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AQA
Realising potential

New for 2016

LEVEL 3 FOUNDATION TECHNICAL LEVEL
ENTERTAINMENT TECHNOLOGY: VIDEO GAMES ART AND MECHANICS
360 GLH (TVQ01022)

LEVEL 3 TECHNICAL LEVEL
ENTERTAINMENT TECHNOLOGY: VIDEO GAMES ART AND ANIMATION
540 GLH (TVQ01023)

LEVEL 3 TECHNICAL LEVEL
ENTERTAINMENT TECHNOLOGY: VIDEO GAMES ART AND DESIGN
720 GLH (TVQ01024)

LEVEL 3 TECHNICAL LEVEL
ENTERTAINMENT TECHNOLOGY: VIDEO GAMES ART AND DESIGN PRODUCTION
1080 GLH (TVQ01025)

Specification
First registration September 2016 onwards

Version 3.2 May 2019

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1 About these qualifications

These qualifications are Advanced (Level 3) Technical qualifications, on a par with A-levels and have been built in close collaboration with employers and professional bodies ensuring that they have both recognition and value.

They are for learners over the age of 16 who wish to specialise or progress into a specific sector or specific occupational group, through advanced/higher apprenticeships, further study or employment.

Transferable skills (sometimes known as 'soft skills') have been contextualised explicitly within the content of each qualification. These transferable skills have been prioritised by employers and professional bodies in this sector and are a mandatory part of the qualification outcome. It is important to note that learners **must** demonstrate successful achievement of the identified transferable skill(s) appropriate to the qualification on at least **one** occasion to the required standard.

The Statements of purpose (pages 16, 21, 26 and 31) give more detail on the likely progression for learners with these qualifications.

Each qualification is one of the three components of the new Technical Baccalaureate (TechBacc).

The TechBacc is a performance table measure which recognises the highest level of technical training. It recognises the achievement of learners taking a Technical Level qualification, a Level 3 maths qualification and an Extended Project Qualification (EPQ).

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2 Qualifications at a glance – overview

2.1 Level 3 Foundation Technical Level Entertainment Technology: Video Games Art and Mechanics

Ofqual qualification number	601/7139/X	**AQA qualification number**	TVQ01022
First registration date	1 September 2016	**Age range**	16–18, 19+
Last registration date	30 August 2020	**UCAS points**	Information on UCAS points can be obtained from ucas.com
Last certification date	30 August 2023	**Performance table points**	Information on performance measures can be found at: education.gov.uk
Total qualification time (TQT)	380 (GLH = 360) (See TQT section for more information)	**Eligibility for funding**	Yes
Unit weighting **Externally assessed** **Internally assessed**	25% each unit (2 x units) 25% each unit (2 x units)	**Entry requirements**	There are no formal entry requirements for this qualification set by AQA.

Mandatory units	All units in this qualification are mandatory.
Resits, resubmissions and retakes	The learner is permitted one resit/retake in relation to each unit of the qualification. Where a unit is examined/externally assessed, this means one resit. Where a unit is internally assessed and externally quality assured, this means one retake. Resits, resubmissions and retakes are each permitted where learners have both failed the requirements of the unit and where the learner wishes to improve on a grade received. Any resubmission of an assignment (ie a second attempt at an internally assessed unit task/ assignment prior to external quality assurance) must be undertaken without further guidance from the tutor and must be completed within a defined and reasonable period of time following the learner receiving their initial result of the assessment.

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Assessment model	This qualification contains one externally examined, one externally assessed and two internally assessed units. Internally assessed units are externally quality assured by AQA.	**Examination sessions**	January and June each year.
Employer involvement during delivery	It is a requirement that employers are engaged meaningfully in the delivery of this qualification. Further information on this can be found in the individual units (where relevant) and the Meaningful employer involvement section.		

Grading	The units are graded Pass, Merit or Distinction The overall qualification is graded as P, M, D, D*

Transferable skills contextualised within the units of this qualification

These are the skills deemed essential by the employers and professional bodies AQA has collaborated with on the development of this qualification. We have contextualised units around these 'soft' skills. There may be more than one opportunity for each transferable skill to be evidenced to the required standard across the units within the qualification. It is important to note that learners **must** demonstrate successful achievement of the identified transferable skill(s) appropriate to the qualification on **one** occasion to the required standard in the identified unit(s). Evidence produced for the transferable skills will be internally assessed and externally quality assured.

