Massachusetts Career Technical Education

Radio and Television Broadcasting Framework

2014

#

# [Strand 2: Technical Knowledge and Skills](#_bookmark0)

##### Fundamentals of Health and Safety in Television and Cinema Production

* + 1. Identify, explain and demonstrate studio production in accordance with current industry and OSHA safety standards.
			1. Explain and demonstrate how to safely set up a ladder and use it both with and without equipment.
			2. Identify how to organize cameras and other production equipment in the studio with proper aisles and egress.
			3. Demonstrate how to hang and focus lighting instruments with proper safety cables and tools.
			4. Demonstrate how to run cables in the studio using proper taping/covering techniques.
			5. Explain how to work with electrical sources and alternating current (AC) or battery powered cinema and video equipment in the studio.
		2. Performance Example:
			- Students will list methods to set up a studio production following safety guidelines.
		3. Identify, explain and demonstrate on-location production in accordance with current industry and OSHA safety standards.
			1. Explain the safety practices for working away, on-location, or in an open environment.
			2. Describe how to organize cameras and other production equipment when working on location while maintaining appropriate aisles and egress.
			3. Demonstrate how to run cables when working on location and using taping/covering techniques.
			4. Explain the necessary safety equipment required and the safety procedures you must follow when working in places of high elevation.
			5. Explain and demonstrate how to properly set up and safely secure lighting equipment when working on location.
			6. Explain how to safely work with electrical sources and AC or battery powered cinema and video equipment.

2.A.02 Performance Examples:

* Students will list methods to set up an on-location production following safety guidelines.
* Students will create a safety plan for use during an on-location production.
	+ 1. Identify proper procedures for handling fragile equipment.
			1. Explain the safe and proper method for replacing the lamps in various types of studio or portable lighting equipment.
			2. Demonstrate how to properly follow manufacturer guidelines and operational procedures for specific cinema and video equipment.
			3. Demonstrate how to properly handle, carry, or transport specific cinema or video equipment when working on location.

2.A.03 Performance Examples:

* Students will demonstrate the handling and usage of cinema and video equipment.
* Students will demonstrate how to change a lamp in a lighting instrument.

##### Fundamentals of Cinema and Video Production

* + 1. Explain concepts fundamental to cinema/video design and composition.
			1. Identify the elements of design (i.e., line, texture, color, scale, movement).
			2. Identify basic camera shots (i.e., establishing, wide, medium, close-up, two- shot, three-shot, knee, bust, cross, over-the-shoulder).
			3. Identify rules of camera movement (i.e., nose room, head room, lead room, overscan areas, safe areas, tilt, track, truck, zoom, arc, cant, tongue, dolly).
			4. Identify elements of composition (i.e., rule of thirds, built in frame, strong diagonal, leading lines, symmetrical balance, asymmetrical balance, contrast, simplicity).
			5. List criteria used to analyze and critique aspects of cinema and video. 2.B.01.06\* Identify advanced elements of composition (i.e., Golden Rectangle, Fibonacci

spiral, rectangle rebatement).

* + 1. Performance Examples:
			- Students will create a visual example demonstrating multiple composition techniques.
			- Students will demonstrate basic camera shots and basic camera movements.
			- Students will critique and analyze a video or cinema focusing on multiple criteria.
		2. Explain concepts fundamental to lighting in cinema and video.
			1. Differentiate between types of lighting techniques for cinema and lighting techniques for video.
			2. Explain the differences between spectral light and diffused light.
			3. Identify the qualities and characteristics of light (i.e., intensity, distribution, direction, color, movement, scale, texture, hard/soft focus).
			4. Contrast properties of reflection versus properties of refraction.
			5. Define and use terms relevant to lighting color theory (i.e., Kelvin color temperature, visible spectrum, natural/artificial light).
			6. Analyze the methods in which color and light can evoke emotion from an audience.
			7. Explain the use of gels/filters to compensate for light source color temperature.
			8. Draw and label a studio set up for three-point lighting (i.e., key, fill, back).
			9. Draw and label a studio light plot for various productions. 2.B.02.10\* Diagram a dimmer/channel chart for a light plot in a studio. 2.B.02.11\* Explain the inverse square law in its relation to positional lighting. 2.B.02.12\* Identify and describe color temperatures specific to various lighting

instruments.

2.B.02 Performance Examples:

* Students will draft a light plot for a studio or remote production.
* Students will list and identify properties of light.
* Students will use gels or filters to adjust a light source for temperature, mood, and color.
	+ 1. Explain concepts fundamental to sets and props in cinema and video.
			1. Identify aspects of set and prop design for cinema and video.
			2. Draw and label a basic studio ground plan.
			3. Draw and label a remote-shoot ground plan.
			4. Draw a concept sketch of a set piece for a remote-shoot. 2.B.03.05\* Design a unit set for use in a cinema or video production.

2.B.03 Performance Examples:

* Students will draft a ground plan for a set or prop for a studio or remote production.
* Students will use measuring/scale techniques for preparation of a concept sketch of a set piece or prop.
	+ 1. Explain concepts fundamental to shooting in cinema and video.
			1. Compare and contrast a single-camera and a multiple-camera production.
			2. Explain the importance of shooting for the edit (i.e., match on action, sequencing, coverage).
			3. Explain the importance of continuity.
			4. Explain the 180° Rule line, and its application in various cinema scenarios.
			5. Identify and establish a specific point-of-view when shooting from a script.
			6. Analyze the methods in which specific shots can evoke emotion from an audience.
			7. Define drop frame and non-drop frame code shooting and explain how to account for both when preparing for an edit.
			8. \* Describe various cinematographic methods necessary when shooting scenes that incorporate post-production visual effects.

2.B.04 Performance Examples:

* Students will list similarities and differences of single-camera and multiple-camera shoots.
* Students will describe multiple shooting considerations that are useful in streamlining the editing process.
	+ 1. Explain the differences between broadcast and non-broadcast media formats.
			1. Differentiate between various digital media formats.
			2. Define rastering and resolution as it relates to cinema and video.
			3. List major broadcast standards (i.e., Advanced Television Systems Committee (ATSC), Phase Alternating Line (PAL), Sequential Color with Memory (SECAM)), their respective regions, and characteristics of each.
			4. Compare and contrast television color standards (Red/Green/Blue (RGB) vs. 601/709).
			5. Identify common aspect ratios (i.e., 4:3, 16:9, letterbox, pillarbox). 2.B.05.06\* Explain chroma subsampling and its relationship to video imaging.

