

Unit 55: Understanding Video Technology

Unit code:	H/502/5766
QCF Level 3:	BTEC National
Credit value:	10
Guided learning hours:	60

● Aim and purpose

This unit provides learners with the knowledge of video technology that they require to undertake production in the studio or on location. The unit is designed to allow learners to develop an understanding of the principles of video and of the operation of recording and post-production equipment.

● Unit introduction

A knowledge of digital video technology is vital across a range of media industries (television production, video and interactive media being perhaps the most obvious) and in a wide variety of production contexts, including factual and fictional programme production, advertising and promotional production, and for various aspects of website production. Employers will expect not just high-level skills, but also an understanding of the capabilities and applications of this technology.

Understanding of the different formats, file types and compression systems used for digital video used worldwide will be useful when making decisions on video production formats for programmes intended for a specific audience.

Learners will develop an understanding of the technology of post-production and the ever-changing technology of digital non-linear editing. There is a growing range of hardware and software available for post-production and learners will experiment and apply this technology to their post-production work. They will also develop skills in line-up and technical operation of location, studio and post-production systems.

The unit provides a valuable introduction to the skills required when working either in a small production company or as a freelancer in the video industry.

Knowledge of, and ability to use, this equipment can be demonstrated through the production of complete video programmes or of content for other applications. Learners can apply the knowledge and skills to their other production work.

● Learning outcomes

On completion of this unit a learner should:

- 1 Understand the principles of video technology
- 2 Be able to use video recording production technology
- 3 Be able to use video post-production technology.

Unit content

1 Understand the principles of video technology

Television standards: PAL (Phase Alternation Line); SECAM (Séquentiel Couleur Avec Mémoire); NTSC (National Television System Committee); standards conversion; widescreen aspect ratios; component video signals; composite video signals; high definition video; HDMI (High Definition Multimedia Interface); DVI (Digital Visual Interface)

Broadcast systems: terrestrial broadcasting; satellite broadcasting; digital broadcasting; multiplexes; cable; internet TV; on demand systems

Digital recording: domestic; professional and broadcast formats; tape and hard drive recording; solid state disc recording eg from RED camera to Panasonic P2 to SD card recording; connection line-up and operation; camera set up for a specific location; colour temperature; lenses (exposure, focus)

Digital editing: file types; file size; compression; system compatibility; hardware; software; data transfer; file management

2 Be able to use video recording production technology

Cameras: single CCD (Charge-Coupled Device); three CCD; colour temperature; white and black balance; colour bar; gain; filters; shutter speed; iris; colour; black and white; 35mm adapters eg Red Rock; audio adapters eg XLR

Studio and multi-camera systems: multi-camera configurations; connecting; genlocking and lining up a system; studio vision mixers; audio configuration; line-up; lighting rig; talk-back systems

3 Be able to use video post-production technology

Post-production systems: hardware; software; monitoring; captions; audio connections; sound and picture synchronisation

Post-production practices: downloading digital material from tape and disc; formatting hard drives; drag and drop systems; timelines; footage storage; external hard drives; RAID (Redundant Array of Inexpensive Disks) drives eg RAID 0-6; exporting to tape and various file formats; compression and file types; timecode

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 describe the principles of digital video technology and digital video recording with some appropriate use of subject terminology [IE, RL]	M1 explain the principles of digital video technology and digital video recording with reference to detailed illustrative examples and with generally correct use of subject terminology	D1 comprehensively explain the principles of digital video technology and digital video recording with elucidated examples and consistently using subject terminology correctly
P2 use digital video production technology with some assistance [IE, RL]	M2 use digital video production technology competently with only occasional assistance	D2 use digital video production technology to a technical quality that reflects near-professional standards, working independently to professional expectations
P3 use digital video post-production technology with some assistance. [SM]	M3 use digital video post-production technology competently with only occasional assistance.	D3 use digital video post-production technology to a technical quality that reflects near-professional standards, working independently to professional expectations.

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

Key	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Initial teaching of this unit could be through a combination of short lectures, demonstrations, and investigative research on video technology and recording principles. Learners should then be encouraged to develop a range of skills through practical activities that can be observed and recorded by a tutor. The set up and use of equipment could be taught through a range of exercises that require studio or editing facilities.

