Unit 66: 3D Modelling

Unit code: K/600/6601

QCF Level 3: BTEC National

Credit value: 10

Guided learning hours: 60

Aim and purpose

The aim of this unit is to introduce learners to the theory and use of 3D modelling software. Learners will develop an awareness of how 3D models are displayed on a computer screen and investigate the geometric theory underlying 3D modelling work. Learners will devise and create 3D models and reflect critically on their own work.

Unit introduction

3D modelling is the art of creating characters and objects for 3D models, including life forms, scenery, vegetation, furniture, and vehicles. It is created by means of 3D computer application software. 3D modellers are sometimes also responsible for applying textures to objects, characters, models and items, such as the surfaces of walls and floors of buildings. This is highly skilled work which requires considerable knowledge of lighting, perspective, materials, and visual effects. Specialist software packages are used to create the models and modellers must portray the models as realistically as possible in an efficient and effective way, making the most appropriate use of the technology.

In this unit learners will have the opportunity to use a 3D modelling software application to produce 3D models for a scene. 3D modelling concepts are complex and in this unit learners are encouraged to research the use of 3D modelling within the interactive media industry. Learners will develop an awareness of how rendered 3D models are displayed on a computer screen. An appreciation of the geometric theory underlying 3D work will help learners understand the technical language used by modellers.

Learners following this unit will have the opportunity to devise and develop original ideas through interpreting creative briefs and considering potential target audiences. They will develop skills in drafting pre-visualisation sketches and storyboards. Developing these planning skills will form a habit of preparation and workflow management which will be valuable to any entrant to the interactive media industry.

Learners will develop practical computer modelling skills and create 3D models using a range of techniques, including box and extrusion modelling and rendering.

This unit will also develop learners' ability to reflect critically on their own work, as they will need this professional skill in any future career.

Learning outcomes

On completion of this unit a learner should:

1 Understand theory and applications of 3D

2 Be able to devise 3D models

3 Be able to create 3D models following industry practice.

Unit content

1 Understand theory and applications of 3D

Applications of 3D: eg models, product design, animations, TV, film, web, games, education, architectural walk-through

Displaying 3D polygon animations: application programming interface, eg Direct3D, OpenGL; graphics pipeline, eg modelling, lighting, viewing, projection, clipping, scan conversion, texturing and shading, display; rendering techniques (radiosity, ray tracing); rendering engines; distributed rendering techniques; lighting; textures; fogging; shadowing; vertex and pixel shaders; level of detail

Geometric theory: vertices; lines; curves; edge; polygons; element; face; primitives; meshes, eg wireframe; coordinate geometry (two-dimensional, three-dimensional); surfaces

Mesh construction: box modelling; extrusion modelling; using common primitives, eg cubes, pyramids, cylinders, spheres

3D development software: software, eg 3D Studio Max, Maya, Lightwave, AutoCAD, Cinema 4D, Softimage|XSI; file formats, eg 3ds, .mb, .lwo, .C4d, .dxf, .obj; plug-ins

Constraints: polygon count; file size; rendering time

2 Be able to devise 3D models

Stimulus: eg client brief, own brief, from market research

Ideas: brainstorming; sketches; pre-visualisation (concept drawings, storyboards, level diagrams, 2D and 3D architectural drawings)

Legal and ethical considerations: legal, eg copyright; ethical, eg confidentiality, decency; representation, eg race, gender, religion, sexuality

Specification: target audience; key visual themes; storyboards; constraints, eg polygon count, image resolution, output size, file type, file size

3 Be able to create 3D models following industry practice

Development software interface: files, eg loading, properties, merging, replacing, importing, saving; viewports, eg configuring viewports, viewport controls; command panels; keyboard shortcuts; floating palettes; customising the interface; floating toolbars; drawing units; drawing aids (layers, grids, snap); object naming conventions

Geometric models and text: models, eg box, tube, plane, sphere, disc, cone, cylinder, pyramid; 3D text

Mesh building and editing: vertices (adding, editing, deleting); polygons, eg planar, non-planar

Modelling: layers; modify (move, rotate, stretch, deform); extend (bevel, extrude, lathe); combine (Boolean, Patch); duplicate (mirror, array, clone); organic modelling, eg sub-division surfaces, weight maps, level of detail; nurbs, eg relational modelling, curves, control vertices, UV coordinates, surfaces, extrudes, sweeps, skinning, trims, fillets, surface approximation

