) perform quality work as measured by a performance evaluation;

(H) pursue education and training opportunities to acquire skills necessary for career advancement;

(I) document successful completion of education and training opportunities;

(J) participate in professional development opportunities such as professional organizations and associations, trade shows, and seminars;

(K) read professional journals, magazines, manufacturers' catalogs, industry publications, and Internet sites to keep current on industry trends; and

(L) identify and prepare for new and emerging occupations, practices, and procedures as well as declining occupations and practices.

(34) The student examines the organization and structure of various segments of the industry to prepare for career advancement. The student is expected to:

(A) recognize segments of the construction industry and show the relationships to specialty areas;

(B) obtain necessary knowledge and skills to enhance employability;

(C) research local and regional labor markets and job growth information to project potential for advancement;

(D) identify sources of career information;

(E) identify job opportunities for the trade;

(F) identify organizations that offer career and job placement;

(G) analyze potential growth of identified careers;

(H) apply labor market and job growth information to career goals;

(I) examine licensing, certification, and credentialing requirements at the national, state, and local levels to achieve compliance;

(J) align licensing, certification, and credentialing requirements to career goals in order to plan for career advancement;

(K) use technologies and resources to research licensing, certification, and credentialing;

(L) evaluate and select suitable sources of licensing, certification, and credentialing;

(M) identify licenses, certifications, and credentials applicable to career goals; and

(N) document sources and agencies for licensing and certification and credentialing information, including contact information.

(35) The student recognizes the responsibilities and personal characteristics of a professional in architecture and construction to develop personal goals for professionalism. The student is expected to:

(A) research information to identify appropriate responsibilities and personal characteristics;

(B) practice the responsibilities and characteristics of a professional in architecture and construction;

(C) identify all critical functions;

(D) document customer satisfaction;

(E) present a professional image in the workplace or job site to enhance career advancement;

(F) maintain appropriate professional memberships; and

(G) follow rules, regulations, and guidelines.

(36) The student initiates and maintains a career portfolio to document knowledge, skills, and abilities. The student is expected to:

(A) select educational and work history highlights to create a personal resumé;

(B) develop a resumé using word processing technology;

(C) contact professional references to acquire recommendations;

(D) obtain appropriate letters of recommendation;

(E) maintain a record of work experiences, licenses, certifications, and education to build a portfolio;

(F) document work experience;

(G) document receipt of licenses, certifications, and credentialing; and

(H) document completion of education and training.

(37) The student reads technical drawings and documents to plan a project. The student is expected to:

(A) interpret blueprints and drawings to assist with project planning;

(B) recognize elements and symbols of blueprints and drawings;

(C) relate information on blueprints to actual locations on the print;

(D) recognize different classifications of drawings; and

(E) interpret and use drawing dimensions.

(38) The student uses and maintains appropriate tools, machines, and equipment to accomplish project goals. The student is expected to:

(A) select tools, machinery, and equipment to match requirements of the project;

(B) safely operate tools, machinery, and equipment;

(C) properly maintain and care for tools, machines, and equipment;

(D) use tools, machines, and equipment productively and efficiently in alignment with industry standards;

(E) identify sources of information concerning state-of-the-art tools, equipment, materials, technologies, and methodologies;

(F) read current periodicals, industry publications, and manufacturers' catalogs; and

(G) use state-of-the-art tools, equipment, materials, technologies, and methodologies.

(39) The student recognizes, identifies, and discusses the appropriate safe use and maintenance of tools used in construction careers. The student is expected to:

(A) recognize, identify, and discuss the appropriate safe use and maintenance of some of the commonly used power tools in construction such as hammers, screwdrivers, sledgehammers, ripping bars and nail pullers, pliers and wire cutters, rulers and other measuring tools, levels, squares, plumb bob, chalk lines, bench vises, clamps, saws, files and rasps, chisels and punches, wrenches, sockets and ratchets, torque wrenches, wedges, utility knives, chain falls and come-alongs, wire brushes, and shovels;

(B) identify and describe the use of slings and common rigging hardware;

(C) describe basic inspection techniques and rejection criteria used for slings and hardware;

(D) describe basic hitch configurations and their proper connections;

(E) describe basic load-handling safety practices; and

(F) demonstrate proper use of American National Standards Institute hand signals.