Though they are no longer necessarily expected to work with it, learners should be encouraged to research analogue video camera technology and compare this with digital video camera technology. It may be appropriate to demonstrate, where available, analogue linear editing technology and compare this with digital non-linear editing technology.

Tutors may prefer to link the assessment of this unit to that of another production unit that requires the use of location and studio-based video production work. If this is the case tutors must ensure that evidence presented for this unit is stored and collated correctly.

Learners will not be required to undertake first line maintenance of equipment. They should, however, have an understanding of the procedures for identifying problems, and know how to describe accurately and precisely what the problem is. They should be able to provide possible solutions for the simpler problems, and know how and where to seek assistance for solving the more complex ones.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan demonstrates one way of planning the teaching and assessment of this unit.

Topics and suggested assignments and activities

Introduction to unit and unit assessment.

Demonstration and lectures:

- basic principles of signals and communication
- television standards
- broadcast systems
- digital recording and editing.

Topics and suggested assignments and activities

Assignment 1: Video Technology

Learners will write an illustrated chapter for a book introducing video technology to 10-12 year-old children, covering:

- television standards
- broadcast systems
- digital recording and editing.

Learners will:

- compile and collate all class notes
- do additional research
- research and obtain illustrative material
- write chapter
- compile chapter with illustrations.

Workshops on single camera operation followed by a number of practice exercises.

Lecture on studio production.

Workshops on studio and multi-camera systems.

Exercise: studio test.

Learners will:

- be observed setting up a camera and using it as instructed
- complete a studio test log.

Lecture: video post production.

Demonstration and workshops:

- post-production
- professional practice
- use of equipment.

Exercise: editing test.

Learners will:

- prepare to edit given material to a brief
- be observed editing the material
- complete a post-production log.

Assignment 2: Studio Production

Learners will:

- complete a studio-based production assignment linked to another unit
- complete a production log.

Assignment 3: Single Camera Production

Learners will:

- complete a single camera production assignment linked to another unit
- complete all relevant production and post-production documentation
- complete a production log.

Unit learning and assessment review.

Assessment

Evidence for assessment

Evidence for the achievement of learning outcome 1 could be in the form of written reports, case studies, illustrated reports or presentations.

For this learning outcome, and for some learners, a formal viva voce assessment might be appropriate. When more than one learner in a cohort is assessed in this way care must be taken to ensure that all learners are asked equivalent questions, and that all are given equal opportunities to expand or clarify their answers. Interviewers must also ensure that questions are not phrased in such a way as to provide or suggest an answer. Formal vivas should be recorded for the purposes of internal and external verification and at least 50 per cent of such assessments must be internally verified.

Achievement of learning outcomes 2 and 3 will most likely be evidenced through activities linked to the use of video technology in the studio or on location. The operation and application of video technology could be assessed through assignments for other units requiring practical video production.

Learners must provide individually generated evidence of achievement for all learning outcomes.

Application of grading criteria

When applying the grading criteria, tutors should follow the advice given below. Please note that any examples of evidence given here are indicative only. This advice is not exhaustive and the examples need not specifically be included in a learner's work in order for that learner to achieve the exemplified grade.

For each of the criteria learners must present evidence that addresses each italicised sub-heading of the content for the learning outcome.

P1: learners will describe video technology and recording principles accurately, covering the main points. They will have some understanding of the technology and will be able to identify, in a limited way, equipment, formats and systems used. Evidence will show a basic understanding of technical terminology but learners will generally be unsure about this vocabulary and will make fairly frequent mistakes when they do use it.

P2 and *P3*: learners will correctly use and apply the technology required for video production in a limited range of applications. They will need frequent assistance and support but will take note of and make use of this help when it is given. If they are in frequent need of such help but fail to make positive use of it they should not be considered for a pass grade for this unit.

M1: learners will explain video technology and recording principles clearly and in some detail. They will have a good understanding of the technology and will explain, for example, how a wide range of equipment, formats and systems are used, how domestic and broadcasting systems differ, and why different formats are mutually incompatible. Learners will use technical vocabulary for the most part correctly, but may make mistakes or be unsure about usages at times.

M2 and *M3*: learners will show facility and some confidence in relation to skills and the handling of equipment in both production and post-production. Work will be approached methodically and with adequate preparation. Processes will be undertaken with care and, generally speaking, thought will be put into the work. Results will be technically competent. Learners will need little assistance, though typically they will still need some support when dealing with more complex technology or trying to apply more sophisticated techniques. Like the pass grade learner, they will respond positively to any help given.