2.B.05 Performance Example:

* Students will list various appropriate media formats and broadcasting signals used in cinema and video production.

##### Fundamentals of Broadcast Journalism

* + 1. Define and describe broadcasting.
			1. Explain the history of broadcasting.
			2. Discuss today’s trends in television broadcasting.
			3. List criteria used to analyze and critique aspects of a television broadcast. 2.C.01.04\* Identify key individuals who influenced change throughout the

development of television broadcasting.

* + 1. Performance Example:
			- Students will analyze today’s broadcasting standards in relation to the history of broadcasting.
		2. Identify production roles in broadcast journalism.
			1. Identify types of lighting techniques for a television broadcast.
			2. Identify types of audio techniques for a television broadcast.
			3. Identify types of camera shots appropriate for a television broadcast.
			4. Identify characteristics of on-screen talent.
			5. Differentiate between broadcast production roles.

2.C.02 Performance Example:

* Students will identify production roles and responsibilities in broadcast journalism and describe how they interrelate to one another.
	+ 1. Explain the role of media literacy in today’s broadcast journalism.
			1. Explain the difference between news, feature, opinion, sports, and other forms of news writing and reporting.
			2. Explain the differences between Electronic Newsgathering (ENG), Electronic Field Production (EFP) and studio productions.
			3. Explain characteristics of newsworthiness, ethics, and bias.
			4. Explain the use of b-roll in broadcast journalism.
			5. Discuss the pros and cons of "going live” with a story.
			6. Explain the role of research in news reporting.
			7. Explain television, cinema, and video copyright laws and describe the needs for each.
			8. Describe the Federal Communications Commission (FCC) regulations and examine the necessity for such regulations in television broadcasting.
			9. Explain multiple perspectives of the argument regarding regulations of broadcasting by the FCC.

2.C.03.10\* Identify major broadcasting legislation and copyright court cases, and explain their significance to today’s broadcasting regulation standards.

2.C.03 Performance Example:

* Students will explain the importance of unbiased reporting, newsworthiness, ethics, and copyright in the creation and distribution of news programs.

##### Fundamentals of Photography

* + 1. Explain concepts fundamental to photography and composition.
			1. Identify the elements of design (i.e., line, texture, color, scale, movement).
			2. Identify elements of composition (i.e., rule of thirds, built in frame, strong diagonal, leading lines, symmetrical balance, asymmetrical balance, contrast simplicity).
			3. List criteria used to analyze and critique aspects of photography.
			4. \* Identify advanced elements of composition (i.e., Golden Rectangle, Fibonacci spiral, rectangle rebatement).
		2. Performance Examples:
			- Students will create a visual example demonstrating composition and design elements.
			- Students will critique and analyze a photograph based on multiple criteria.
		3. Explain concepts fundamental to exposure in photography.
			1. Define exposure and the variables that control exposure (i.e., aperture, shutter speed, International Organization for Standardization (ISO)).
			2. Diagram the exposure triangle, showing the connection between aperture, shutter speed, and ISO.
			3. List the range of f-stops, as a measurement of aperture, common with most cameras.
			4. List the range of shutter speeds common with most cameras.
			5. List the range of ISO common with most cameras.
			6. Define exposure value, and how the exposure value table shows the connection between aperture, shutter speed, and ISO.
			7. Explain how variation in aperture can affect depth of field in an image.
			8. Explain how variation of shutter speed can affect motion in an image.
			9. Explain how variation of ISO can affect image detail and quality. 2.D.02.10\* Describe the use and application of a light meter in determining proper

exposure.

2.D.02.11\* Diagram an exposure value table, showing the connection between aperture, shutter speed, and ISO.

2.D.02.12\* Describe high dynamic range imaging (HDR).

2.D.02 Performance Examples:

* Students will draw a diagram of the Exposure Triangle, and describe the interrelation of aperture, shutter speed, and cinema speed/ISO.
* Students will examine how adjusting exposure variables directly relates to the amount of light available in the creation of an image.
* Students will list the ranges of each of the exposure variables: aperture, shutter speed, and cinema speed/ISO.
	+ 1. Explain concepts fundamental to the use of lenses in photography.
			1. Identify types of lenses (i.e., normal, wide angle, telephoto, variable zoom, macro, fisheye).
			2. Describe the differences in lenses and their effects on the composition of an image.
			3. Define focal length and describe how it relates to the size of a lens.
			4. Describe how the focal length can affect depth of field.
			5. Explain how lenses are used to refract light.
			6. Explain how lenses are used to focus an image.
			7. \* Explain how varying types of lenses and camera positioning can affect image framing and perspective.
			8. \* Explain the characteristics and applications of special purpose lenses (i.e., swing shift lens, slant-focus lens, pitching lens, Dynalens).

2.D.03 Performance Examples:

* Students will compare the similarities between the workings of a cinema lens and the human eye.
* Students will describe how the curvature of a lens and the placement of a lens affect the directionality of light and the focus of an image.
	+ 1. Explain and demonstrate the use of media formats in photography.
			1. Differentiate between digital media formats in digital and dark room photography.
			2. Define raster and resolution as it relates to photography.
			3. Identify common image sensors found in a digital camera (i.e., Complimentary Metal-Oxide-Semiconductor (CMOS)).
			4. Identify common photo preparation software tools and describe how photo preparation software affects raw/compressed images.
			5. Explain and demonstrate how photo editing tools can be used to make common adjustments to an image (i.e., sizing, cropping, hue/saturation, brightness/contrast, dodge/burn).
			6. Identify advanced concepts relating to image sensors in cameras (i.e., debayering, bayer pattern image, bayer filter mosaic, color filter array).

2.D.04 Performance Examples:

* Students will edit a digital photograph using photo editing software to adjust the size, cropping, hue/saturation, brightness/contrast, and dodge/burn.
* Students will contrast the differences between digital media formats in relation to digital and dark room photography.

