Santiago High School
Corona-Norco Unified School District

Digital Drawing for Game Art
2018-2019 Semester 1 & 2

Course Syllabus

Instructor Mr. Gallery
E-mail eric.gallery@cnusd.k12.ca.us
Room E116
Phone 951 739-5600 x2409
Hours Period 4

Text(s)/Resource(s):

3D Game Textures: Create Professional Game Art Using Photoshop (3rd Ed)
Luke Ahern
Focal Press, 2012

Description:

This course is an introduction to digital drawing techniques using industry standard software. Topics include usage of digital drawing hardware, digital image manipulation, techniques for digitally painting custom textures, exploration of the elements of art as they apply to games, composition, and perspective, layout design, character design, and concept development. Includes development of observational, motor, and creative skills. Use of layers, layer styles, adjustment layers and blending modes.

ARTICULATION - **Completion of this course, with a 'B' grade or higher, will give students articulated credit with Riverside Community College District (RCCD) - Norco College, earning (4) college credits, pending the students completing the required application process.**

Goals:

Upon successful completion of the course students should be able to:

- Complete projects using industry standard digital drawing software using selections, layers and channels to create digital paintings and textures used in game art.
- Apply methods of critical analysis and synthesis in creating a game art project using industry standard digital painting methods and image manipulation.
- Use Layers, Layer Styles, Adjustment Layers and Blending Modes.
- Create custom texture maps for video games and animation software.
- Participate in critical discussions and reviews, assessing artworks using appropriate terminology.

Student Expectations:

- **Respect:** Please show respect at all times – to yourself, your fellow students, and all teachers and staff. It is important to respect the ideas of others, even when you don't agree. This includes not letting yourself be distracted during instructional time.

- **Attitude:** Please come to class with a positive attitude. "*Whether you think you can or think you can't, you are right*".
- **Academic Honesty:** Please practice honesty and integrity in completing all of your assignments. Cheating is the most destructive action in the academic world, Cheating undermines the academic process, shatters student integrity, and destroys the trust necessary to teacher-student relationships. All students involved in cheating will be subject to lowered academic and citizenship grades.
- **Attendance:** Please come to class and on time! Excessive absences and tardiness (for any reason) will also lead to lowered academic and citizenship grades.
- **Assignments:** Successfully completing all classroom and homework assignments are critical to your success in this class.
- **Keep Your Work!** It is extremely important to save your files and keep all of your assignments until after the end of the school year.

Requirements:

Students will be required to complete the following types of assignments throughout the year:

- In-Class and Outside-of-Class Reading Assignments
- In-Class and Outside-of-Class Writing Assignments
- Various In-Class and Outside-of-Class Assignments

Resources:

- Mr. Gallery, Room E116, eric.gallery@cnusd.k12.ca.us
- Internet, Library
- Classmates

Evaluation:

Your grade will be based on the following components:

- Classwork (approx. 50%) – Individual & Small-Group Projects & Activities, Written Reports
- Tests (approx. 15%) – Quizzes and Exams
- Final (approx. 10%) – Project & Exam
- Participation (approx. 25%) – Attendance, Class Participation, Staying on Task

Between 2 and 6 participation points are earned each day depending on the length of the class period. To keep all the participation points for the day, students must be present, on time, and on task. A student who is tardy will lose points based on how late he or she is (*1 point during the first 20 minutes, another point during the next 20 minutes, etc.*) A student who is absent (excused or unexcused) will not earn participation points for the day (*exceptions may be made for absences due to school-related functions, chronic illness, or an emergency*).

Grading is done on a points-based system, where your total points earned are divided by the total points available. In general, exams and larger assignments are worth more points than other assignments. Students will have limited opportunity for extra credit throughout the school year.

Grading Scale

A+	97.0 – 100%	B+	87.0 – 89.9%	C+	77.0 – 79.9%	D+	67.0 – 69.9%
A	93.0 – 96.9%	B	83.0 – 86.9%	C	73.0 – 76.9%	D	63.0 – 66.9%
A-	90.0 – 92.9%	B-	80.0 – 82.9%	C-	70.0 – 72.9%	D-	60.0 – 62.9%
						F	less than 60

Class Rules:

Food and Drinks – No food or drinks are allowed in class (including water - *due to the electronic equipment in the room*)

Electronic Devices – Phones and other electronic devices are allowed in class if they do not become a distraction (texting, playing games, checking social media, web browsing, etc.). Students who are regularly off task or behind in their work, will have their phone privileges revoked. However, during instructional time, tests and quizzes, electronic devices are not to be used at all (unless directed to by the teacher).