- Communication (oral)
- Research

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2.2 Level 3 Technical Level Entertainment Technology: Video Games Art and Animation

Ofqual qualification number	601/7140/6	**AQA qualification number**	TVQ01023
First registration date	1 September 2016	**Age range**	16–18, 19+
Last registration date	30 August 2020	**UCAS points**	Information on UCAS points can be obtained from ucas.com
Last certification date	30 August 2023	**Performance table points**	Information on performance measures can be found at: education.gov.uk
Total qualification time (TQT)	570 (GLH = 540) (See TQT section for more information)	**Eligibility for funding**	Yes
Unit weighting **Externally assessed** **Internally assessed**	16.66% each unit (2 x units) 16.66% each unit (4 x units)	**Entry requirements**	There are no formal entry requirements for this qualification set by AQA.

Mandatory units	All units in this qualification are mandatory.
Resits, resubmissions and retakes	The learner is permitted one resit/retake in relation to each unit of the qualification. Where a unit is examined/externally assessed, this means one resit. Where a unit is internally assessed and externally quality assured, this means one retake. Resits, resubmissions and retakes are each permitted where learners have both failed the requirements of the unit and where the learner wishes to improve on a grade received. Any resubmission of an assignment (ie a second attempt at an internally assessed unit task/ assignment prior to external quality assurance) must be undertaken without further guidance from the tutor and must be completed within a defined and reasonable period of time following the learner receiving their initial result of the assessment.

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Assessment model	This qualification contains one externally examined, one externally assessed and four internally assessed units. Internally assessed units are externally quality assured by AQA.	**Examination sessions**	January and June each year.
Employer involvement during delivery	It is a requirement that employers are engaged meaningfully in the delivery of this qualification. Further information on this can be found in the individual units (where relevant) and the Meaningful employer involvement section.		

Grading	The units are graded Pass, Merit or Distinction The overall qualification is graded as PP, MP, MM, DM, DD, D*D, D*D*

Transferable skills contextualised within the units of this qualification

These are the skills deemed essential by the employers and professional bodies AQA has collaborated with on the development of this qualification. We have contextualised units around these 'soft' skills. There may be more than one opportunity for each transferable skill to be evidenced to the required standard across the units within the qualification. It is important to note that learners **must** demonstrate successful achievement of the identified transferable skill(s) appropriate to the qualification on **one** occasion to the required standard in the identified unit(s). Evidence produced for the transferable skills will be internally assessed and externally quality assured.

- Communication (oral)
- Research

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2.3 Level 3 Technical Level Entertainment Technology: Video Games Art and Design

Ofqual qualification number	601/7141/8	**AQA qualification number**	TVQ01024
First registration date	1 September 2016	**Age range**	16-18, 19+
Last registration date	30 August 2020	**UCAS points**	Information on UCAS points can be obtained from ucas.com
Last certification date	30 August 2023	**Performance table points**	Information on performance measures can be found at: education.gov.uk
Total qualification time (TQT)	760 (GLH = 720) (See TQT section for more information)	**Eligibility for funding**	Yes
Unit weighting **Externally assessed** **Internally assessed**	12.5% each unit (3 x units) 12.5% each unit (5 x units)	**Entry requirements**	There are no formal entry requirements for this qualification set by AQA.

Mandatory units	All units in this qualification are mandatory.
Resits, resubmissions and retakes	The learner is permitted one resit/retake in relation to each unit of the qualification. Where a unit is examined/externally assessed, this means one resit. Where a unit is internally assessed and externally quality assured, this means one retake. Resits, resubmissions and retakes are each permitted where learners have both failed the requirements of the unit and where the learner wishes to improve on a grade received. Any resubmission of an assignment (ie a second attempt at an internally assessed unit task/ assignment prior to external quality assurance) must be undertaken without further guidance from the tutor and must be completed within a defined and reasonable period of time following the learner receiving their initial result of the assessment.

