

Unit 31: Computer Animation

Unit code:	D/601/7658
QCF Level 3:	BTEC National
Credit value:	10
Guided learning hours:	60

● Aim and purpose

The aim of this unit is to ensure learners understand types of animation and their uses and develop the knowledge and skills required to use software techniques to design and implement different types of animation.

● Unit introduction

Computer animation is the art of creating moving images through the use of computers. It brings together computer graphics and animation techniques. Animation does not require computers, however the increasing ability of computers to create and manipulate sets of images has allowed basic animation to reach new levels of sophistication and realism.

To create the illusion of movement, a sequence of images is displayed over time and the human eye perceives this sequence as continual movement. The technique is at the heart of all existing technologies such as television and motion pictures. It is increasingly created by means of 3D computer graphics, although 2D computer graphics are still widely used for low bandwidth and faster real-time needs. Only 2D graphics are required in this unit.

Animation has become a prominent feature of the worldwide web and is used to create interest and attract attention. In this area, however, there are other factors that need to be taken into account when designing and building applications, such as the nature of the display device and the bandwidth of the connection. As with all computer applications learners must first identify the need, specific requirements and constraints before building the solution.

Learners will start by looking at different types of animation and their uses and formats. The available tools, techniques and software will be examined as well as the special techniques used when animating for the web. Managing file size is important and learners will come to know about the techniques for minimising file sizes.

Finally, learners will design and develop their own animations.

● Learning outcomes

On completion of this unit a learner should:

- 1 Understand the types and uses of animation
- 2 Know the software techniques used in animation
- 3 Be able to design and implement digital animations.

Unit content

1 Understand the types and uses of animation

Origins: persistence of vision; pioneers; techniques eg William Horner, Edison, Lumiere brothers; traditional techniques eg claymation

Types of animation: eg movement, masking, morphing

Uses: advertising; creative arts; entertainment; education eg scientific visualisation; others eg simulations (military training, architecture, etc)

Digital animation formats: animated GIF; others eg dynamic HTML, Flash, Shockwave, Quicktime, Realplayer, Silverlight

2 Know the software techniques used in animation

Tools: frames; layers; controls; tweening; others eg buttons, libraries; symbols, integrating other media; preloaders; scripts

Animation software: vector graphics; bitmap graphics; specialist software packages eg Dream Studio, Bryce, Maya, Blender, TrueSpace, Lightwave, 3D Studio Max, SoftImage XSI, Adobe Flash (2D)

Animating for the web: special techniques eg animated rollovers; email attachments, e-cards; output devices eg mobile phone, PDA, monitor

Files: file types; file type features; converting files; importing files; exporting files; file management

Managing file size: quality of image; special techniques eg frame disposal, autocrop

3 Be able to design and implement digital animations

Design: storyboarding; timings; key frames; frame numbering; frame naming

Implement: create; test; review; document

Test: test functionality; debug

Review: compare with original design; suggest improvements

Document: description; purpose; format; target file size; other eg storage location, naming; source of images

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 explain the different types of animation	M1 explain persistence of vision	
P2 explain different uses of animation		
P3 discuss the advantages and limitations of animated GIFs	M2 compare different animation formats	
P4 describe the software tools available for animation		
P5 describe factors that need to be taken into account when creating animations for the web [IE5]	M3 explain particular techniques that are used to minimise the file size of animations.	D1 compare different specialist computer animation software packages
P6 design computer animations using different animation techniques [CT 1]		
P7 implement animations using different animation techniques. [IE4]		D2 evaluate the tools and techniques used to create animations.

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

The unit content suggests the types of software available to which learners should have access, but, as with most branches of IT, new packages and versions are produced on an almost continual basis. Tutors should always attempt to use current commercial versions. It is vital that learners have sufficient access to this type of software if this unit is to be delivered successfully.

Tutors may prefer to work with the practical aspects of learning outcome 3 to introduce the unit and then use some of the material produced and techniques acquired to evidence the rest of the unit. This would be an exciting way of working, but needs proper planning and control to be effective.

Tutors will start by looking at some of the basic concepts of animation and the work of the pioneers in the field. The unit content includes persistence of vision, the science of which has caused some controversy over the years, but its application in animation is not doubted. This should be delivered from the application point of view. Learners will also study the work of some of the animation pioneers, and some traditional techniques. The use of directed study is a particular useful technique for much of this delivery, together with demonstrations, or examples of, traditional techniques.