D1: learners will fully explain video technology and recording principles and will describe them in detail. They will develop their explanations critically (ie, compare, assess and discriminate). Fuller and more extensive explanation, better application of examples, and provision of argument to support points made, plus the higher quality expression, will discriminate between this grade and the merit. Learners will be able to draw out of an example precisely what it is about that exemplifies the point it illustrates. Technical vocabulary will be secure and used correctly and confidently at all times.

D2 and D3: learners will have clearly understood the technology of production and post-production and be able to use it in an extensive range of applications. The phrase 'to a technical quality that reflects near-professional standards' means that technical and production skills are beginning to approach the professional standard and they bear comparison with it. It does not mean that learners have to achieve actual professional standards as that would be unrealistic at Level 3. In all practical activity learners will be capable of working autonomously and effectively. The term 'working independently' means that they are able to work on their own initiative, do not need constant support or supervision, give the work their full commitment, work positively and cooperatively with others, and meet deadlines. In other words, they have the kind of self-management skills that would be expected of them in a professional context. Note also that this criterion should not be taken to mean that learners do not seek advice or that they work without discussing things with their tutor, but rather that they are not dependent upon the support of others and that when they take advice they weigh it carefully for themselves.

Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Edexcel assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, M1, D1	Assignment 1: Video Technology	Commission from a publisher to write an illustrated chapter for a book introducing video technology to 10-12 year-old children.	<ul style="list-style-type: none"> All class and research notes. Illustrations. Finished chapter.
P2, M2, D2 P3, M3, D3	Assignment 2: Studio Production	As specified in assignment set for other unit.	<ul style="list-style-type: none"> Tutor observation record. Finished production. Production log.
P2, M2, D2 P3, M3, D3	Assignment 3: Single Camera Production	As specified in assignment set for other unit.	<ul style="list-style-type: none"> Tutor observation record. Finished production. Production and post-production documentation. Production log.

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Art and Design suite. This unit has particular links with the following units in the BTEC Art and Design suite:

Level 2	Level 3
Working with Interactive Media Briefs	Digital Video Production for Interactive Media
Working with Moving Image Briefs	Film and Video Editing Techniques
Working with Digital Art and Design Briefs	Single Camera Production

There are opportunities to relate the work done for this unit to Skillset National Occupational Standards in Camera, Editing, Lighting for Film and Television, and Sound as follows:

Camera

- C2 Specify camera equipment required
- C4 Obtain, prepare and return equipment
- C12 Provide assistance to record and review the video image
- C13 Maintain camera batteries during shoot
- C14 Co-ordinate the crew to position a camera
- C19 Focus the lens
- C27 Elevate and track the video camera
- C28 Position and move the camera to frame and compose the image

Editing

- E1 Identify and agree editing outcomes and process
- E5 Capture pictures and sound for nonlinear editing
- E9 Edit materials using linear video-tape equipment
- E11 Edit materials using non-linear equipment
- E13 Assemble pictures and sound to specification
- E14 Produce first cuts
- E15 Evaluate first cuts and agree changes to them
- E16 Produce fine cut/locked out materials for final post-production
- E23 Realise complex effects

Lighting for Film and Television

- L3 Prepare and use equipment to modify and manipulate light
- L6 Identify and select the lighting requirements for film & television productions
- L7 Lighting for a single camera

Sound

- S2 Identify, devise and manage the sound requirements
- S3 Assess studios and locations
- S4 Design sound rigs for multi-camera productions
- S5 Rig sound equipment
- S29 Document and store media.

Essential resources

Learners will need access to a range of industry-standard video production and post-production equipment. This should cover both location and studio-based production technology. A range of post-production technology should be available.

Employer engagement and vocational contexts

Centres should develop links with local production companies and freelancers working in film, video and television. Visiting industry speakers are particularly valuable when they are able to provide professional insight and offer industry related briefs. Some employers will be able to provide work placement or create production scenarios for learners replicating a variety of techniques involving professional practices. Centres may also be able to develop relationships with external organisations which will act as clients for productions which will have real audiences.