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Assessment model	This qualification contains two externally examined, one externally assessed and five internally assessed units. Internally assessed units are externally quality assured by AQA.	**Examination sessions**	January and June each year.
Employer involvement during delivery	It is a requirement that employers are engaged meaningfully in the delivery of this qualification. Further information on this can be found in the individual units (where relevant) and the Meaningful employer involvement section.		

Grading	The units are graded Pass, Merit or Distinction The overall qualification is graded as PP, MP, MM, DM, DD, D*D, D*D*

Transferable skills contextualised within the units of this qualification

These are the skills deemed essential by the employers and professional bodies AQA has collaborated with on the development of this qualification. We have contextualised units around these 'soft' skills. There may be more than one opportunity for each transferable skill to be evidenced to the required standard across the units within the qualification. It is important to note that learners **must** demonstrate successful achievement of the identified transferable skill(s) appropriate to the qualification on **one** occasion to the required standard in the identified unit(s). Evidence produced for the transferable skills will be internally assessed and externally quality assured.

- Communication (oral)
- Research

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2.4 Level 3 Technical Level Entertainment Technology: Video Games Art and Design Production

Ofqual qualification number	601/7142/X	**AQA qualification number**	TVQ01025
First registration date	1 September 2016	**Age range**	16–18, 19+
Last registration date	30 August 2020	**UCAS points**	Information on UCAS points can be obtained from ucas.com
Last certification date	30 August 2023	**Performance table points**	Information on performance measures can be found at: education.gov.uk
Total qualification time (TQT)	1140 (GLH = 1080) (See TQT section for more information)	**Eligibility for funding**	Yes
Unit weighting **Externally assessed** **Internally assessed**	8.33% each unit (4 x units) 8.33% each unit (8 x units)	**Entry requirements**	There are no formal entry requirements for this qualification set by AQA.

Mandatory units	All units in this qualification are mandatory.
Resits, resubmissions and retakes	The learner is permitted one resit/retake in relation to each unit of the qualification. Where a unit is examined/externally assessed, this means one resit. Where a unit is internally assessed and externally quality assured, this means one retake. Resits, resubmissions and retakes are each permitted where learners have both failed the requirements of the unit and where the learner wishes to improve on a grade received. Any resubmission of an assignment (ie a second attempt at an internally assessed unit task/ assignment prior to external quality assurance) must be undertaken without further guidance from the tutor and must be completed within a defined and reasonable period of time following the learner receiving their initial result of the assessment.

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Assessment model	This qualification contains two externally examined, two externally assessed and eight internally assessed units. Internally assessed units are externally quality assured by AQA.	**Examination sessions**	January and June each year.
Employer involvement during delivery	It is a requirement that employers are engaged meaningfully in the delivery of this qualification. Further information on this can be found in the individual units (where relevant) and the Meaningful employer involvement section.		

Grading	The units are graded Pass, Merit or Distinction The overall qualification is graded as PPP, PPM, MMP, MMM, MMD, DDM, DDD, D*DD, D*D*D, D*D*D*

Transferable skills contextualised within the units of this qualification

These are the skills deemed essential by the employers and professional bodies AQA has collaborated with on the development of this qualification. We have contextualised units around these 'soft' skills. There may be more than one opportunity for each transferable skill to be evidenced to the required standard across the units within the qualification. It is important to note that learners **must** demonstrate successful achievement of the identified transferable skill(s) appropriate to the qualification on **one** occasion to the required standard in the identified unit(s). Evidence produced for the transferable skills will be internally assessed and externally quality assured.

- Communication (oral and written)
- Research
- Teamwork

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3 Level 3 Foundation Technical Level Entertainment Technology: Video Games Art and Mechanics: Statement of purpose

3.1 Qualification objective

The objective of this qualification is:

- preparing learners to progress to a qualification in the same subject area but at a higher level or requiring more specific knowledge, skills and understanding
- meeting relevant programmes of learning
- preparing learners for employment
- giving learners personal growth and engagement in learning.