Virtual camera: concepts, eg lens length, field of vision (FOV), focus and aperture, depth of field; cameras, eg creating a camera, creating a camera view; camera parameters; camera type, eg target, free; conversion from real world equivalents (especially in light of digital photography and use of smaller sensors)

Lighting: light types (ambient, distant, area, spot, point, linear, photometric, raytraced); lighting controls and effects, eg projector; attenuation; colour; shadows; atmospheric, eg clouds, smoke, fire; volumetric, eg fog, mist

Texturing: creating textures; loading; applying textures to objects; material editor; mapping materials; material modifiers; material types, eg bitmap, procedural

Rendering: scene rendering, eg rendering controls, rendering options, output size and aspect ratio, safe-frame, file type, file size; image resolution, eg TV, film, web, desktop, image formats, compression

Industry practice: reflect on finished product (compared with original intentions, fitness for purpose, technical qualities, aesthetic qualities); production skills (ideas generation, modelling specification, workflow and time management, technical competence, teamwork)

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 summarise accurately theory and applications of 3D with some appropriate use of subject terminology [IE]	**M1** explain theory and applications of 3D with reference to detailed illustrative examples and with generally correct use of subject terminology	**D1** comprehensively explain theory and applications of 3D with elucidated examples and consistently using subject terminology correctly
P2 generate outline ideas for 3D models working within appropriate conventions and with some assistance [CT; SM]	**M2** generate detailed ideas for 3D models showing some imagination and with only occasional assistance	**D2** generate thoroughly thought-through ideas for 3D models showing creativity and flair and working independently to professional expectations
P3 create 3D models following industry practice, working within appropriate conventions and with some assistance. [CT; SM; RL]	**M3** create 3D models to a good technical standard following industry practice, showing some imagination and with only occasional assistance.	**D3** create 3D models to a technical quality that reflects near-professional standards following industry practice, showing creativity and flair and 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

It is suggested that teaching follow the order of the learning outcomes, addressing the concepts and principles of 3D initially, followed by generating ideas and planning 3D models, the production of original 3D models, and finally reflecting upon own 3D modelling work.

Tutors should note that if the content relating to learning outcome 1 has been covered in either 3D Animation or 3D Environments there is no need to cover it again here.

This unit could be taught through a variety of activities during the teaching sessions using lectures, discussions, practical sessions and demonstrations. The largest proportion of time should be spent in practical sessions using 3D modelling application software.

Formal lectures and independent study will be the main methods used to teach understanding of the concepts and principles of 3D. Learners could research a range of contemporary 3D modelling work and investigate how professional 3D modelling artists incorporate their work into a range of multimedia applications.

Learners will need to appreciate the application of 3D and the principles of 3D geometric theory, mesh construction and the developments of 3D software. They will, therefore, need to understand the features of 3D application software and the techniques and methods used in the development of 3D models. This can be achieved through formal lectures, independent study or through the practical use of 3D software to create 3D models. Learners will also need access to a range of 3D design tools and plug-ins. These tools are available on the internet and will allow learners to modify existing 3D models or create their own.

Teaching of 3D application software is best done in short, carefully structured stages, each stage being reinforced with small practical projects which, when completed, allow progress to other stages. Learners must produce 3D models to a brief that might be specified by a client or in a simulated assignment thus developing knowledge, skills and techniques associated with industry-standard 3D software to produce realistic models.

Reflective practice is an important part of development and design. Learners should be encouraged to compare their completed 3D models with their original intentions and with current and past professional work.

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.
Introduction to concepts and principles of 3D. Learners will receive lectures and demonstrations, and hold discussions to: • examine how 3D is used by the interactive media and computer games industry • explain how 3D models are displayed • explain how 3D models are constructed • examine the types of development software used in the production of 3D models.
Assignment 1 – 3D: the Basics Learners write an article entitled '3D: the basics' for an online 3D art ezine, examining the application and use of 3D models within interactive media and computer game products. The article must cover: • applications of 3D • displaying 3D polygon animations • geometric theory • mesh construction • 3D development software • constraints.
Introduction/review of ideas generation and recording.
Assignment 2 – 3D Models for an Asset Library Learners will generate ideas and specification documentation for 3D models to meet the requirements of a brief. Learners will: • consider and interpret the creative brief • generate and record ideas • carry out pre-production planning • compile a comprehensive development log evidencing their creative work.
Sessions on development of practical web animation skills, with brief introductory lectures, covering: • basic software interface tools • advanced software interface tools • models production processes • reviewing own 3D models production work.