##### Fundamentals of Audio Production

* + 1. Explain the properties of sound in audio production.
			1. Identify terms used when describing properties of sound (i.e., frequency, pitch, intensity).
			2. Identify terms used when measuring sound (i.e., decibels, hertz).
			3. Explain frequency response.
			4. Identify characteristics of digital, Amplitude Modulation (AM), Frequency Modulation (FM), and satellite signals.
			5. \* Calculate the differences between frequency, pitch, and intensity relating to the human voice.
		2. Performance Examples:
			- Students will list and identify terms relating to properties of sound.
			- Students will collect frequency data and chart a wave frequency illustration using gathered data.
		3. Explain types of microphones used in audio production.
			1. Identify types of microphones (i.e., omni-directional, cardioid, super- cardioid, hyper-cardioid, bi-directional, unidirectional).
			2. Identify common microphone pick-up patterns.
			3. Differentiate between types of microphones for different situations.
			4. Explain the differences between balanced and unbalanced cables and signals.
			5. \* Differentiate between dynamic and condenser type microphones and identify the pros and cons of each.

2.E.02 Performance Examples:

* Students will diagram pick up patterns for various types of microphones.
* Students will analyze how different types of microphones are best suited for various types of productions.
	+ 1. Explain types of recording devices in audio production.
			1. Identify various audio devices (recorders, mixers).
			2. Identify the elements of an audio mixer (i.e., input channels, volume controls, trim, equalizer (EQ) controls, pan pots, volume unit (VU) meters, cue channels, submixes, auxiliary channels, output volume controls).
			3. Connect an audio mixer to a variety of sources.
			4. Operate an audio mixer with multiple sources.
			5. Explain the differences between microphone and line inputs.
			6. Explain impedance and its connection to microphone sources. 2.E.03.07\* Identify various digital recording media devices.

2.E.03 Performance Example:

* Students will demonstrate use of an audio mixer to control the high, mid, and low frequencies of a human voice.
	+ 1. Use audio equipment to record sound.
			1. Differentiate between manual and automatic recording levels.
			2. Identify various digital audio formats (i.e., mp3, wav, aiff, m4a).
			3. Explain the importance of using nat sound in a production.
			4. Identify vocal techniques used for recording audio (i.e., enunciation, pronunciation, inflection, pacing, modulation, dialect).
			5. Identify terms used when recording audio (narration, voice over (VO), sound on tape (SOT), and voice over sound on tape (VOSOT)).
			6. Record various types of audio (live, narration, VO, SOT, VOSOT).
			7. Set recording levels on a variety of recording devices, including multiple sources’ VU levels.
			8. Explain microphone placement in studio and on-location productions.
			9. Define the 60-cycle hum.
			10. Describe troubleshooting methods for studio and on-location audio productions.
			11. \* Explain the role of a Foley artist and create a Foley audio track for a cinema or video production.
			12. \* Explain basic acoustics and the importance of sound control in studio and on-location productions.

2.E.04 Performance Example:

* Students will record audio for a production using a variety of audio recording devices and techniques.

2.E.05\* Explain and demonstrate announcing techniques used in audio and video production according to current industry standards.

* + - 1. \* Demonstrate microphone placement to eliminate plosive sounds while announcing.
			2. \* Describe breathing techniques for effective announcing (i.e., diaphragmatic breathing, relaxation, posture).
			3. \* Explain how to prepare copy for vocal delivery (i.e., marking breathing breaks, emphasizing key words, clarify pronunciation, fit copy to time slots).
			4. \* Demonstrate appropriate vocal styles used for announcing, news reporting, commercial delivery, disc jockey, and drama/entertainment.

2.E.05 Performance Examples:

* Students will analyze the characteristics of various radio broadcast genres (i.e., announcing, news reporting, commercial delivery, disc jockey, drama/entertainment).
* Students will host a simulated radio broadcast.

##### Studio and Field Equipment Use

* + 1. Explain parts of a video camera and video camera accessories.
			1. Identify and describe basic video camera elements (i.e., lens/optics, liquid crystal display (LCD) screen, eye piece, zoom control, focus control, menu navigation, recording mechanism/media, battery/power adapter, A/V input and output).
			2. Identify and adjust basic video camera functions (i.e., aperture, shutter speed, ISO, white/black balance, phase, gain, filters)
			3. Identify various video camera support equipment (i.e., tripod, dolly, pan/tilt head, steadicam, external camera control, matte box).
			4. \* Identify advanced video camera accessories (i.e., jib arm, crane, tracking shot, waterproof housing, vehicle mounts, aerial shooting mounts).
		2. Performance Example:
			- Students will properly set up and adjust video camera and tripod settings for a production shoot.
		3. Describe and demonstrate the use of parts of a still/DSLR (Digital Single Lens Reflex) camera and DSLR accessories.
			1. Identify and describe basic DSLR camera elements (i.e., lens/optics, LCD screen, eye piece, zoom control, focus control, menu navigation, recording media, battery/power adapter, universal serial bus (USB) output).
			2. Identify and adjust basic DSLR camera functions (i.e., aperture, shutter speed, ISO, color balance, gain, filters).
			3. Identify and use various DSLR camera support equipment (i.e., monopod, tripod, steadicam, matte box).
			4. \* Identify various types of lens filters and their purpose and use in

controlling the image quality or appearance (i.e., polarizing, neutral-density, infrared, ultraviolet, diffusion, tone control, color conversion/compensation, Didymium, special effect).

2.F.02 Performance Example:

* Students will set up and adjust a DSLR camera for a photography shoot.
	+ 1. Explain and demonstrate the use of the various types of studio and field lighting equipment.
			1. Identify various studio lighting instruments (i.e., fluorescent, scoop, ellipsoidal, tungsten, hydragyrum medium-arc iodide (HMI), light-emitting diode (LED)) and their application in a studio.
			2. Identify various field lighting instruments (i.e., soft box, portable light kit).
			3. Identify and describe lighting instrument accessories (i.e., scrims, barn doors, flags, cookies/gobos, reflector kits, grip kits, gels).
			4. Explain and demonstrate how to remove and replace lamps.

2.E.05.05\* Identify and demonstrate the procedures for changing electrical connectors for various lighting cables (i.e., Edison, twist-lock, stage pin).