Computer Use – The classroom computers and related devices are to be used for classwork only. Do not download any files or programs not related to your classwork. Do not change the Login screen background. Do not install any program without permission of the teacher. Do not run any unapproved programs (Minecraft, Call of Duty, Halo, etc.), even from a network or external drive. Do not view or download any images, videos, or sound files that are offensive, racist, promote violence or drug use, etc.

Failure to follow these rules will result in one or more of the following disciplinary actions: Loss of participation points, parent notification, after-school detention, Saturday School, loss of computer privileges.

COURSE OUTLINE:		**CA State CTE Game (IT Sector & AME Sector)**
Week(s):	**Topic**	**& Anchor Standards**
1 - 2	Basic Art & Color Theory *Elements of Art, Principles of Design, Primary, Secondary, Monochromatic, Greyscale, Warm, Cool, Hue, Tint, Shade, Analogous*	G(AME) 4.0, 10.0; G(IT) – D 1.0, 2.0, 5.0 AS 1.0, 2.0, 4.0
3 - 4	Digital Drawing Core Concepts *Navigation & Interface, Tool bars/customization, Layers, Selection, Hand Painting, Texture Manipulation, Brushes & Pallets*	G(AME) 4.0, 8.0, 10.0; G(IT) – D 1.0, 2.0, 5.0 AS 1.0, 2.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0
5 - 6	Composition *Elements*: Line, Shape, Form (Light/Dark), Color, Texture, Space (Positive/Negative), Balance, Continuity, Rhythm, Proportion (Golden Ratio, Rule of Thirds)	G(AME) 4.0, 10.0; G(IT) – D 1.0, 2.0, 5.0 AS 1.0, 2.0, 4.0, 5.0, 7.0, 8.0, 9.0, 10.0, 11.0
7 - 8	Selection Concepts *Quick Selection Sets, Selection Conversion-paths and masks, Editing a Mask – saving, conversion*	G(AME) 4.0, 10.0; G(IT) – D 1.0, 2.0, 5.0 AS 1.0, 2.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0
9 - 11	Pen Tool *Techniques, Bezier Handles & Types, Converting Anchor Points, Paths, Path Layers*	G(AME) 4.0, 8.0, 10.0; G(IT) – D 1.0, 2.0, 5.0 AS 1.0, 2.0, 4.0, 5.0, 6.0, 7.0 8.0, 9.0, 10.0, 11.0
12 - 14	Careers & Leadership *Resumes, Skills, Certifications, Industry Standards, CTSO Opportunities & Competitions*	G(AME) 2.0, 4.0, 9.0, 10.0; G(IT) – D 1.0, 2.0, 5.0 AS 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0
15 - 17	Tools *Navigation, Tablet Drawing, Importing and Transforming Images, Image – Size, Resolution, Color Modes*	G(AME) 4.0, 10.0; G(IT) – D 1.0, 2.0, 5.0 AS 1.0, 2.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0
18 - 22	Tools Painting Texture *Layers* – Filters & Brushes Editing Texture Pages – Transforms, Free Transform, Rotating, Scale, Skew Perspective, Short Cuts, Fill Options for Texture Styles: Basic Fills, Pattern Fills, Content Aware, Opacity & Flow Options, Text and Customization	G(AME) 4.0, 7.0, 10.0; G(IT) – D 1.0, 2.0, 5.0 AS 1.0, 2.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0
23 - 28	Layers *Layer Palette, Styles, Flattening, Layers Styles for Mapping Techniques, Blending Modes, Adjustment Layers, Layer Composites, Locks, FX, Groups, Selection, Channels & Channel Masks, Filters, Gradient Maps*	G(AME) 4.0, 10.0; G(IT) – D 1.0, 2.0, 5.0 AS 1.0, 2.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0
29 - 36	Advanced Painting & Editing Techniques *Custom* Painting Techniques – Water Color, Acrylic, Oils *Custom Textures and Uses – Bump Map, Specular Map, Opacity/Alpha Maps, Displacement, Hand Painted, Seamless, Photo, Custom Brushes – Creating/Defining Custom Brushes, Importing, Adjusting, Saving, Use of 3D Images to Enhance Textures – As Templates: UV Pages, 3D Models, Ambient Occlusion Maps, Game Art Textures and Bitmaps, Tilable/Seamless/Offset Texture Maps, Types of Files for Games, Custom Actions, Patterns*	G(AME) 4.0, 6.0, 10.0; G(IT) – D 1.0, 2.0, 5.0 AS 1.0, 2.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0