Topics and suggested assignments and activities
Assignment 3 – 3D Models for an Architectural Walk-through of a Building Learners will create 3D models of a building for an architectural walk-through in response to a brief. Learners will: • undertake production workshop sessions following their planned ideas • present 3D modelling production work • review their own 3D models and production work.
Unit learning and assessment review.

Assessment

Evidence for assessment

Evidence for the achievement of learning outcome 1 could be a presentation or a report explaining the applications of 3D, geometric theory, mesh construction, 3D development software and constraints. Research could include extracts from books, journals, articles, material published on the internet or trade publications. Evidence relating to learning outcome 1 might also be presented in the form of wiki articles.

Tutors should note that if learners have already been assessed for either 3D Animation or 3D Environments there is no need for them to provide additional evidence for the assessment of this element of 3D Modelling, as the content relating to learning outcome 1 is the same in all three units and one body of evidence is sufficient for all three. Some learners may, however, wish to take the opportunity to improve their grade for this element of the assessment by submitting new or additional evidence produced when covering this unit.

As evidence of achievement of learning outcomes 2 and 3, learners must produce documentation showing ideas generation, planning and review of each 3D model using 3D application software. Documentation could be presented as annotated screen grabs or via screen capture software with voiceover.

Presentations must be recorded for the purposes of internal and external verification.

For some elements of this unit, 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.

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 inclusive and the examples need not 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.

Pass

To achieve a pass grade, learners must achieve all the criteria at pass level. 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 the use of 3D within the interactive media industry and how 3D graphics are displayed including reference to geometric theory and mesh construction, though will typically not discuss displaying 3D polygon models. The description will not be related through examples to particular 3D applications. Descriptions of geometric theory and mesh construction will be correct and should cover the main points. 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. A pass grade learner might note when discussing geometric theory, 'Points are the most basic part of every 3D object. The joining of points creates lines, which in turn can then be made into polygons. Points are used to identify a place or location in 3D space. Once you have your points, you can now connect them to make a line.'

P2: learners will indicate some consideration of brief or target audience, though this is likely to be a cursory statement of fact, without discussion of implications. Evidence will show some recording of ideas generation outlining their ideas through brainstorming sheets, sketches, storyboards or otherwise, though they will not justify choice of final ideas for implementation. There will be some imagination behind the ideas and some attempt will have been made to explain intentions but this will be patchy and not always clear. Learners will have constructed a brief specification which will outline the idea, and will give some indication of what will be required to produce the models. They will also show that they have taken account, to some extent, of legal and ethical considerations though this evidence is likely to be minimal and factual only, lacking consideration of implications for the final models.

P3: learners will produce an asset library of related 3D models using 3D application software. It is expected that for this grade learners will have produced a minimum of six models from ideas generated in response to the brief. Learners' use of the 3D application software to produce their 3D models will be basic – for example, box and extrusion modelling using standard primitives such as box, tube, plane, sphere, disc, cone, cylinder; using ambient, distant, area, and spot lighting types; adding a target virtual camera; applying basic textures to objects and basic rendering techniques. Learners will provide documentation on their use of the 3D application software tools and features employed but it will be scanty and lacking in detail. Following industry practice, learners will review their finished 3D modelling work in such a way that they move beyond merely describing it. They will make evaluative comments upon what they have done but these comments will be assertions that are not supported by evidence or exemplification. They will discuss both the production process and the finished product, making comments on ideas generation, planning their 3D models, their fitness for purpose (considering client brief where relevant and target audience) and commenting on how they have used 3D development software to create a solution to the brief. A pass grade learner will make basic comments that do not address opportunities for future improvement. A learner might note, 'I based my models on my brief which was to design models for a space station scene on a mysterious planet in deep space. I created several models for the space station using my development sketches as a guide. I used some basic primitives to construct my models – for example, boxes and cylinders to make a spaceship. I found metal textures on the internet and applied them to the spaceship model. I had a problem with my lighting and my camera angles, the finished rendered models looked really poor.'