2.F.03 Performance Example:

* Students will set up lighting equipment for use in both a studio and an on-location production.
	+ 1. Explain and demonstrate the use of various types of studio and control room equipment.
			1. Identify, describe the function of, and use a production switcher.
			2. Identify, describe the function of, and use camera control unit (CCU).
			3. Identify, describe the function of, and use character generator.
			4. Identify, describe the function of, and use an audio mixer.
			5. Identify, describe the function of, and use a playback/recording device.
			6. Identify, describe the function of, and use a waveform monitor and vectorscope.
			7. Identify and describe the use and application of an intercom system.

2.F.04 Performance Examples:

* Students will set up the control room to prepare for a studio production.
* Students will diagram the signal flow between sources in a studio control room.
	+ 1. Explain types of basic audio/video connectors and their applications.
			1. Identify basic audio connectors (i.e., mini, quarter inch, XLR, optical, RCA).
			2. Identify basic video connectors (i.e., Bayonet Neill-Concelman (BNC), F- connector, video graphics array (VGA), digital visual interface (DVI), Radio Corporation of America (RCA), luminance/chrominance (Y/C), high definition multi-media interface (HDMI)).
			3. Identify basic computer/data connectors (i.e., USB, firewire, eSata, thunderbolt).
			4. Differentiate between composite, S-Video, component and HD/SDI connectors.
			5. Roll and store cables.

2.F.05 Performance Example:

* Students will explain the importance of choosing the appropriate cable for a variety of given applications.

##### Aspects of Pre-Production

* + 1. Demonstrate appropriate methods for developing an idea or concept for a cinema or video production.
			1. Write a treatment/synopsis for a cinema or video.
			2. Research a show topic.
			3. Identify target audiences and objectives for a production.
			4. Write a production script/screenplay for a variety of productions (i.e., news broadcast, narrative cinema/video, documentary).
			5. Create a storyboard from a script/screenplay.
			6. Pitch a cinema or video idea to a prospective client or producer. 2.G.01.07\* Write a production script/screenplay and refine/edit the text with the

purpose of enhancing the story (i.e., message, symbolism, character development, story development).

* + 1. Performance Examples:
			- Students will write a script/screenplay for a news broadcast, narrative cinema/video, or documentary.
			- Students will pitch a cinema/video idea to a prospective client or producer.
			- Students will draw a storyboard from a script/screenplay depicting specific cinema/video camera shots.
		2. Demonstrate appropriate methods for planning a cinema or video production.
			1. Describe and perform duties of pre-production personnel.
			2. Assign roles for a production.
			3. Develop a shooting schedule, emphasizing time management for each production aspect, based on a script/screenplay.
			4. Create call sheets appropriate to shoot schedule and production personnel.
			5. List practices used to schedule project workflow.
			6. Scout locations for productions.
			7. State the importance of obtaining approval and sign-off.
			8. Identify procedures for obtaining licenses and permits.
			9. Design and execute sets/props for a production.
			10. Audition and cast a production based on a script/screenplay.
			11. \* Research and develop a budget for a proposed cinema or video production including cost of equipment and personnel.
			12. \* Interview and hire crew personnel for a proposed cinema or video production.

2.G.02 Performance Examples:

* Students will develop a shooting schedule, call sheet, and rehearsal schedule for various production personnel.
* Students will describe the procedures for procuring a location for a cinema/video shoot.
	+ 1. Demonstrate appropriate methods for setting up a studio or remote production.
			1. Plan a studio or remote set-up.
			2. Block/rehearse a scene based on a script/screenplay (i.e., working with actors, cameras, lights, grips).
			3. Set up audio for a studio or remote production.
			4. Position lights for a studio or remote production.
			5. Position sets/props for a studio or remote production.
			6. Position cameras for a studio or remote production.
			7. \* Identify and apply advanced cinematography techniques to compensate for changing conditions when shooting on-location (i.e., available light, weather, scenery, natural elements).

2.G.03 Performance Examples:

* Students will arrange a studio or remote production cinema/video shoot with correct positioning of audio, lights, sets/props, and cameras.
* Students will rehearse a scripted cinema/video scene with cast and crew.

##### Aspects of Production

* + 1. Demonstrate operation of a video camera during a studio or remote production.
			1. Demonstrate movements of a video camera.
			2. Compose shots following basic composition guidelines.
			3. Follow a moving subject while keeping the subject properly framed.
			4. Move the camera using a tripod, dolly, and pan-tilt head. 2.H.01.05\* Operate the camera using a steadicam, jib or crane. 2.E.05.06\* Compose shots following advanced composition guidelines.

2.E.05.07\* Perform complex camera movements and shots (i.e., truck and zoom, rack- focus, pull-focus, interior to exterior, exterior to interior).

2.E.05.08\* Explain the characteristics and purpose of varying frame rates when shooting a cinema or video production (i.e., time-lapse, slow motion, speed ramping, time-slice/bullet time).

* + 1. Performance Example:
			- Students will operate a video camera during a studio or remote production employing various camera techniques.
		2. Demonstrate operation of audio equipment during a studio or remote production.
			1. Record audio using audio devices, including recorders and mixers.
			2. Set up audio for a studio or remote production, including setting levels.
			3. Record audio to account for timecode/sync.

2.H.02 Performance Example:

* Students will operate audio equipment during a studio or remote production employing various recording techniques.
	+ 1. Demonstrate operation of a production switcher during a live production.
			1. Describe chroma key and its uses in live and post production.
			2. Set up chroma key for use in a live production.
			3. Select between different inputs on a switcher.
			4. Use a variety of switcher transitions (i.e., wipe, dissolve).

2.H.03 Performance Examples:

* Students will operate a production switcher during a live production employing various transitions.
* Students will determine the appropriate settings for chroma key using a production switcher and various background color choices.
	+ 1. Demonstrate operation of a character generator during a studio or remote production.
			1. Key text over a piece of live video using a character generator.
			2. Create a lower-third graphic for use in a production.
			3. Create a title graphic for use in a production.
			4. Create a digital on-screen graphic (bug graphic) for use in a production.

2.H.04 Performance Examples:

* Students will operate a character generator during a live production.
* Students will create various types of graphics for use in a production.
	+ 1. Demonstrate techniques appropriate to on-screen talent in a production.
			1. Perform in front of a camera with a microphone.
			2. Read off of a teleprompter.
			3. Rehearse and perform a scene from a script/screenplay.
			4. Interview a subject both on camera and off camera to acquire information about a chosen subject.