Projects to include:
Comic Style Coloring, Photo-manipulation & Retouching, Animations, Portraits and Character Design, Background Painting, Matte Painting, Painting 3D Objects, Creating Hand Painted AO Maps and other topics.

*Timeline is an estimate. Other topics may be included.

CA State CTE Arts, Media, and Entertainment Pathway Standards - Game Design and Integration Pathway

Students who follow the Game Design and Integration pathway prepare for careers within the game design industry and in related technical fields. Students will develop foundational knowledge in game design, animation, graphics, and computer software and hardware. They will apply skills in Mathematics, Physics, English Language Arts, Social Science, and Entrepreneurship. Most importantly, students will learn the twenty-first century skills of creativity, critical thinking, communication, collaboration, and technical expertise, which will increase employment capacity across the job market. In the Game Design and Integration Pathway students prepare for both entry-level employment and additional postsecondary training needed for advancement in the highly competitive game design industry. They prepare for occupations such as Game Tester/Analyst, 2-D and 3-D Animator, Storyboard, Level Artist, Texture Artist, Cinematic Artist, Game Designer, Game Programmer, and Production Team Manager. Students completing this pathway develop the skills and knowledge to be creative partners in video game design while building capacity for employment in all areas of the creative workforce.

D1.0 Demonstrate understanding of current trends and the historical significance of both electronic and non-electronic games. Students will analyze different game systems and identify how these systems have influenced consumer technology.

- D1.1 Research and analyze different game genres, including multiplayer games.
- D1.2 Define and use necessary vocabulary related to games, their genres, game platforms, and game hardware.
- D1.3 Research, compare, and categorize different game platforms and game hardware.
- D1.4 Analyze the technology transfer from video games to other industries, such as education, medical, corporate training, and military simulation.
- D1.5 Present a mock-up of a future generation game platform and hardware system based on research of current and emerging technologies and future predictions.

D2.0 Analyze the core tasks and challenges of video game design and explore the methods used to create and sustain player immersion.

- D2.1 Identify and define the roles and responsibilities of each member of a video game design team.
- D2.2 Break down and identify the fundamental building blocks of game play: player goals, player actions, rewards, and challenges.
- D2.3 Research various input controls and display types then identify how these impact game play.
- D2.4 Research and define the term “player immersion.”
- D2.5 Explore and explain the factors that create player immersion in a game.
- D2.6 Compare and contrast player-centric design and designer-centric design in video games.
- D2.7 Describe a designer-centric game to highlighting features other than game play and entertainment value.
- D2.8 Prototype a small game using real-world objects, such as dice, cards, balls, pen and paper, etc.

D3.0 Acquire and apply appropriate game programming concepts and skills to develop a playable video game.

- D3.1 Implement common programming concepts, including logic operators, conditional statements, loops, variables, events, actions, and handling user input.
- D3.2 Understand the basics of game physics, including collision and motion.
- D3.3 Examine the use of math and physics (such as gravity and friction) in game development.
- D3.4 Explore the basics of random number generation.
- D3.5 Implement a small video game utilizing mathematics and physics that features at least one moving object (such as a spaceship) which rotates along an axis and moves in whichever direction it is facing after rotation. The game must include collision physics.

D4.0 Students will demonstrate mastery of game art and multimedia, including music, sound, art, and animation.

- D4.1 Demonstrate understanding of the elements of art, including line, shape, color, value, texture, space, and balance, to set the mood and feel of a scene.

