Unit 26: Computer Animation

NQF Level 3: BTEC National

Guided learning hours: 60

Unit abstract

Computer animation is the art of creating moving images via the use of computers. It brings together computer graphics and animation techniques. Animation does not require computers; however the increasing power 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. In this unit only 2D graphics are required.

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 a 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.

Learning outcomes

On completion of this unit a learner should:

1 Understand the origins and types of animation

2 Be able to use software techniques used in animation

3 Be able to plan, create and review an animation using digital methods.

Unit content

1 **Understand the origins and types of animation**

Basis of and origins of animation: persistence of vision; pioneers and techniques eg William Horner, Edison, Lumiere brothers; traditional techniques eg claymation

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

Types of animation: eg movement, masking, morphing

Animation formats: animated GIF; others eg dynamic HTML, Flash, Shockwave, Quicktime, Realplayer

Animated GIFs: features; advantages; limitations; alternatives

2 **Be able to use software techniques used in animation**

Tools: frames; layers; controls; tweening; others eg buttons, libraries and symbols, integrating with other media such as sound, preloaders, scripts and script editing

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

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

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

Files: file types and features of each; converting files; importing and exporting files; file management

3 **Be able to plan, create and review an animation using digital methods**

Design: story boarding; timings; key frames; frame numbering and naming

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

Software: appropriate for purpose; use of tools

Review: testing functionality; against original purpose and requirements; improvements

Grading grid

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

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 how persistence of vision is used in animation	M1 compare two different animation formats	D1 evaluate one software package or technique that is used to create animations
P2 describe three applications for animations	M2 compare two different specialist software package or programming techniques used to create computer animation	D2 evaluate the tools and techniques used to create finished animations.
P3 describe the features, advantages and limitations of animated GIFs and one other animation format	M3 adapt and improve animations based on formal reviews	
P4 describe two different types of animation techniques	M4 explain particular techniques that are used to minimise the file size of animations.	
P5 describe the special factors that need to be taken into account when creating animations for the web		

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:**
P6 design, create and review animations for particular purposes that use both vector and bit map graphics P7 design, create and review animations for particular purposes that are designed to be incorporated into web pages.		

Essential guidance for tutors

Delivery

This is essentially a practical unit, however it is important that learners do not simply focus on the mechanical skills needed to create animations. As noted in the unit abstract, learners must be aware that, in the commercial environment, they must routinely look to formally identify requirements and purpose before beginning to design or produce a solution. This theme, together with the routine embarking on cycles of reviews and adaptation before presenting the final product, must run in parallel. Exceptions might be the exercises and examples that are used to demonstrate competence for the early pass criteria which are used to show particular aspects or features required.

For many of the real-world applications of animation, creativity is a key aspect and where possible, expertise from creative arts departments within centres should be accessed. If possible, external expertise in terms of practising computer animators should be brought in for talks as this would bring a reality to the activity. Although specialist computer animators may be difficult to find, it is likely that there will be web designers who have developed particular expertise. However, it is important to brief them and check that the presentation will add value and fit in to the programme. Visits to exhibitions would also be particularly valuable.

Links with graphics units would be beneficial and it is also possible that further links could be made with other related units within other BTEC programmes such as media studies.

Assessment

To achieve a pass grade, learners must achieve the seven pass criteria listed on the grading grid. For P1, learners could use their emerging skills to create simple animations with different numbers of frames and time intervals. The activity could be presented as a type of experiment and the impact of the variables formally recorded. At the end of the activity, learners should know at what points different effects are achieved. No physiological explanations of the biological functions of the eye are necessary. Alternatively, historical techniques such as flicker books could be used and documented.

For P2, learners might be asked to research three different applications in the media or base one or all on talks given or exhibitions visited. It is likely that written reports, presentations or web pages would be used as the vehicle for the evidence.

Evidence for P3 might include simple examples of animated GIFS that show the different features supported by notes or documented discussions with tutors that confirm understanding. Descriptions of one other format are needed, however no comparisons are necessary.

For P4, practical activities can provide the basic evidence needed supported by explanations. The explanations can be written reports or, possibly, the explanations could be incorporated as part of the animation itself.

Evidence for P5 is likely to be in the form of written reports, possibly based around demonstrations of animations built for the web showing potential pitfalls or other problems.

For P6, no more than two animations are needed in total. It is expected that they be produced for a particular purpose and a specification developed. Ideally, there should be a recognised client who can take part in the later review. It is expected that the range of tools identified in the tools content in learning outcome 2 is covered, however it may be necessary to substitute tools of similar complexity depending on what package the centre uses.