2.H.05 Performance Examples:

* Students will perform on-camera in various cinema/video scenarios.
* Students will plan and conduct an interview based on gathered data in a relevant researched subject matter.
	+ 1. Demonstrate techniques appropriate to the role of a producer and director in a production.
			1. Manage cast and crew required for a production.
			2. Use checklists to ensure proper execution of a production plan.
			3. Describe and perform duties of production personnel.
			4. Shoot/record a studio production script/screenplay.
			5. Shoot/record a field production script/screenplay.

2.H.06 Performance Examples:

* Students will produce and direct a studio or field production script/screenplay.
* Students will contrast the roles and responsibilities of a producer and a director.

##### Aspects of Post-Production

* + 1. Demonstrate appropriate methods for planning the post-production stage of a project.
			1. Describe and perform duties of post-production personnel.
			2. Work with a producer/director to establish objectives for editing a project.
			3. Identify resources for editing audio and video.
			4. Prepare an edit log or outline for editing.
			5. Define metadata and explain how media should be labeled in order to store and access within a database.
			6. Explain the importance of back-up, recovery, and media redundancy.
		2. Performance Example:
			- Students will work with a producer/director to create objectives and prepare an outline for editing.
		3. Demonstrate appropriate methods of setting and adjusting user preferences within a non- linear editing software program.
			1. Choose appropriate compression and frame rates for digital video.
			2. Define drop frame and non-drop frame time code.
			3. Establish general preferences and settings for a project.
			4. Establish appropriate device control preferences.
			5. Establish appropriate capture/import/ingest preferences.
			6. Establish appropriate scratch disk preferences.

2.I.02 Performance Example:

* Students will choose and adjust settings and user preferences for a non-linear editing software program.
	+ 1. Demonstrate appropriate methods of creating a project and organizing media within that project.
			1. Create a new project or open an existing project.
			2. Create a proxy/off-line edit workflow for a project.
			3. Identify components of a workspace within non-linear editing software.
			4. Demonstrate best practices used to label and log media.
			5. Create and use bins to organize media.
			6. Prepare images digitally for inclusion in a program.
			7. Capture audio/video from a tape.
			8. Import or ingest audio/video/media from a file or drive based device.
			9. Demonstrate use of computer-based audio/recording software.

2.I.03 Performance Example:

* Students will create a project and organize media within that project.
	+ 1. Demonstrate appropriate methods of creating a rough cut.
			1. Identify the tracks of a sequence/timeline (i.e., video, audio, timecode).
			2. Create a new sequence/timeline.
			3. Differentiate between insert/splice and assemble/overwrite edit.
			4. Use a variety of basic editing tools (i.e., splice/overwrite, mark in/out, extract/lift).
			5. Use b-roll/cutaway footage to enhance a project.
			6. Edit a project for specific objectives (i.e., match-on-action, 180° Rule line, continuity, mood, pacing for speech, music).
			7. Explain why jump-cuts detract from a finished video.

2.I.04 Performance Examples:

* Students will create a sequence/timeline and assemble media within that sequence/timeline.
* Students will evaluate the importance of continuity while editing.
	+ 1. Demonstrate various methods of refining an edited sequence/timeline.
			1. Move audio/video clips within a sequence/timeline.
			2. Trim audio/video clips within a sequence/timeline.
			3. Use L-cut edits to enhance a video.
			4. Alternate between camera shots within a sequence/timeline manually or by using a multi-cam tool.
			5. Use various transitions to enhance a video (i.e., dissolve, fade, wipe).
			6. Make appropriate adjustments to audio levels within a sequence/timeline. 2.E.05.07\* Apply advanced editing techniques to enhance the continuity, flow and

timing of a narrative story (i.e., slip edit, slide edit, replace edit, fit-to-fill).

2.E.05.08\* Apply basic audio filtering techniques (i.e., banpass/reject, noise-reduction, reverb, digital delay, compressors, expanders) to live and prerecorded audio signals.

2.I.05 Performance Examples:

* Students will edit audio/video within a sequence/timeline.
* Students will use audio/video transitions and apply editing techniques to a sequence/timeline.
	+ 1. Demonstrate various methods of enhancing and finishing an edited sequence/timeline.
			1. Add text to a project within a sequence/timeline (i.e., lower third, title graphic, on-screen graphic/bug).
			2. Composite video over video within a sequence/timeline (i.e., picture-in- picture, split screen, alpha channel).
			3. Apply filters and effects to audio/video within a sequence/timeline.
			4. Make appropriate adjustments to the color, gamma, and levels of video in a sequence/timeline (i.e., balance/correct for color, enhance the mood, create a desired effect).
			5. Render portions of a sequence/timeline for the purpose of viewing an applied effect, graphic, or composite.
			6. \* Demonstrate techniques of key-frame editing to adjust the parameters and properties of video, filters or effects over time.

2.E.05.07\* Create and apply advanced enhancements to video on a

sequence/timeline (i.e., animated graphics, 3D compositing, special effects).

2.I.06 Performance Examples:

* Students will demonstrate the use of video compositing and special effects for editing.
* Students will employ the use of a color correcting tool to alter colors for a variety of specifications.
	+ 1. Demonstrate appropriate methods of exporting media from a sequence/timeline for distribution.
			1. Describe procedures that prepare products for mastering, publishing, and distribution.
			2. Define codec, identify various media formats (i.e., mp4, H.264), and give common uses for each.
			3. Dub a program to DVD.
			4. Compare and contrast streamed and downloaded video.
			5. Explain considerations specific to creating audio/video for the internet.
			6. Export audio/video for use on portable devices.
			7. \* Export video for additional editing and refining within outside software applications (i.e., visual effects generation, graphics animation, sound editing and enhancement).

2.I.07 Performance Example:

* Students will export a sequence/timeline for various distribution methods.

# [Strand 3: Embedded Academics](#_bookmark0)

Strand 3: Embedded Academics, a critical piece of a Vocational Technical Education Framework, are presented as Crosswalks between the Massachusetts Vocational Technical Education Frameworks and the Massachusetts Curriculum Frameworks. These Crosswalks are located in the Appendix of this Framework.