This will be followed by looking at the application of animation across various aspects of life including advertising, creative arts, entertainment, education, and any other aspect tutors think of. It is useful for learners to look at least at one example of each, and they should be encouraged to seek out examples for themselves. It may be helpful for learners to produce a list of various examples which they can use for reference if required later.

The tutor can follow this by demonstrating some types of animation, or show examples of different types of animation, as long as it represents what is suggested in the unit content. Learners can carry out further research and list, with comments, some types of animation for future reference. Group exercises in researching and using some of these can be amalgamated to provide a useful information leaflet for reference purposes.

Learners need to study at least two animation formats, plus animated GIFs. Handouts or directed study on the advantages, limitations and alternatives to each are also useful. Simple learner exercises can be included where they create different formats. Gapped handouts and quizzes, particularly in electronic formats, are extremely useful to back up this information.

The tutor can demonstrate the use of tools in animation and the use of software, including at least two specialist software packages, backed up by appropriate learner exercises.

Learners will consider various aspects of files and their management, and once again tutor demonstrations followed by learner exercises are appropriate forms of delivery. These can be backed up by learner searches on the internet and tutor-led discussion groups.

Designing is probably best delivered through tutor demonstration and learner exercises.

Documentation will involve looking at good examples of existing documents, handouts and checklists of what is required, and some practical exercises where learners attempt to document the material they have produced in exercises.

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 in planning the delivery and assessment of this unit.

Topic and suggested assignments/activities and/assessment
Introduction to the unit
Types and uses of animation: <ul style="list-style-type: none">• whole-class exercise – emphasise thinking (old and new) on persistence of vision• whole-class exercise – using examples of applied animation• whole-class exercise – tutor demonstrates different types of animation• directed research – study of different animation formats, including animated GIFs.
Assignment 1 – A Basis for Animation
Software techniques: <ul style="list-style-type: none">• individual exercise – use a variety of tools• whole-class exercise – tutor demonstrates software available at the centre including specialist software packages• individual exercise – learners use the internet to find, and list, examples where various animation techniques have been used• whole-class exercise – tutor demonstrates different file types, file conversions etc• whole-class exercise – tutor-led discussions on the merits of various techniques.
Assignment 2 – Tools and Software
Design and make animations: <ul style="list-style-type: none">• individual exercise – case study example of requirement, design and solution• whole-class exercise – tutor demonstrates how to work with a design to produce an animation• individual exercise – learners produce pieces of documentation for some of the exercises they have undertaken• individual exercise – case studies where learners select appropriate software and tools• individual exercise – role play reviewing a piece of work.
Assignment 3 – The Complete Package

Assessment

It is suggested that this unit is assessed using the three assignments summarised in the *Programme of suggested assignments* (PSA) table.

The material in the unit is quite diverse and it can be difficult to find a logical scenario which covers all aspects. The assignment in the PSA suggests learners take the role of working for an animation company as an overall scenario, with the tutor possibly playing their manager or client.

This, however, is one idea among many others which could be appropriate.

Suggested Assignment 1 – A Basis for Animation

P1 requires an explanation of different types of animation. The unit content should inform the expected coverage. A poster is suggested as a format for evidence.

For P2, learners should explain how animations are used. Note that it is how the animations have been used which are to be explained, and that the different areas are prescriptive (for example advertising, creative arts, entertainment and education plus at least one other). These should be selected by learners but may be selected from a list supplied by the tutor.

M1 asks for an explanation of 'persistence of vision'. There is a certain amount of controversy around some of the 'science' of persistent vision, but little around its use in this field. Tutors who may have started delivery with the more practical elements of the unit could get learners to produce a piece of animation to illustrate and describe this, or any other of the criteria in this assignment.

Suggested Assignment 2 – Tools and Software

A presentation is suggested in the PSA but an illustrated report or any other format is acceptable.

For P3, learners should discuss the advantages and limitations of animated GIFs.

M2 is an extension of P3 and is a comparison of different animation formats. The GIFs explained for P3 may be one of the formats compared.

P4 requires a description of the available software tools (note the prescriptive unit content).

For P5, learners must describe the factors that need to be taken into account when creating animations for the web.

