



DIGITAL ANIMATION 10.0304.00

TECHNICAL STANDARDS

An Industry Technical Standards Validation Committee developed and validated these standards on February 11, 2020. The Arizona Career and Technical Education Quality Commission, the validating authority for the Arizona Skills Standards Assessment System, endorsed these standards on July 13, 2020.

Note: Arizona's Professional Skills are taught as an integral part of the Digital Animation program.

The Technical Skills Assessment for Digital Animation is available SY2021-2022.

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STANDARD 1.0 ANALYZE THE COMMUNICATION MEDIA TECHNOLOGIES INDUSTRY, ITS BUSINESS PRACTICES, AND ITS ROLE IN THE ECONOMY

- 1.1 Investigate the history and evolution of the Communication Media Technologies industry (i.e., technology, processes, production, etc.)
- 1.2 Examine the impact of social media and emerging technologies on the Communication Media Technologies industry
- 1.3 Research the societal and economic impact of the Communication Media Technologies industry
- 1.4 Examine the impact of the Communication Media Technologies Industry on marketing practices (i.e., delivery systems, monetization, etc.)
- 1.5 Define cultural diversity and the need for awareness and sensitivity in creative and professional decision-making
- 1.6 Explain the importance of multiculturalism in creative and professional decision-making (i.e., treating impartially and fairly each ethnic group, etc.)
- 1.7 Analyze client/service provider interaction practices appropriate to the Communication Media Technologies industry (e.g., customer service)
- 1.8 Determine budgets for various media projects and/or specific sub-tasks (e.g., personnel requirements, labor costs, and expenses)
- 1.9 Examine time management practices appropriate to the Communication Media Technologies industry (i.e., scheduling, hourly tracking, task management, managing deadlines, etc.)
- 1.10 Identify professions that comprise the Communication Media Technologies industry (i.e., animation, broadcasting, filmmaking, graphic design, illustration, music and audio production, digital imaging, printing, publishing, etc.)
- 1.11 Describe how diversity (cultural, ethnic, multigenerational) and ethics affect the selection of programs, projects, and creative choices
- 1.12 Compare various business models for generating income (i.e., employment, entrepreneurship, the gig economy, social media monetization, etc.)
- 1.13 Describe how production processes, cycles, and deadlines affect media businesses and career pathways
- 1.14 Comply with the safety standards and regulations specific to OSHA (specific to OSHA 10)
- 1.15 Describe how the Americans with Disabilities Act (ADA) affects creative professionals in various roles (e.g., employees/employers, subordinates/managers, and customers/suppliers)

STANDARD 2.0 INVESTIGATE INTELLECTUAL PROPERTY (IP) LAW AND RIGHTS MANAGEMENT

- 2.1 Identify current legal issues in media professions
- 2.2 Examine intellectual property law and its ramifications (e.g., copyright, free and fair use, and licensing)
- 2.3 Explain plagiarism and its effects in business

STANDARD 3.0 DEMONSTRATE CLIENT/SERVICE PROVIDER PRACTICES APPROPRIATE TO DIGITAL ANIMATION

- 3.1 Use industry terminology appropriate to the work environment
- 3.2 Employ written, verbal, and nonverbal communications that are appropriate to the target audience and situation (i.e., active listening, empathy, body language, openness, negotiation, problem solving, conflict resolution, assertiveness, positive attitude, etc.)

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- 3.3 Practice verbal, nonverbal, and listening communication skills for effectiveness with people of diverse cultures, generations, and situations (i.e., email, text, phone call, video conferencing, interpersonal meetings, etc.)
- 3.4 Conduct formal and informal research to collect information, verify the accuracy of information, and authority of sources
- 3.5 Assess the stated purpose and audience when making content choices and developing communications
- 3.6 Apply editing and proofing skills when reviewing any communication

STANDARD 4.0 UTILIZE TECHNOLOGY TO MANAGE PRINCIPLES, ACTIVITIES, AND TRENDS IN DIGITAL ANIMATION

- 4.1 Select appropriate software and hardware for specific work tasks (i.e., time management, customer services records, media projects, etc.)
- 4.2 Apply essential commands and knowledge of computer operating systems
- 4.3 Utilize computer file management techniques for organizing, archiving, and version control
- 4.4 Maintain equipment and related accessories
- 4.5 Explain methods of protecting computer systems against data loss and external threats (e.g., on-premise and in the cloud)
- 4.6 Identify software and hardware that supports data capture (i.e., digital image, video, 3D models, motion, facial, and camera tracking, etc.)
- 4.7 Select appropriate standards and formats for data, creation, capture, and exchange
- 4.8 Determine efficient methods for converting, editing, exchanging, and ingesting data (i.e., sharing between systems, contractors, clients, etc.)