#### Academic Crosswalks

[Appendix A: English Language Arts](#_bookmark20) [Appendix B: Mathematics](#_bookmark20)

[Appendix C: Science and Technology/Engineering](#_bookmark22) Earth and Space Science

Life Science (Biology)

Physical Science (Chemistry and Physics) Technology/Engineering

# [Embedded Academic Crosswalks](#_bookmark0)

## [Embedded English Language Arts and Literacy](#_bookmark0)

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| CVTELearning Standard Number | Strand Coding Designation Grades ELAsLearning Standard Number | Text of English Language Arts Learning Standard |
| 2.A-2.I | WHST 9-12 #2 a-b | Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.1. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
2. Develop the topic with well-chosen, relevant, and sufficient facts,

extended definitions, concrete details, quotations, or other information and examples appropriate to the audience’s knowledge of the topic.Performance Example:Students introduce and organize communication ideas in writing, including lists, identifications, comparisons, and discussions. Students develop their ideas in writing focusing on specific audiences. |
| 2.A-2.D | WHST 9-12 #2 c-e | Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.Performance Example:Students expand their writing to include cinema/video specific terminology in a formal writing tone. |
| 2.A.03,2.B.01,2.C.01,2.C.03,2.D.01,2.E.02,2.G.01,2.G.02,2.G.03,2.H.05 | Speaking 9-10 #3, 4, 6 | 3. Evaluate a speaker’s point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.4. Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task6. Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.Performance Example:Students present information or explain demonstration of cinema/video skills based on findings. |
| 2.B.01,2.C.01,2.C.03,2.D.01,2.E.02 | Writing 9-12 #1 a-e | Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.1. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences claim(s), counterclaims, reasons, and evidence.
2. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience’s

knowledge level, concerns, values, and possible biases.1. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
2. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
3. Provide a concluding statement or section that follows from and supports the argument presented.

Performance Example:Students analyze communications media, critique multiple arguments, and present their findings in well- organized, objective writing. |
| 2.B.02,2.B.03 | RHIST 9-12 #4 | Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-12 texts and topics.Performance Example:Students draft light plots and ground plans for studio or remote productions. |
| 2.G.01 | Writing 9-12 #3 a-e,RL 9-12 #5 | 1. Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well- structured event sequences.
	1. Engage and orient the reader by setting out a problem, situation, or observation, establishing one or multiple point(s) of view, and introducing a narrator and/or characters; create a smooth progression of experiences or events.
	2. Use narrative techniques, such as dialogue, pacing, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters.
	3. Use a variety of techniques to sequence events so that they build on one another to create a coherent whole.
	4. Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.
	5. Provide a conclusion that follows from and reflects on what is experienced, observed, or resolved over the course of the narrative.

Analyze how an author’s choices concerning how to structure specific parts of a text (e.g., the choice of where to begin or end a story, thechoice to provide a comedic or tragic resolution) contribute to its overall structure and meaning as well as its aesthetic impact.Performance Example:Students write scripts/screenplays and develop storyboards for news broadcasts, narrative cinema/video, or documentary productions. |
| 2.H.05 | Writing 9-12 #4,7 | 4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiplesources on the subject, demonstrating understanding of the subject under investigation.1. Performance Example: Students plan and conduct interviews based on gathered data in a relevant, researched subject matter.
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| 2.H.06 | Speaking 9-12 #1 a-b | 1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.
	1. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
	2. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish

individual roles as needed.Performance Example:Students produce and direct a studio or field production script/screenplay. |

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## [Embedded Mathematics](#_bookmark0)

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| CVTELearning Standard Number | Math Content Conceptual Category and Domain Code Learning Standard Number | Text of Mathematics Learning Standard |
| 2.B.05,2.D.04 | G-SRT | Understand similarity in terms of similarity transformations.1. Verify experimentally the properties of dilations given by a center and a scale factor:1a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.1b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.Performance Example:Students identify and adjust aspect ratios for cinema, video, and photography. |
| 2.B.02,2.B.03 | G-MG | Apply geometric concepts in modeling situations.1. Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).

Performance Example:Students use proper measuring techniques to draft a light plot or ground plan for a set or prop for a studio or remote production. |
| 2.E.01 | F-IF, F-TF | Analyze functions using different representations. 7e. Graph exponential and logarithmic functionsModel periodic phenomena with trigonometric functions.1. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.

Performance Example:Students collect frequency data and produce graphs and charts based on sound frequencies. |
| 2.D.03 | G-GPE | Translate between the geometric description and the equation for a conic section.3. (+) Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.MA.3.a. (+) Use equations and graphs of conic sections to model real- world problems.Performance Example:Students describe how the curvature of a lens and the placement of a lens affect the directionality of light and the focus of an image. |
| 2.D.02 | G-CO | Experiment with transformations in the plane.1. Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
2. Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).

12. Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).Performance Example:Students diagram various source flows/charts showing relationships between mediums. |
| 2.D.02 | F-IF, S-ID | Interpret functions that arise in applications in terms of the context.1. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
2. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.

Summarize, represent, and interpret data on a single count or measurement variable.1. Represent data with plots on the real number line (dot plots, histograms, and box plots).
2. Use statistics appropriate to the shape of the data distribution to

compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.Performance Example:Students use photographic exposure elements to extrapolate data and graph their findings relating to range, median, and mean. |

[Embedded Science and Technology/Engineering](#_bookmark0)

[*Earth and Space Science – Grades 6 – 8*](#_bookmark0)

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| CVTELearning Standard Number | Subject Area, Topic Heading andLearning Standard Number | Text of Earth and Space Science Learning Standard |
| 2.B.02 | Heat Transfer in the Earth System | 4. Explain the relationship among the energy provided by the sun, the global patterns of atmospheric movement, and the temperaturedifferences among water, land, and atmosphere.Performance Example:Students identify color temperature based on Kelvin scale, and use gels/filters to adjust lighting colors. |
| 2.B.03 | Mapping the Earth | 1. Recognize, interpret, and be able to create models of the earth’s common physical features in various mapping representations, including contour maps.

Performance Example:Students use proper measuring/scale techniques for a concept sketch of a set piece or prop. |
| 2.E.02 | Matter and Energy in the Earth’s System | * 1. Describe the characteristics of electromagnetic radiation and give examples of its impact on life and the Earth’s systems.