3.2 Who is this qualification for?

This qualification is aimed at 16 to 18 year-old learners who are in a full-time Level 3 education programme and who wish to pursue a career in the video games industry by studying the core principles of video game art and video game mechanics. Whilst centred on video games, the content means it is suitable for other creative media roles in which gaming techniques are applied more generally, including e-learning, participatory arts and arts practice and performance.

There are no formal entry requirements for this qualification, but in order to optimise a learner's chances of success, they will typically have achieved four GCSEs at grade C or above, including Maths and English and would also benefit from having studied art and design.

This qualification could be taken alongside a Level 3 maths qualification and EPQ to fulfil the requirements of a Technical Baccalaureate.

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3.3 What does this qualification cover?

All of the units in this qualification are mandatory and will provide the core video game arts and mechanics technical knowledge and skills required for progression towards working as a games artist or designer in the video games sector.

The learner will cover topics such as:

- Business for video games – essential elements involved in setting up or working within a business in the video games industry, including: how games businesses work today, what knowledge and skills are required to start up a games business, what's needed to work within an existing games business and how to manage the development of games.
- 2D games art – essential drawing skills required by a games artist, covering the use of mixed media, various techniques and processes such as tone, colour, shape, line, perspective and proportion, and the various visual styles achievable through the language of drawing. The visual recording skills that learners develop form the basis for many subsequent units in the associated larger qualifications, such as 3D modelling (character and environment) and Concept art.
- 3D environment art – key construction methods for environment art, focusing on modelling and texturing pipelines required for the creation of a city building.
- Games mechanics – learning the fundamental ideas behind games design, why we play games and how games are designed. Through the application of visual scripting, this knowledge is used to drive the technical development of a playable character within a games engine. This character will be built up to participate in a complete playable experience.

Transferable skills are those generic 'soft skills' that are valued by employers and higher education alike. The following transferable skills have been contextualised into the content of the qualification:

- communication (oral)
- research.

Units which provide opportunities to achieve these skills are listed below:

Unit code	Unit title	Transferable skill(s)
A/507/6612	2D games art	Communication (oral) and research

Opportunities for each available transferable skill will be highlighted in the pass criteria for the unit where appropriate.

There may be more than one opportunity for each transferable skill to be evidenced to the required standard across the units within the qualification. It is important to note that learners **must** demonstrate successful achievement of the identified transferable skill(s) appropriate to the qualification on at least **one** occasion to the required standard.

The Transferable skills standards can be found in Appendix A.

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3.4 What could this qualification lead to?

Learners who achieve this qualification will have a range of options, as studying this qualification does not restrict future progression into one particular role.

Learners may also wish to consider adding further skills relevant to the video games production pipeline by studying one of the three larger qualifications in this suite. This qualification is part of a suite of AQA Level 3 Technical Levels in Entertainment Technology that includes Video Games Art and Mechanics, Video Games Art and Animation, Video Games Art and Design and Video Games Art and Design Production.

Examples of potential career progression opportunities are 2D games artist, environment artist, graphic designer, technical artist and games designer.

This qualification could also form part of the learner's basis for application to a higher education course (degree, foundation degree, HNC/HND) in a video games related discipline.

This qualification can be taken alongside a Level 3 maths qualification (including Core Maths) and an EPQ to fulfil the requirements of the Technical Baccalaureate performance table measure that records the achievement of students taking advanced (Level 3) programmes.

3.5 Who supports this qualification?

Name	**Website address**
Creative Skillset	creativeskillset.org/
Creative and Cultural Skills	ccskills.org.uk/
UKIE	ukie.org.uk/
Staffordshire University	staffs.ac.uk/
Warwickshire College	warwickshire.ac.uk/
Ella Romanos	ellaromanos.com
Creative Assembly	creative-assembly.com
Radiant Worlds	RadiantWorlds.com
FLIX Interactive	flixinteractive.com
Rodeo Games	rodeogames.co.uk/

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3.6 What are the benefits of this qualification?

To learners

Studying this qualification will give you a variety of options. You could choose to use your achievements to contribute towards the larger qualifications in this suite, culminating in an in-depth understanding of the video games production pipeline, or you could use the qualification to contribute towards university entry.