P2 and P3: in terms of the imaginative qualities of their work, pass grade learners will not move beyond the conventional, but the conventions applied will be appropriate to the form or genre within which they are working. Learners will require frequent assistance and support from tutors to prepare and produce their 3D modelling ideas, though they will take note of and make use of this help when 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.

Merit

To achieve a merit grade, learners must achieve all the pass and all the merit grade criteria. For each of the criteria learners must present evidence that addresses each italicised sub-heading of the content for the learning outcome.

M1: learners will correctly explain the use of 3D within the interactive media industry and how 3D graphics are displayed including explanation of geometric theory and mesh construction. These must be explained clearly, using generally appropriate subject terminology. For this grade the evidence will include detailed illustrative examples but they will not be elaborated to show how they illustrate the points being made. Learners will use technical vocabulary for the most part correctly, but may make mistakes or be unsure about usage at times. A merit grade learner might note when discussing geometric theory, 'Points are the most basic part of all 3D objects also known as vertices. The joining of vertices creates lines known as edges. When you connect three or more lines together you have an area which is closed making a face known as a polygon. Diagram X shows how four points are defined using the Cartesian coordinate system. When connected the area closed within the lines is called a face, otherwise known as a polygon.'

M2: learners will generate and plan 3D models which combine the key characteristics of 3D modelling in an imaginative way, making use of conventions but not slavishly copying them. Evidence will reveal imagination beyond the conventional, an organised approach to ideas generation and planning and clear explanations of intentions. Evidence is likely to be a report or presentation including brainstorming sheets, sketches, and storyboards or otherwise within a final specification document presented as a final proposal suitable for use by another to prepare the product. Merit grade learners will indicate consideration of brief or target audience; this will include discussion of implications. There must be evidence which indicates an awareness of legal and ethical constraints, with some consideration of their implications for the final models.

M3: learners will produce an asset library of related 3D models from ideas generated through their interpretation of a brief. It is expected that for this grade the learner will produce the minimum of six models, and will competently use the 3D application software in their production – typically employing, for example, box and extrusion modelling using layers and object naming conventions; mesh building and editing vertices and polygons; layers; models modified using bevel, extrude, extend; combine and duplicate; appropriate lighting types, lighting controls and effects; target and virtual cameras. They will apply camera parameters; create, load and apply textures to objects; use the materials editor to modify and map materials and produce rendered scene to client brief requirements. Learners will document in some detail their use of the 3D application software tools and features employed. Learners will discuss both the production process and the finished product. Following industry practice, learners will review their finished 3D modelling work and will make comments on fitness for purpose (considering client brief where relevant and target audience), will write about their application of techniques to the generation of ideas and planning their 3D models and explain how they have used 3D development software to create a solution to the brief. Learners will explain what they have tried to accomplish and how they have worked to try to achieve what they have set out to do. They will explain decisions made and to exemplify this explanation through relevant and detailed reference to their own work, though the examples they give will not be further elucidated. A learner might note, 'I based my models on my brief which was to design models for a space station scene on a mysterious planet in deep space. My idea came from researching the TV series *Star Trek*. From my mood board I created a series of models for the space station using some of the common primitives in 3D Studio Max (for example, boxes and cylinders) to make the basic shape for the spaceship. I then used box and extrusion modelling techniques to develop the models and make their shape more realistic. I applied metal textures I had found on an internet site to my models. I was not pleased with them but I did not have time to make my own. I had a problem with my lighting and my camera angles, and the finished rendered models looked really poor. To resolve this I changed the angle of the camera and moved it closer to my model and I changed my light to a spot. I worked with the lighting controls until the models looked right. However, I was not pleased with all my models as some of my textures did not scale correctly. Some of my finished models did not look anything like my original ideas.'

M2 and M3: though learners might still be working within recognisable generic conventions, there will be some thought behind the application of technical skills, and codes and conventions will be used with some inventiveness. Learners will need little assistance from tutors to prepare and produce their 3D modelling ideas, 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.

Distinction

To achieve a distinction grade, learners must achieve all the pass, all the merit and all the distinction grade criteria. For each of the criteria learners must present evidence that addresses each italicised sub-heading of the content for the learning outcome.