Performance Example:1. Students explain and analyze the connection between microphones and speakers, and identify the tools appropriate for various types of productions.
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*[Earth and Space Science – Grades 9 – 12](#_bookmark0)*

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| CVTELearning Standard Number | Subject Area, Topic Heading andLearning Standard Number | Text of Earth and Space Science Learning Standard |
| 2.C.01,2.G.01 | SIS3 | Analyze and interpret results of scientific investigations.Use results of an experiment to develop a conclusion to an investigation that addresses the initial questions and supports or refutes the stated hypothesisPerformance Example:Students analyze the history of broadcasting through the development of one or more script/screenplays. |
| 2.C.03,2.G.01 | SIS2 | Design and conduct scientific investigations.Articulate and explain the major concepts being investigated and the purpose of an investigationEmploy appropriate methods for accurately and consistently making observations, making and recording measurements at appropriate levels of precision collecting data or evidence in anorganized wayPerformance Example:Students explain the importance of unbiased reporting, newsworthiness, ethics, and copyright through the development of one or more script/screenplays. |
| 2.H.05 | SIS4 | Communicate and apply the results of scientific investigations. Explain diagrams and charts that represent relationships of variables.Performance Example:Students conduct research and conduct interviews based on gathered data. |

[*Life Science (Biology)*](#_bookmark0) *– Grades 6 - 8*

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| CVTELearning Standard Number | Subject Area, Topic Heading andLearning Standard Number | Text of Biology Learning Standard |
| 2.C.03 | Changes in Ecosystems Over Time | 17. Identify ways in which ecosystems have changed throughout geologic time in response to physical conditions, interactions among organisms, and the actions of humans. Describe how changes may becatastrophic such as volcanic eruptions or ice storms.Performance Example:Students identify changes in the Earth, and explain/report upon those changes with unbiased story creation. |
| 2.D.03 | Systems in Living Things: | 6. Identify the general functions of the major systems of the human body (digestion, respiration, circulation, excretion, protection from disease, and movement, control, andcoordination) and describe ways that these systems interact with each other.Performance Example:Students identify and label the human eye, and compare the eye’s similarities to a camera lens. |

*[Life Science (Biology)](#_bookmark0) – Grades 9 - 12*

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| CVTELearning Standard Number | Subject Area, Topic Heading andLearning Standard Number | Text of Biology Learning Standard |
| 2.D.02,2.D.03 | Anatomy and Physiology | 4.4 Explain how the nervous system (brain, spinal cord, sensory neurons, motor neurons) mediates communication among different parts of the body and mediates the body’s interactions with theenvironment. Identify the basic unit of the nervous system, the neuron, and explain generally how it works.Performance Example:Students examine variable light and its effects on the human eye’s ability to adjust. |
| 2.E.03 | Anatomy and Physiology | 4.3 Explain how the respiratory system (nose, pharynx, larynx, trachea, lungs, alveoli) provides exchange of oxygen and carbondioxide.Performance Example:Students demonstrate adjustments of an audio mixer to control the high, mid, and low frequencies of the human voice. |
| 2.H.06 | Ecology | * 1. Explain how birth, death, immigration, and emigration influence population size
	2. Analyze changes in population size and biodiversity (speciation and extinction) that result from the following: natural causes,

changes in climate, human activity, and the introduction of invasive, non-native species.Performance Example:Students produce script/screenplays and reflect upon society’s changing world. |
| 2.H.05 | SIS4 | Communicate and apply the results of scientific investigations Use language and vocabulary appropriately, speak clearly andlogically, and use appropriate technology (e.g., presentation software) and other tools to present findingsPerformance Example:Students perform in front of a camera, presenting findings and research for broadcasts. |
| 2.H.03 | SIS2 | Design and conduct scientific investigationProperly use instruments, equipment, and materials (e.g., scales,probeware, meter sticks, microscopes, computers) including set-up, calibration (if required), technique, maintenance, and storagePerformance Example:Students operate control room equipment for broadcasts. |

*[Physical Science (Chemistry)](#_bookmark0) – Grades 9 - 12*

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| CVTELearning Standard Number | Subject Area, Topic Heading andLearning Standard Number | Text of Chemistry Learning Standard |
| 2.B.03 | Properties of Matter | Central Concept: Physical and chemical properties reflect the nature of the interactions between molecules or atoms, and can be used to classify and describe matter.Performance Example:Students draft and create set pieces for a set or prop in a studio or remote production. |
| 2.B.03,2.H.01,2.G.02 | SIS2 | Design and conduct scientific investigations Properly use instruments, equipment, and materials.Performance Example:Students follow pre-determined procedures to develop, scout, and shoot a remote production. |
| 2.C.02,2.G.02 | SIS4 | Communicate and apply the results of scientific investigations. Explain diagrams and charts that represent relationships of variables Develop descriptions of and explanations for scientific concepts that were a focus of one or more investigationsUse language and vocabulary appropriately, speak clearly and logically, and use appropriate technology (e.g., presentationsoftware) and other tools to present findingsPerformance Example:Students develop production charts and materials for studio or remote productions. |
| 2.D.04 | Properties of Matter | 1.2 Explain the difference between pure substances (elements and compounds) and mixtures. Differentiate between heterogeneous and homogeneous mixtures.Performance Example:Students contrast differences between digital media formats in relation to digital and dark room photography. |

*[Physical Science (Physics)](#_bookmark0) – Grades 9 - 12*

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| CVTELearning Standard Number | Subject Area, Topic Heading andLearning Standard Number | Text of Physics Learning Standard |
| 2.B.02 | Electromagnetic Radiation | * 1. Recognize that electromagnetic waves are transverse waves and travel at the speed of light through a vacuum.
	2. Describe the electromagnetic spectrum in terms of frequency and wavelength, and identify the locations of radio waves, microwaves, infrared radiation, visible light (red, orange, yellow, green, blue, indigo, and violet), ultraviolet rays, x-rays, and gamma rays on the