This qualification will give you a solid foundation in understanding how the games industry works, provide you with essential drawing skills required by any games artist, a working understanding of how games are designed and what a games engine is and how it functions, including an introduction to visual scripting.

You will study the course as part of a learning programme that could also include other subjects, but which will help you to develop the skills and knowledge that are needed in the fast moving video games industry.

You will be working on industry-focused assignments to help you to prepare for work, which will help you to talk confidently about your knowledge and skills in an interview situation.

To employers

This qualification has been developed in consultation with employers, professional bodies, higher education institutes (HEIs) and further education (FE) colleges, who have identified a range of technical and personal skills that are essential for a junior role in this area.

All learners who have achieved this technical qualification will have learned and been assessed using the same content. There are no optional units in this programme and learners will have demonstrated and achieved a range of transferable skills that are essential in this area, such as the ability to research and to learn communication skills.

Employers can therefore be confident that learners have a solid grounding in these areas.

To higher education institutions (HEIs)

Discussions with HEIs during the development of this qualification identified that to succeed in higher study, learners would benefit from basic technical games art and design skills, particularly if the units studied also had embedded research and communication skills development.

In this qualification, learners will learn the fundamental principles of games art and its implementation in a games engine, in addition to demonstrating the transferable skills of research and oral communication to the required standard.

HEIs can therefore be confident that this qualification will have developed both technical and personal skills necessary to study successfully at a higher level.

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4 Level 3 Foundation Technical Level Entertainment Technology: Video Games Art and Mechanics: Unit summary

This qualification is made up of four mandatory units. All units must be completed to achieve the full qualification.

	Unit title	Assessment type	Ofqual unit reference
1	Business for video games	External examination	M/507/6610
3	2D games art	Internally centre assessed	A/507/6612
5	3D environment art	External set and marked assignment	J/507/6614
10	Games mechanics	Internally centre assessed	H/507/6622

Links with other qualifications

The following units:

M/507/6610 1 Business for video games
A/507/6612 3 2D games art
J/507/6614 5 3D environment art
H/507/6622 10 Games mechanics

also appear within:

AQA Level 3 Technical Level Entertainment Technology: Video Games Art and Animation
AQA Level 3 Technical Level Entertainment Technology: Video Games Art and Design
AQA Level 3 Technical Level Entertainment Technology: Video Games Art and Design Production.

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5 Level 3 Technical Level Entertainment Technology: Video Games Art and Animation: Statement of purpose

5.1 Qualification objective

The objective of this qualification is:

- preparing learners to progress to a qualification in the same subject area but at a higher level or requiring more specific knowledge, skills and understanding
- meeting relevant programmes of learning
- preparing learners for employment
- giving learners personal growth and engagement in learning.

5.2 Who is this qualification for?

This qualification is aimed at 16 to 18 year-old learners who are in a full-time Level 3 education programme and who wish to pursue a career in the video games industry by studying the core principles of video game art, video game mechanics, animation and visual effects (VFX). Whilst centred on video games, the content means it is suitable for other creative media roles in which gaming techniques are applied more generally, including e-learning, participatory arts and arts practice and performance.

There are no formal entry requirements for this qualification but in order to optimise a learner's chances of success, they will typically have achieved four GCSEs at grade C or above, including Maths and English and would also benefit from having studied art and design.

This qualification could be taken alongside a Level 3 maths qualification and an EPQ to fulfil the requirements of a Technical Baccalaureate.

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5.3 What does this qualification cover?

All of the units in this qualification are mandatory and will provide the core video game arts, mechanics and animation technical knowledge and skills required for progression towards working as a games artist, games designer or a games animator in the video games sector.