D1: learners will explain fully and clearly the use of 3D within the interactive media industry and the ways in which 3D graphics are displayed, including consideration of geometric theory and mesh construction, using explicit examples of particular 3D objects to provide a clear explanation of the points being made. They will justify points made using supporting arguments or evidence and draw out of an example precisely what it is about it that exemplifies the point it illustrates. Fuller and more extensive explanation, the better application of examples and provision of argument to support points made will discriminate between this grade and the merit. Technical vocabulary will be secure and used correctly and confidently at all times. A distinction grade learner might note when discussing geometric theory, 'Points are the most basic part of all 3D objects known as vertices. The joining of vertices creates lines known as edges. When you connect three or more lines together you have an area which is closed, making a face known as a polygon. More complex polygons can be created out of multiple triangles, or as a single object with more than three vertices. Triangles are the most common shapes used in polygonal modelling. A group of polygons which are connected by shared vertices is referred to as a mesh. Diagram XX shows how four points are defined using the Cartesian coordinate system. When connected together the area closed within the lines is called a face, otherwise known as a polygon.'

D2: learners will work independently to prepare a final specification document, report or presentation including brainstorming sheets, sketches, and storyboards or otherwise. This will be presented as a final specification suitable for use by another to prepare the animation. Learners will demonstrate a consideration of the brief or target audience which will include a reasoned and justified discussion of implications. Evidence will demonstrate creativity and flair with an organised approach to ideas generation and planning, and all decisions and intentions will be clearly explained. Distinction grade learners will justify the choice of final ideas for implementation. There will be evidence which indicates a thoughtful consideration of the effects of legal and ethical constraints upon the final product.

D3: learners will produce 3D models showing creativity and flair, drawing clearly on their interpretation of the brief and the ideas generated. For this grade they will use the 3D application software with confidence and autonomy to produce their 3D models – for example, box and extrusion modelling using layers and object naming conventions; mesh building and editing vertices and polygons; use layers; modify models using bevel, extrude, extend; use appropriate lighting types, lighting controls and effects; use target and virtual cameras, and apply camera parameters; create, load and apply textures to objects; use the materials editor to modify and map materials and produce a rendered scene to the client's requirements. Learners will fully document their use of the 3D application software tools and features employed. Following industry practice, learners will review their finished 3D modelling work. Learners will discuss both the production process and the finished product, commenting on fitness for purpose (considering client brief where relevant and target audience), their application of techniques to the generation of ideas and planning their 3D models, and commenting on how they have used 3D development software to create a solution to the brief. Distinction grade learners will consider a range of sources of information about their performance and will make reasoned judgements that consider areas for future improvement. They will make an accurate assessment of their own achievement (with, of course, detailed reference to elucidated examples taken from that work) through critical comparison of their work with current or past practice in a relevant area (that is, the same genre or format as they have

worked in). A learner working at this grade might note, 'I based my models around the information given in the brief which was to design models for a space station scene on a mysterious planet in deep space. My ideas came from researching the TV series *Star Trek*. From my mood board I created a series of models for the space station using some of the common primitives in 3D Studio Max (for example, boxes and cylinders) to make the basic shape for the spaceship. I then used box and extrusion modelling techniques to develop the models and make their shape more realistic. I applied metal textures I had found on an internet site to my models. I was not pleased with them as I could not get them to scale properly. I should have made my own but due to my bad time management I did not have time to use PhotoShop to make them. I had a problem with my lighting and my camera angles, and the finished rendered models looked really poor. To resolve this I changed the angle of the camera and moved it closer to my model and I changed my light to a spot. I worked with the lighting controls until the models looked right. However, I was not pleased with the final quality of my models as some of my textures did not scale correctly due to their poor resolution and pixel depth. I could have enhanced my models by experimenting with the ambient, distant and spot lighting features of the software and used my own textures. This would have made the rendered models more realistic and aesthetically pleasing.'

D2 and D3: learners will apply their technical skills not just with imagination but with ingenuity and even elegance, and codes and conventions will be used with occasionally surprising results. In all practical activity distinction grade 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 if 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 – 3D: the Basics	Article on 3D modelling for an online 3D art ezine.	• All preparatory notes. • Ezine article.
P2, M2, D2	Assignment 2 – 3D Models for an Asset Library	Brief from client to create 3D models for an asset library.	Development log containing: • all ideas notes, sketches, concept drawings, storyboards • asset library of models.
P3, M3, D3	Assignment 3 – 3D Models for an Architectural Walk-through of a Building	Brief from client to create 3D models for an architectural walk-through of a building.	Project portfolio containing: • planning notes • all production documentation • proposal outline • modelling specifications • personal reflective commentary.