M3 is an explanation of techniques used to minimise file size. Note that it is the actual techniques that are to be explained, not the file sizing itself. Learners should be able to explain how it is carried out and not necessarily what is carried out.

D1 is a comparison. It may be easier for learners to compare specialist packages if these are available (for example Dream Studio and Flash). In many cases the availability of such software may be limited, in which case select dissimilar techniques (which may be translated as the practical application of tools). The software or techniques may be selected by learners or assigned by the tutor.

Suggested Assignment 3 – The Complete Package

For P6, learners must design computer animations using different animation techniques. 'Different' in this case should be defined only as more than one, but otherwise the number of techniques used should be selected by the tutor.

For P7, learners must implement an animation. Implementation covers creation, testing, reviewing and documenting, and all areas must be completed. Learners must create a working animation that plays to an acceptable level from start to finish. Tutors should note that the criterion does not define the quality of the artwork in the animation, but instead focuses on the technical process of creating the animation.

Testing should be adequate and documented. The review should compare the final product with the original design and suggest improvements, possibly following user feedback. Documentation will probably be naturally occurring as the creation and testing progresses. There is no need for a formal document to be produced but there must be evidence for all the unit content.

For D2, learners' evaluations should include consideration of ease of use, technical aspects of the animations created, limitations of the package, appearance of animations produced etc. In all cases, learners should look at these facets in terms of good points, less good points and whether improvements could be made to the tools or technique being evaluated. It is the tools and techniques learners have used that are being evaluated and not the animations produced.

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, P2, M1	A Basis for Animation	Working for an animation production company you have been asked to produce material for a visiting school.	Poster
P3–P5, M2, M3, D1	Tools and Software	Prepare material for junior staff not well versed in creating animations.	Presentation
P6, P7, D2	The Complete Package	A rush job arrives and you are the best person to design, create and review the animations required.	Design documents Detailed witness statements Working animation Test logs Review Documentation

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

This unit forms part of the BTEC in IT sector suite. This unit has particular links with the following unit titles in the IT suite:

Level 2	Level 3	Level 4
Unit 23: Computer Graphics	Unit 23: Human Computer Interaction	Unit 10: Human Computer Interaction
Unit 30: Animation Techniques	Unit 33: Digital Graphics	Unit 38: 3D Computer Modelling and Animation
Unit 35: Digital Graphics		

This unit maps to some of the underpinning knowledge from the following areas of competence in the Level 2 National Occupational Standards for IT (ProCom):

- 4.3 Human Needs Analysis
- 4.6 Human Computer Interaction/Interface (HCI) Design.

Essential resources

Learners must have access to specialised animation software and systems with sufficient capacity to run this effectively. Without this it is impossible to undertake the unit.

Projection equipment or a suitable alternative is vital for tutor demonstrations if these are used to deliver the unit.

Employer engagement and vocational contexts

Visiting speakers from, or learner visits to, relevant commercial organisations would be an effective way of familiarising learners with current commercial practices

Indicative reading for learners

Textbook

Lawson J, Blundell P, Anderson K, Smith A, Philips J, Kaye A, Jarvis A and Wasyliv B – *Information Technology Practitioners Book 2, 2nd Edition* (Heinemann, 2007) ISBN-10: 0435465503, ISBN-13: 978-0435465506

Parent R – *Computer Animation: Algorithms and Techniques, 2nd Edition* (Morgan Kaufmann, 2007) ISBN-10: 0125320000, ISBN-13: 978-0125320009

Websites

www.cgarena.com/

www.cgexplorer.com/

www.cgshelf.com/

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	describing factors that need to be taken into account when creating animations for the web implementing animations using different animation techniques
Creative thinkers	designing computer animations using different animation techniques.

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 ...
Independent enquirers	evaluating the tools and techniques used to create animations
Creative thinkers	explaining particular techniques that are used to minimise the file size of animations comparing different specialist computer animation software packages.

● Functional Skills – Level 2

Skill	When learners are ...
ICT – Using ICT	
Select, interact with and use ICT systems safely and securely for a complex task in non-routine and unfamiliar contexts	implementing animations using different animation techniques
ICT – Developing, presenting and communicating information	
Enter, develop and refine information using appropriate software to meet requirements of a complex task	implementing animations using different animation techniques
Evaluate the selection, use and effectiveness of ICT tools and facilities used to present information	evaluating the tools and techniques used to create animations.