Unit Title: **3D Tools: Principles and Practice**

Unit Level:	**Three**
Guided Learning Hours:	**80**
Ofqual Unit Reference Number:	**F/507/3209**
Unit Review Date:	**31/07/2017**
Unit Sector:	**9.3 Media and Communication**

Unit Overview

The aim of this unit is to ensure learners understand the fundamental components which make up a 3D model. With knowledge of these basic building blocks, anything can be created in the virtual space. Learners will also understand the limitations imposed on the use of these components by memory and processing capacity. Knowledge of how 3D models are created, stored and rendered, and the tools and techniques used to construct them is invaluable and transferrable across many digital creative industries.

The unit will introduce the software used to create 3D models and learners will develop a familiarity with their interfaces and the basic modelling tools within them. Being able to use those tools to manipulate the basic components of a model and to build complete objects is an important outcome of this unit.

Learning Outcomes

The learner will:

3DPP 1 Understand the basic components of a 3D Model

3DPP 2 Understand the function of different types of textures

3DPP 3 Know how to use a 3D Modelling package

3DPP 4 Understand the benefit of good workflows and efficient techniques for creating 3D models

Indicative Content

- 3D model: Vertex, Edge, Polygon, N-Gon, Vertex Normal, Polygon Normal, UVs
- Learn theory and function of Diffuse Colour, Specular/Reflection, Normal/Displacement texture maps
- Create different maps using image editing software
- Apply maps to model in 3d software/game engine
- Modelling Package Basics: Viewport Navigation, Orthographic/Perspective viewports, Primitives, Items/Meshes, Move Scale Rotate, Mesh Components, Keyboard Shortcuts, Reference/Background image, Scene Scale, Mesh Import/Export, Mesh Stats (Poly/Tri/Vert count), Edge Smoothing/Smoothing Groups, Mirroring Geometry/Symmetry
- Modelling Tool Basics: Poly Slice/Cut, Loop Slice, Vert Join/Weld, Edge/Poly Extrude, Bevel, Subdivide, Spin Edge
- UVs: Planar Projection, Unwrapping, Relaxing, Distortion, Uniformity, UV Islands, Separating/Joining Islands, Exporting UV map for texture painting

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- Materials: Assigning Materials/IDs, Editing Material Parameters, Using Textures to control parameters
- Rendering: Basic Lighting, Basic Camera Controls, Basic Render Settings, Output Resolution, Producing quick WIP Renders
- Technical Considerations: Mesh Topology, Overall Vert/Poly Budget, Efficient UV Layout, 'Bad' Geometry (N-Gons, Concave Polys, 2-point polys, Duplicate/Overlapping polys, unwelded verts), Naming Conventions, Scene Organisation & Cleanup

Assessment
This unit is assessed using the following assessment method:

- Asset Development Portfolio (see Assessment Pack)

See the assessment section of the qualification specification and the Assessment Pack for full details on the assessment.

Delivery
This unit is intended as an introduction to 3D modelling where learners have no previous experience with 3D models or creating them. The unit should first ensure learners understand the universal components of a 3D model in order to then be able to understand how individual modelling tools can be used to manipulate geometry in specific ways.
As well as teaching the basic theory behind individual mesh components and textures, attention should be paid at all times to good working practices and technical considerations common within the games, animation and visual effects industries, for example minimising or eliminating use of N-Gons, having good quality and easy to use UV layouts which maximise texture space and maintaining good mesh topology.

The majority of the unit should consist of tutor-led practical sessions to give learners the maximum amount of time with the 3D modelling package. Modelling packages can be complex and frustrating pieces of software and it is important that learners are allowed the time to familiarise themselves with the modelling environment.

Unit content can be taught using pre-built assets wherever necessary to demonstrate key techniques. Having access to quality example assets will allow learners to investigate their construction independently and give examples to refer back to whilst constructing their own assets. Pre-built assets would be particularly useful for teaching the application of texture maps so learners can understand the theory of their use before being taught how to create their own. Examples of poorly built models with bad geometry and UV's could also be provided.

Modelling packages contain a large variety of tools for specific uses; when moving on to create their own assets, learners should build several simple, small, models which require only a small subset of modelling tools to complete, building up knowledge and skills in stages, while going through the process of modelling an object from start to finish several

times. It is important that learners gain experience of accurately reproducing two dimensional concept art or reference images in three dimensions.

To aid delivery, this unit can be taught using whichever software the tutor is most familiar with, but it is essential that learners are exposed to industry standard modelling packages as much as possible. Examples of industry standard packages would include Autodesk Max or Maya, Luxology Modo or Blender. The unit aims to build knowledge of basic concepts and fundamental skills in 3D modelling which can be transferred between many software packages.

Resources

Learners must have access to:

- Computers installed with an industry standard 3D modelling package

AIM Awards