D4.2 Research and describe the different perspectives used in video games, including first person, second person, and third person perspectives.
D4.3 Explain how to create the illusion of 3-D in a 2-D environment.
D4.4 Create 2-D art and 3-D models.
D4.5 Create an animation sequence.
D4.6 Design a game environment using lines, fills, and color to set a specific mood and feel of a scene.
D4.7 Create, record, and edit audio for a game.
D4.8 Define and discuss intellectual property, copyrights, trademarks, and piracy as they relate to art and multimedia assets in a game.
D4.9 Understand the basics of character design and development, world design, and level design.
D4.10 Create a storyboard for a game cut-scene applying the basic principles of design and concepts of cinematography.

D5.0 Demonstrate an understanding of testing techniques used to evaluate, assess, rate, and review quality assurance of video games.

D5.1 Test and analyze games to determine the quality of rules, interfaces, navigation, performance, and game play.
D5.2 Identify the key elements in a game and make intelligent judgments about whether the game succeeded or failed in its objectives.
D5.3 Compare and contrast the differences between functionality and usability of software.
D5.4 Evaluate games in terms of accessibility issues.
D5.5 Demonstrate technical reading and writing skills.
D5.6 Test a classmate's game project and create a bug report for the game. For each error submitted, write steps in sufficient detail so it is identifiable and reproducible to the developer. Use a metric to identify how critical the error is based on its negative impact on game play.

D6.0 Understand the general procedures, documentation, and requirements of large scale game design projects. Examine and categorize the significant processes in the production of games.

D6.1 Identify processes of design and development from concept to production, including content creation, filling team roles, design documentation, communication, and scheduling for video game design teams.
D6.2 Discuss the iterative nature of game and simulation design.
D6.3 Develop design plans, character sketches, documentation, and storyboards for proposed games.
D6.4 Enumerate individual tasks of a project using basic time management skills to complete each task and track its completion.
D6.5 Describe the importance and interrelationship between development schedule and budget constraints in a video game design project.
D6.6 Compare and contrast common uses of different game development tools.
D6.7 Create a set of original design documents and build a small game.

D7.0 Understand the fundamentals of business and marketing, including entrepreneurship, global marketing, and localization.

D7.1 Identify, define, and discuss the different ways games are funded, distributed, marketed, and sold.
D7.2 Identify and describe licensing management for different game platforms, tools, and intellectual properties.
D7.3 Identify successful business models and analyze various facets of those models, such as market analysis, marketing strategy, and product value.
D7.4 Understand the components of marketing campaigns for games, including advertising in traditional and social media.
D7.5 Understand the role community management plays in marketing and business models.
D7.6 Discuss the relationships between publishers, developers, distributors, marketers, and retailers.
D7.7 Evaluate game journalism and professional reviews in terms of bias.

D7.8 Explore and describe the effects of globalization on the design and production of video games.
D7.9 Evaluate how video games adhere to government rating systems.
D7.10 Create a plan for a game to target a specific audience within three different countries while adhering to their governments' rating systems.

D8.0 Understand the impact of games and the role of play in human culture. Analyze the ethics and global impact of the game industry.

D8.1 Discuss the word "play" and its many definitions.
D8.2 Investigate and discuss how play can help humans acquire knowledge and social skills.
D8.3 Describe the benefits of games and simulations, including online economies and community building.
D8.4 Compare and contrast the different opinions on the effects of games on behavior, cognitive development, and motor skills.
D8.5 Describe how frequent exposure and/or access to video games has reshaped the level of technical proficiency of our workforce.
D8.6 Explore and discuss the impact of video games on the economy.
D8.7 Design a game you believe will have positive impact on the world.

D9.0 Identify career goals and develop a career plan that explores employment opportunities in the video game industry.

D9.1 Demonstrate personal and interpersonal skills appropriate for the workplace, such as responsibility, dependability, punctuality, positive attitude, initiative, respect for self and others, and professional dress.
D9.2 Investigate how the skills acquired in game design/development can be applied to other industries.
D9.3 Use personal assessment tools to identify personal and professional strengths and weaknesses.
D9.4 Analyze job and career requirements as related to career interests and opportunities in the game industry.
D9.5 Investigate the common employment contracts in the game industry, such as Nondisclosure Agreements, "Work for Hire" agreements, and "Noncompete" clauses.
D9.6 Create a resume and use it during a mock interview. At the end of the interview process, apply negotiation skills as they relate to salary and benefits packages.