Evidence for P7 will be similar to P6 and it can be linked with one of the merit criteria, for example M4. For P7, as well as P6, the evidence will be varied, the actual animations themselves can be viewed and documented by an observation record. These can be supplemented with written evidence of purpose, specification, as detailed in the design and documentation content of learning outcome 3.

To achieve a merit grade, learners must achieve all of the pass grade criteria and the four merit grade criteria. For M1, learners must compare two different animation formats.

For M2, evidence can be an extension of the activity used to generate evidence for P3. A tabular format would be appropriate.

Evidence for M3 could be based on the facilities available in the centre. It is unlikely that learners will be able to make realistic comparisons without actually using two packages, however they will need to build in-depth skills within one only. Activity that includes the review and adaptations could be used for M3.

For M4, a series of animations could be used as the basis of the evidence, however it is necessary to explain these techniques and this might be done best using supporting written explanations. However, multimedia presentations, hypertext documents or web pages could be a more creative solution.

To achieve a distinction grade, learners must achieve all of the pass and merit grade criteria and the two distinction grade criteria. Evidence for D1 and D2 might be achieved best through written reports.

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

This unit has links to the Level 3 National Occupational Standards for IT Practitioners, particularly the area of competence ‘Software Design and Development’.

Essential resources

Learners will need individual access to a specialist games development package or an appropriate language with extensions as needed to meet the criteria.

Indicative reading for learners

Textbooks

Grebler E — *3D Game Programming for Teens* (Thompson Learning, 2005)
ISBN 159200900X

Habgood J and Overmars M — *The Game Maker's Apprentice* (Apress US, 2006)
ISBN 1590596153

Schuytema P — *Game Design*: *A Practical Approach* (Charles River Media, 2006)
ISBN 1584504714

Sherrod A — *Ultimate Game Programming with Directx* (Charles River Media, 2006)
ISBN 1584504587

Key skills

Achievement of key skills is not a requirement of this qualification but it is encouraged. Suggestions of opportunities for the generation of Level 3 key skill evidence are given here. Tutors should check that learners have produced all the evidence required by part B of the key skills specifications when assessing this evidence. Learners may need to develop additional evidence elsewhere to fully meet the requirements of the key skills specifications.

Application of number Level 3	
When learners are:	**They should be able to develop the following key skills evidence:**
• comparing two different specialist software package or programming techniques used to create computer animation.	N3.1 Plan an activity and get relevant information from relevant sources. N3.2 Use this information to carry out multi-stage calculations to do with: a amounts or sizes b scales or proportion c handling statistics d using formulae. N3.3 Interpret the results of your calculations, present your findings and justify your methods.

Communication Level 3	
When learners are:	**They should be able to develop the following key skills evidence:**
• describing how persistence of vision is used in animation.	C3.1a Take part in a group discussion. C3.1b Make a formal presentation of at least eight minutes using an image or other support material. C3.2 Read and synthesise information from at least **two** documents about the same subject. Each document must be a minimum of 1000 words long. C3.3 Write **two** different types of documents each one giving different information about complex subjects. One document must be at least 1000 words long.
Information and communication technology Level 3	
When learners are:	**They should be able to develop the following key skills evidence:**
• describing the features, advantages and limitations of animated GIFs and one other animation format.	ICT3.1 Search for information, using different sources, and multiple search criteria in at least one case. ICT3.2 Enter and develop the information and derive new information. ICT3.3 Present combined information such as text with image, text with number, image with number.

Improving own learning and performance Level 3	
When learners are:	**They should be able to develop the following key skills evidence:**
• adapting and improving animations based on formal reviews.	LP3.1 Set targets using information from appropriate people and plan how these will be met. LP3.2 Take responsibility for your learning, using your plan to help meet targets and improve your performance. LP3.3 Review progress and establish evidence of your achievements.
Problem solving Level 3	
When learners are:	**They should be able to develop the following key skills evidence:**
• explaining particular techniques that are used to minimise the file size of animations.	PS3.1 Explore a problem and identify different ways of tackling it. PS3.2 Plan and implement at least one way of solving the problem. PS3.3 Check if the problem has been solved and review your approach to problem solving.
Working with others Level 3	
When learners are:	**They should be able to develop the following key skills evidence:**
• designing, creating and reviewing animations for particular purposes that use both vector and bit map graphics.	WO3.1 Plan work with others. WO3.2 Seek to develop co-operation and check progress towards your agreed objectives. WO3.3 Review work with others and agree ways of improving collaborative work in the future.