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

This unit forms part of the BTEC Creative Media Production suite. This unit has particular links with the following units in the BTEC Creative Media Production suite:

Level 2	Level 3
3D Computer Game Engines	3D Animation
Animation Techniques	3D Environments
	Computer Game Engines
	Digital Graphics for Interactive Media
	Drawing Concept Art for Computer Games

There are opportunities to relate the work done for this unit to Skillset National Occupational Standards in Interactive Media and Computer Games as follows:

- IM1 Work effectively in interactive media
- IM2 Obtain assets for use in interactive media products
- IM29 Direct asset production for interactive media products.

Essential resources

Learners must have access to 3D development software such as 3D Studio Max, Maya, Lightwave, AutoCAD Cinema 4D or Softimage|XSI, and internet access to download plug-ins.

Employer engagement and vocational contexts

Centres should develop links with local interactive media production studios which could be approached to provide visiting speakers, study visits or samples of typical products.

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

Ahearn L – *3D Game Textures: Create Professional Game Art Using Photoshop* (Focal Press, 2006) ISBN 978-0240807683

Birm J – *Digital Lighting and Rendering* (New Riders, 2006) ISBN 978-0321316318

Brooker D – *Essential CG Lighting Techniques with 3Ds Max* (Focal Press, 2008) ISBN 978-0240521176

Capizzi T – *Inspired 3D Modelling and Texture Mapping* (Premier Press, 2002) ISBN 978-1931841504

Gahan A – *3ds Max Modelling for Games: Insider's Guide to Game Character, Vehicle, and Environment Modelling* (Focal Press, 2008) ISBN 978-0240810614

Summers D – *Texturing: Concepts and Techniques* (Charles River Media, 2004) ISBN 978-1584503002

Journals

3D World

Develop Magazine

Edge Magazine

MCV Magazine

Websites

www.3dcafe.com – texture and model resources

www.blinkimage.com – use of environment walk-throughs etc

www.turbosquid.com – textures, models and 3D tutorials

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	generating ideas for 3D models to be used in an interactive context carrying out research into theory of 3D modelling and its application carrying out research to develop ideas for their own 3D models
Creative thinkers	trying out different ways of creating their 3D models, following ideas through to complete their models for the asset library adapting their ideas as circumstances change
Reflective learners	reviewing and reflecting on their 3D modelling work and acting on the outcomes to modify and improve their work setting goals with success criteria for their production work inviting feedback on their own work and dealing positively with praise, setbacks and criticism evaluating their learning and experience to inform future progress
Self-managers	producing 3D models to be used in an interactive context seeking out challenges or new responsibilities and showing flexibility when circumstances change dealing with competing pressures, including personal and work-related demands responding positively to change, seeking advice and support when needed.

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 ...
Team workers	if working in a group to produce 3D models, taking responsibility for their own role managing their personal contribution to and assimilating information from others in discussions to reach agreements and achieve results.

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	handling 3D models systems to create their 3D models
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	planning for the 3D models for their asset library
Manage information storage to enable efficient retrieval	managing assets sourced and created for their asset library
Follow and understand the need for safety and security practices	handling 3D modelling systems to create their 3D models
Troubleshoot	handling 3D modelling systems to create their 3D models
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	sourcing assets for their 3D models
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	researching asset types and their limitations for use with their 3D models
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	building and presenting their project portfolio showing their interpretation of the brief and generation of ideas, documenting the management of their chosen assets, considering legal implications and reviewing their own work
Bring together information to suit content and purpose	
Present information in ways that are fit for purpose and audience	
Evaluate the selection and use of ICT tools and facilities used to present information	preparing a report on 3D modelling tools and how 3D models are rendered
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	gathering feedback on their 3D modelling work as part of their self-reflective practice

Skill	When learners are ...
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	using coordinate geometry to create 2D and 3D models
Identify the situation or problem and the mathematical methods needed to tackle it	
Select and apply a range of skills to find solutions	
Use appropriate checking procedures and evaluate their effectiveness at each stage	
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	
Draw conclusions and provide mathematical justifications	
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	taking part in brainstorming sessions to generate ideas as a response to a creative brief
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	studying manufacturers' manuals to research 3D modelling software
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	creating their project portfolio with ideas, notes, production documentation and reflective comment.