D10.0 Students will build a game that demonstrates teamwork and project management by creating a game design production plan that describes the game play, outcomes, controls, rewards, interface, and artistic style of a video game.

D10.1 Use design documents to create a game design production plan.
D10.2 Solicit and accept constructive criticism.
D10.3 Use computer tools to create game programming, art, and audio.
D10.4 Create and use animated objects in a game.
D10.5 Create sound and music to enhance the game experience.
D10.6 Test and debug the completed game.
D10.7 Apply listening, speaking, and collaborative communication skills to effectively convey information.
D10.8 Demonstrate a professional level of written and oral communication as necessary in the game industry.

CA State CTE Information & Communication Technologies Pathway Standards – Games and Simulation Pathway

Students in the Game and Simulation pathway learn relevant technical knowledge and skills to prepare for further education and careers. Game and simulation design requires that students have a solid foundational understanding of game design, hardware, graphics, and animation. Persons with expertise in game and simulation design have had practical experiences in game/simulation conceptualization, design, storyboarding, development methodologies, essential programming techniques, working with a team, and implementation issues.

D1.0 Identify and describe critical game and simulation studies, the resulting societal impact, and the management, industry, and career requirements.

- D1.1 Categorize the different gaming genres and gaming systems.
- D1.2 Describe the historical significance of electronic and nonelectronic games.
- D1.3 Describe the role of play in human culture.
- D1.4 Describe the psychological impact of games on individuals and groups.
- D1.5 Describe the business model commonly used in the game development industry.
- D1.6 Examine and categorize the significant processes in the production of interactive games.
- D1.7 Identify the core tasks and challenges that face a game or simulation design team.
- D1.8 Describe legal issues that affect games, developers and players.
- D1.9 Describe the impact of the game and simulation industry on the economy.

D2.0 Demonstrate an understanding of game and simulation analysis, design, standard documentation, and development tools.

- D2.1 Demonstrate an understanding of the vocabulary for discussing games and play by listing and describing the general procedure and requirements of game and simulation design.
- D2.2 Describe the game development life cycle.
- D2.3 Develop a game design document or blueprint.
- D2.4 Understand the general principles of storytelling and the use of storyboarding in game design.
- D2.5 Know how to use tools and software commonly used in game/simulation development and become familiar with popular game tools and different gaming engines.
- D2.6 Demonstrate an understanding of the techniques used to evaluate game mechanics, game play, flow, and game design.
- D2.7 Describe the complex interaction between games and players and the role it plays in the popularity of a game.
- D2.8 Experience the methods used to create and sustain player immersion.
- D2.9 Demonstrate an understanding of interface design, hardware constraints on games, including processors and I/O devices, and nonhardware constraints.
- D2.10 Make informed decisions about game physics: how the game world works, how the players interact with the game world, and how the players interact with one another.

D3.0 Create a working game or simulation individually or as part of a team.

- D3.1 Create a storyboard describing the essential elements, plot, flow, and functions of the game/simulation.
- D3.2 Create a design specification document to include interface and delivery choices, rules of play, navigation functionality, scoring, media choices, start and end of play, special features, and development team credits.
- D3.3 Using simple game development tools, create a game or simulation.
- D3.4 Present the game or simulation.

D4.0 Identify, describe, and implement standard game/simulation strategy and rules of play.

- D4.1 Understand strategic outlining in game designs.
- D4.2 Know elements of puzzle design.

D4.3 Use key strategic considerations in game design.
D4.4 Understand the process of creating and designing player actions.
D4.5 Create and design the game flow as it relates to story and plot.
D4.6 Assess common principles and procedures in game flow design.
D4.7 Describe rule creation elements of player challenge.

D5.0 Integrate music, sound, art, and animation as it applies to the environmental design of the game/simulation.
D5.1 Understand the methodologies for integrating digital media into a game or simulation.
D5.2 Identify commonly used art and animation production tools in the game design industry.
D5.3 Understand the general concepts of environmental design.
D5.4 Describe how environmental design is used in conjunction with game level design.