spectrum.Performance Example:Students list and identify properties of light and the effects of gels or filters for temperature, mood, and color. |
| 2.D.04,2.E.01,2.H.03 | SIS2 | Design and conduct scientific investigation.Articulate and explain the major concepts being investigated and the purpose of an investigation.Select required materials, equipment, and conditions for conducting an experiment.Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up,calibration (if required), technique, maintenance, and storagePerformance Example:Students collect and chart frequency data, and operate control equipment based on that data. |
| 2.E.01, | Waves, | Central Concept: Waves carry energy from place to place without the |
| 2.E.04 | Mathematical Skills | transfer of matter.4.1 Describe the measurable properties of waves (velocity, frequency, wavelength, amplitude, period) and explain the relationships among them. Recognize examples of simple harmonic motion.4.6 Describe the apparent change in frequency of waves due to the motion of a source or a receiver (the Doppler effect).Construct and use tables and graphs to interpret data setsPerformance Example:Students record production audio based upon charted frequencies of the human voice. |
| 2.E.02,2.H.04 | SIS4 | Construct and use tables and graphs to interpret data setsExplain diagrams and charts that represent relationships of variables Communicate and apply the results of scientific investigations.Develop descriptions of and explanations for scientific concepts that were a focus of one or more investigations.Performance Example:Students diagram pick up patterns for various types of microphones and analyze how different microphones are best suited for various types of productions. |

[*Technology/Engineering*](#_bookmark0) *– Grades 6 - 8*

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| CVTELearning Standard Number | Subject Area, Topic Heading andLearning Standard Number | Text of Technology/Engineering Learning Standard |
| 2.B.02,2.B.03 | Materials, Tools, and Machines | * 1. Given a design task, identify appropriate materials (e.g., wood, paper, plastic, aggregates, ceramics, metals, solvents, adhesives) based on specific properties and characteristics (e.g., strength, hardness, and flexibility.
	2. Identify and explain appropriate measuring tools, hand tools, and power tools used to hold, lift, carry, fasten and separate, and explain their safe and proper use.
	3. Identify and explain the safe and proper use of measuring tools, hand tools, and machines (e.g., band saw, drill press, hammer, screwdriver, pliers, tape measure, screws, nails, and other

mechanical fasteners) needed to construct a prototype of an engineering design.Performance Example:Students draft set designs and light plots, and use proper measuring/scale techniques for creation of a concept sketch. |
| 2.E.02, 2.H,2.I | Communication Technologies | 3.1 Identify and explain the components of a communicationsystem, i.e., source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.Performance Example:Students identify and explain various communication systems (i.e., video, audio, computer) and identify the components of each and their relation to cinema or video production. |
| 2.F | Manufacturing Technologies | 4.2 Explain and give examples of the impacts of interchangeable parts, components of mass-producedproductions, and the use of automation, e.g., robotics.Performance Example:Students identify components of audio/video equipment and demonstrate proper usage of equipment. |
| 2.G.01 | Communication Technologies | 3.4 Identify and explain how symbols and icons (e.g., international symbols and graphics) are used to communicate message. Performance Example:Students use storyboards and scripts/screenplays to pitch a movie idea geared towards a specific target audience. |
| 2.H.06 | Communication Technologies | 3.3 Identify and compare communication technologies and systems, i.e., audio, visual, printed, and mass communication.Performance Example:Students explain the interrelationships between sources in the control room for a production. |

*[Technology/Engineering](#_bookmark0) – Grades 9 - 12*

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| CVTELearning Standard Number | Subject Area, Topic Heading andLearning Standard Number | Text of Technology/Engineering Learning Standard |
| 2.A.01 | Engineering Design | * 1. Identify and explain the steps of the engineering design process: identify the problem, research the problem, develop possible solu- tions, select the best possible solution(s), construct prototypes and/or models, test and evaluate, communicate the solutions, and redesign.

Performance Example:1. Students list methods to set up a studio production following proper safety guidelines.
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| 2.A.02 | Engineering Design | 1.2 Understand that the engineering design process is used in the solution of problems and the advancement of society. Identify exam- ples of technologies, objects, and processes that have been modified toadvance society, and explain why and how they were modified.Performance Example:Students create a safety plan for use during an on-location production, from methods listed for safety procedures. |
| 2.A.03 | Engineering Design, Steps of the Engineering Process | 1.5 Interpret plans, diagrams, and working drawings in the construction of prototypes or modelsSteps of the Engineering Design Process4. Select the best possible solution(s)Determine which solution(s) best meet(s) the original requirementsPerformance Example:Students demonstrate proper handling of studio and field equipment. |
| 2.B.02,2.B.03,2.B.04,2.D.01 | Engineering Design | * 1. Produce and analyze multi-view drawings (orthographic projections) and pictorial drawings (isometric, oblique, perspective), using various techniques.
	2. Interpret and apply scale and proportion to orthographic projections and pictorial drawings (e.g., ¼" = 1'0", 1 cm = 1 m).

Performance Example:1. Students measure, draft, and produce light plots, ground plans, and models for studio or remote productions.
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| 2.B.04 | Communication Technologies | 6.1 Explain how information travels through the following media: electrical wire, optical fiber, air, and space.Performance Example:Students examine similarities and differences in wiring for single-camera and multiple-camera shoots. |
| 2.B.05,2.I.06 | Communication Technologies | 6.2 Differentiate between digital and analog signals. Describe how communication devices employ digital and analog technologies (e.g.,computers, cell phones).Performance Example:Students compare broadcasting signals used for audio/video production and audio/video export variables for a variety of consumer options. |  |
| 2.B.02,2.E.03 | Energy and Power Technologies – Electrical Systems | 5.1 Explain how to measure and calculate voltage, current, resistance, and power consumption in a series circuit and in aparallel circuit. Identify the instruments used to measure voltage, current, power consumption, and resistance.Performance Example:Students describe the connections between sources in the use of an audio mixer or a light board, and properly calculate source power for each. |  |
| 2.G.03 | Steps of the Engineering Process | 1. Construct one or more prototypes and/or models

Model the selected solution(s) in two and three dimensions.1. Test and evaluate the solution(s) Does it work?

Does it meet the original design constraints?Performance Example:Students arrange a studio or remote production shoot with correct positioning of audio, lights, sets/props, and cameras. |  |

[Industry Recognized Credentials](#_bookmark0) (Licenses and Certifications/Specialty Programs)

Post Production Editing Software Certification Exams: AVID Media Composer Certified User Exam Final Cut Pro Associate User Exam

Final Cut Pro Certified User Exam Adobe Premiere Certified User Exam