The following agencies exist to develop film and media in the UK. Their websites provide material for research and many of them include clips of production work. The agencies themselves do not fund production work by learners, but offer information about production, distribution and exhibition initiatives taking place across the UK:

- www.bfi.org.uk – British Film Institute
- www.em-media.org.uk/pages/home – East Midlands Media
- www.filmagencywales.com – Film Agency for Wales
- www.filmlondon.org.uk – Film London
- www.northernirelandscreen.co.uk – Northern Ireland Screen
- www.northernmedia.org – Northern Film and Media
- www.northwestvision.co.uk – North West Vision and Media
- www.scottishscreen.com – Scottish Screen
- www.screeneast.co.uk – Screen East
- www.screensouth.org – Screen South
- www.screenwm.co.uk – Screen West Midlands
- www.screenyorkshire.co.uk – Screen Yorkshire
- www.swscreen.co.uk – South West Screen
- www.ukfilmcouncil.org.uk – UK Film Council.

Skillset, the Sector Skills Council for the creative media sector, has a substantial section of its website dedicated to careers, including job descriptions – www.skillset.org/careers.

Further general information on work-related learning can be found at the following websites:

- www.aimhighersw.ac.uk/wbl.htm – work-based learning guidance
- www.businesslink.gov.uk – local, regional business links
- www.nebpn.org – National Education and Business Partnership Network
- www.vocationallearning.org.uk – Learning and Skills Network
- www.warwick.ac.uk/wie/cei – Centre for Education and Industry, University of Warwick – work experience and workplace learning frameworks

Indicative reading for learners

Textbooks

Baylis P, Freedman A, Procter N et al – *BTEC Level 3 National Creative Media Production, Student Book* (Pearson, 2010) ISBN 978-1846906725

Baylis P, Freedman A, Procter N et al – *BTEC Level 3 National Creative Media Production, Teaching Resource Pack* (Pearson, 2010) ISBN 978-1846907371

Hartwig R L – *Basic TV Technology, Digital and Analog, 4th Edition* (Focal Press, 2005) ISBN 978-0240807171

Kindem G and Musburger R – *Introduction to Media Production: From Analog to Digital, 4th Edition* (Focal Press, 2009) ISBN 978-0240810829

Roberts-Breslin J – *Making Media: Foundations of Sound and Image Production, 2nd edition* (Focal Press, 2007) ISBN 978-0240809076

Journals

AV

Broadcast

Production Solutions

Television

Websites

nt12.orbital.net/bksts/about.asp – BKSTS (British Kinematograph Sound & Television Society) organises events, courses, and demonstrations of new equipment

shootingpeople.org/account/auth.php – Shooting People, a film making forum

www.bectu.org.uk – BECTU (Broadcasting Entertainment Cinematograph and Theatre Union) is the trade union representing video production professionals

www.firstlightmovies.com – First Light exists to encourage film making amongst young people and has links to Skillset and the UK Film Council

www.hitachidigitalmedia.com – a commercial site but containing useful information on technology

www.radioandtelly.co.uk – explanations of standards and formats

Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

Skill	When learners are ...
Independent enquirers	identifying questions to answer about television standards and resolving technical problems planning and carrying out research into the use of production and post-production equipment exploring issues, events or problems around the use of video technology from different perspectives
Reflective learners	evaluating experiences and learning around video technology to inform future progress selecting material from research in order to produce a presentation about the principles of technology considering the use and role of production and post-production equipment
Self-managers	organising the use of video equipment as part of a production working towards goals, showing initiative, commitment and perseverance, and organising time and resources, prioritising actions when engaged in video production work.

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are ...
Creative thinkers	using video technology to record material for a production using video post-production technology as part of a production
Team workers	working as a member of a video production team
Effective participators	contributing to a community production.

● Functional Skills – Level 2

Skill	When learners are ...
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	using digital video editing software working with menus on digital video recording equipment
ICT – Find and select information	
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	researching information about TV standards and formats
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: <ul style="list-style-type: none"> • text and tables • images • numbers • records 	researching video technology
Bring together information to suit content and purpose	preparing reports on digital technology
Present information in ways that are fit for purpose and audience	presenting reports on digital technology
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	using edit decision lists and logging procedures
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	presenting production proposals
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	researching the techniques and conventions of digital video technology
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	preparing a group presentation on an aspect of video technology.