D6.0 Explain the role and principles of event modeling and interface design and apply those principles in a game/simulation design and project.
D6.1 Define the meaning of simulation and pertinent issues facing game designers.
D6.2 Describe applied event modeling as it relates to game design.
D6.3 Identify and describe the basic Human Computer Interface (HCI) design principles.
D6.4 Apply the "eight golden rules" of interface design.
D6.5 Understand the use of inventory systems in game design.

D7.0 Acquire and apply appropriate programming skills for rendering a single player or multiuser game or simulation project, including program control, conditional branching, memory management, scorekeeping, timed event strategies, and implementation issues.
D7.1 Identify functions of information processing and describe basic network terminology and network security and demonstrate an understanding of operating systems, environments, and platforms.
D7.2 Plan program design and evaluate assigned game programming tasks.
D7.3 Code and test programs.
D7.4 Create and maintain documentation and perform program maintenance.
D7.5 Implement enhanced program structures.
D7.6 Implement multimedia programming.

D8.0 Acquire and apply appropriate artificial intelligence (AI) techniques used by the game development industry.
D8.1 Describe AI and how it relates to game and simulation design and development.
D8.2 Design, program, and implement intelligent agents for action games.
D8.3 Use AI techniques, like finite state machines, to produce the illusion of intelligence in the behavior of nonplayer characters (NPCs).
D8.4 Create intelligently designed games that would educate as well as engage the players.

CA State CTE Information & Communication Technologies Anchor Standards

1.0 Academics

Analyze and apply appropriate academic standards required for successful industry sector pathway completion leading to postsecondary education and employment. Refer to the Information and Communication Technologies academic alignment matrix for identification of standards.

2.0 Communications

Acquire and accurately use Information and Communication Technologies sector terminology and protocols at the career and college readiness level for communicating effectively in oral, written, and multimedia formats. (Direct alignment with LS 9-10, 11-12.6)

3.0 Career Planning and Management

Integrate multiple sources of career information from diverse formats to make informed career decisions, solve problems, and manage personal career plans. (Direct alignment with SLS 11-12.2)

4.0 Technology

Use existing and emerging technology, to investigate, research, and produce products and services, including new information, as required in the Information and Communication Technologies sector workplace environment. (Direct alignment with WS 11-12.6)

5.0 Problem Solving and Critical Thinking

Conduct short, as well as more sustained, research to create alternative solutions to answer a question or solve a problem unique to the Information and Communication Technologies sector using critical and creative thinking, logical reasoning, analysis, inquiry, and problem-solving techniques. (Direct alignment with WS 11-12.7)

6.0 Health and Safety

Demonstrate health and safety procedures, regulations, and personal health practices and determine the meaning of symbols, key terms, and domain-specific words and phrases as related to the Information and Communication Technologies sector workplace environment. (Direct alignment with RSTS 9-10, 11-12.4)

7.0 Responsibility and Flexibility

Initiate, and participate in, a range of collaborations demonstrating behaviors that reflect personal and professional responsibility, flexibility, and respect in the Information and Communication Technologies sector workplace environment and community settings. (Direct alignment with SLS 9-10, 11-12.1)

8.0 Ethics and Legal Responsibilities

Practice professional, ethical, and legal behavior, responding thoughtfully to diverse perspectives and resolving contradictions when possible, consistent with applicable laws, regulations, and organizational norms. (Direct alignment with SLS 11-12.1d)

9.0 Leadership and Teamwork

Work with peers to promote divergent and creative perspectives, effective leadership, group dynamics, team and individual decision making, benefits of workforce diversity, and conflict resolution such as those practiced in the Future Business Leaders of America and SkillsUSA career technical student organization. (Direct alignment with SLS 11-12.1b)

10.0 Technical Knowledge and Skills

Apply essential technical knowledge and skills common to all pathways in the Information and Communication Technologies sector, following procedures when carrying out experiments or performing technical tasks. (Direct alignment with WS 11-12.6)

11.0 Demonstration and Application

Demonstrate and apply the knowledge and skills contained in the Information and Communication Technologies anchor standards, pathway standards, and performance indicators in classroom, laboratory, and workplace settings, and through career technical student organizations such as Future Business Leaders of America and SkillsUSA.