STANDARD 5.0 ENGAGE IN PRE-PRODUCTION/PLANNING PHASE OF CONTENT CREATION IN DIGITAL ANIMATION

- 5.1 Interpret a design brief (e.g., art styles, platform specifications, asset lists, and priorities)
- 5.2 Select creative approaches that meet the needs of the design brief (e.g., time scales, polygon counts, and texture sizes)
- 5.3 Develop a plan to efficiently develop, reuse, and repurpose assets for use on the project
- 5.4 Create a folder hierarchy and organize project files within folders using consistent naming conventions (e.g., naming layers in Photoshop and naming objects in a 3D program)
- 5.5 Apply the elements and principles of design to all drawings, models, environments, and projects
- 5.6 Apply drawing skills (i.e., shading, perspective, and gesture drawing)
- 5.7 Apply basic anatomy to figure drawing and character design
- 5.8 Develop concept art for all key (priority) assets (e.g., thumbnails and silhouette sketches)
- 5.9 Apply the 12 principles of animation to all animated projects (e.g., *The Illusion of Life*)
- 5.10 Create detailed comprehensive storyboards for a project

STANDARD 6.0 IMPLEMENT PLANS FOR THE CREATION OF CONTENT USING MODELING, TEXTURING, AND LIGHTING TECHNIQUES

- 6.1 Explain the animation pipeline and its stages
- 6.2 Construct 3D models using appropriate techniques and geometric principles (e.g., Boolean, polygonal, NURBS/hyper-nurbs, subdivision surfaces, sculpting, and symmetrical)
- 6.3 Classify organic vs. hard surface modeling
- 6.4 Create texture maps on polygon objects using planar, cylindrical, spherical mapping, and the UV texture editor
- 6.5 Evaluate and correct UVW maps and surface normals
- 6.6 Differentiate among types of surface shaders for various rendering techniques [i.e., Phong, ray tracing, Physically Based Rendering (PBR), High Dynamic Range Imaging (HDRIs), etc.]
- 6.7 Create complex textures and reflections using process/nodal maps with commercial software
- 6.8 Simulate fire, hair, cloth, crowds, and fluids using particles and dynamic systems
- 6.9 Differentiate among types of lights and their attributes
- 6.10 Explain the three lights in the three-point lighting system
- 6.11 Compare white and colored lights and shadows to create mood in a scene

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STANDARD 7.0 IMPLEMENT PLANS FOR THE CREATION AND DELIVERY OF CONTENT USING VARIOUS RIGGING AND ANIMATION TECHNIQUES AS WELL AS DYNAMIC SIMULATION AND RENDERING

- 7.1 Explain the efficiencies at render time for pre-baking lighting solutions and shadows
- 7.2 Compare exposure sheet with Graph and Curve Editor for manipulating keyframe interpolation
- 7.3 Create animation using motion paths and constraints [i.e., Set Dynamic Keys (SDKs)/action constraints, Artificial Intelligence (AI), etc.]
- 7.4 Explain the use of bones, armatures, and constraints for rigging and skinning techniques [i.e., forward kinematics and inverse kinematics (FK/IK)]
- 7.5 Explain how cinematic decisions [i.e., Field of View (FOV), camera angles, paths, etc.] for capturing images from a 3D scene can be used to make an aesthetically pleasing composition that reinforces the story
- 7.6 Export assets to real-time rendering engine in the appropriate format and inspect/correct UVW maps, textures, and lighting to emphasize the most important aspects of the scene
- 7.7 Test assets in the real-time engine to ensure animations and deformations work as intended
- 7.8 Compare the benefits of different rendering methods (e.g., real-time rendering, or offline as an image sequence, or video file)
- 7.9 Explain how exposing parameters of digital assets can enhance their utility and value [i.e., programmatic access, creating user interfaces (UI), repurposing assets, etc.]

STANDARD 8.0 PERFORM TASKS IN POST-PRODUCTION PHASE OF REFINEMENT IN DIGITAL ANIMATION

- 8.1 Animate layers of footage in a compositing program
- 8.2 Create cinematic transitions and atmospheric effects
- 8.3 Generate masks and track mattes
- 8.4 Choose color-keying techniques (i.e., Keylight, color difference, difference mattes, spill suppressors, etc.)
- 8.5 Track motion and apply the data to footage
- 8.6 Combine sound files and image sequences into a movie file

STANDARD 9.0 DELIVER/DISTRIBUTE CONTENT USING VARIOUS MEDIA IN ACCORDANCE WITH CLIENT EXPECTATIONS IN DIGITAL ANIMATION

- 9.1 Identify various file formats and their advantages and disadvantages
- 9.2 Select video or audio codecs for various file formats and target delivery platforms
- 9.3 Create or convert 3D modeling/animation to be viewed through Virtual Reality (VR) (i.e., Oculus, HTC Vive, etc.), Augmented Reality (AR), and Mixed Reality (MR), and a merging of VR with AR (i.e., MS HoloLens2, Magic Leap, etc.)
- 9.4 Identify security considerations when using the internet as a delivery system (i.e., Dropbox, Google Drive, GitHub, etc.)

STANDARD 10.0 MONITOR QUALITY ASSURANCE OF CONTENT CREATION CONCURRENT WITH ALL PHASES OF PRODUCTION IN DIGITAL ANIMATION

- 10.1 Critique delivered content for artisanship, effectiveness, and tone (i.e., concept art, storyboards, textures, models, images, rendered animations, etc.)
- 10.2 Review a project workflow after completion and determine areas for improvement
- 10.3 Identify organizational and communication factors that contribute to the relative success of the project

STANDARD 11.0 PRESENT TO SELECTED AUDIENCE(S) USING DIGITAL ANIMATION

- 11.1 Structure and develop a portfolio and/or demo reel of an appropriate subject matter and quality
- 11.2 Explore methods of distributing portfolios and demo reels for the purpose of work, employment, or investment
- 11.3 Research industries and companies as potential employers; develop job-specific cover letters and résumés
- 11.4 Explore interviewing techniques for professional placement
- 11.5 Explain how to create an effective pitch and/or animatic

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