The learner will cover topics such as:

- Business for video games – essential elements involved in setting up or working within a business in the video games industry, including: how games businesses work today, what knowledge and skills are required to start up a games business, what's needed to work within an existing games business and how to manage the development of games.
- 2D games art – essential drawing skills required by a games artist, covering the use of mixed media, various techniques and processes such as tone, colour, shape, line, perspective and proportion, and the various visual styles achievable through the language of drawing. The visual recording skills that learners develop form the basis for many subsequent units in the associated larger qualifications, such as 3D modelling (character and environment) and Concept art.
- 3D environment art – key construction methods for environment art, focusing on modelling and texturing pipelines required for the creation of a city building.
- Games mechanics – learning the fundamental ideas behind games design, why we play games and how games are designed. This knowledge will be used to drive the technical development of a playable character within a games engine. This character will be built up to participate in a complete playable experience.
- Concept art – essential digital drawing skills required by a games concept artist. Through the use of digital image manipulation and drawing software, learners will investigate the essential elements of composition, perspective, masking and selecting, colour theory, brushes and commonly used tools.
- Animation and VFX – key principles of animation focusing on the development of character and environment animations for games, together with an introduction to visual effects for games engines including particle systems and dynamics.

Transferable skills are those generic 'soft skills' that are valued by employers and higher education alike. The following transferable skills have been contextualised into the content of the qualification:

- communication (oral)
- research.

Units which provide opportunities to achieve these skills are listed below:

Unit code	Unit title	Transferable skill(s)
A/507/6612	2D games art	Communication (oral) and research
F/507/6613	Concept art	Communication (oral)

Opportunities for each available transferable skill will be highlighted in the pass criteria for the unit where appropriate.

There may be more than one opportunity for each transferable skill to be evidenced to the required standard across the units within the qualification. It is important to note that learners **must** demonstrate successful achievement of the identified transferable skill(s) appropriate to the qualification on at least **one** occasion to the required standard.

The Transferable skills standards can be found in Appendix A.

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5.4 What could this qualification lead to?

Learners who achieve this qualification will have a range of options, as studying this qualification does not restrict future progression into one particular role.

Learners may also wish to consider adding further skills relevant to the video games production pipeline by studying one of the two larger qualifications in this suite. This qualification is part of a suite of AQA Level 3 Technical Levels in Entertainment Technology that includes Video Games Art and Mechanics, Video Games Art and Animation, Video Games Art and Design and Video Games Art and Design Production.

Examples of potential career progression opportunities are 2D games artist, graphic designer, technical artist, concept artist, games designer, games animator, and environment artist.

This qualification could also form part of the learner's basis for application to a higher education course (degree, foundation degree, HNC/HND) in a video-games related discipline.

This qualification can be taken alongside a Level 3 maths qualification (including Core Maths) and an EPQ to fulfil the requirements of the Technical Baccalaureate performance table measure that records the achievement of students taking advanced (Level 3) programmes.

5.5 Who supports this qualification?

Name	Website address
Creative Skillset	creativeskillset.org/
Creative and Cultural Skills	ccskills.org.uk/
UKIE	ukie.org.uk/
Staffordshire University	staffs.ac.uk/
Warwickshire College	warwickshire.ac.uk/
Ella Romanos	ellaromanos.com
Creative Assembly	creative-assembly.com
Radiant Worlds	RadiantWorlds.com
FLIX Interactive	flixinteractive.com
Rodeo Games	rodeogames.co.uk/

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5.6 What are the benefits of this qualification?

To learners

Studying this qualification will give you a variety of options. You could choose to use your achievements to contribute towards the larger qualifications in this suite, culminating in an in-depth understanding of the video games production pipeline, or you could use the qualification to contribute towards university entry.

This qualification will give you a solid foundation in understanding how the games industry works, provide you with essential drawing skills required by any games artist and a working understanding of what a games engine is and how it functions.

You will understand and be able to apply animation and VFX techniques used in industry and enhance your creative thinking when developing your own concept art.

You will study the course as part of a learning programme that could also include other subjects, but which will help you to develop the skills and knowledge that are needed in the fast moving video games industry.

You will be working on industry-focused assignments to help you to prepare for work, which will help you to talk confidently about your knowledge and skills in an interview situation.

To employers

This qualification has been developed in consultation with employers, professional bodies, HEIs and FE colleges, who have identified a range of technical and personal skills that are essential for a junior role in this area.

All learners who have achieved this technical qualification will have learned and been assessed using the same content. There are no optional units in this programme and learners will have demonstrated and achieved a range of transferable skills that are essential in this area such as the ability to research and to learn communication skills.

Employers can therefore be confident that learners have a solid grounding in technical and personal skills in research and communication.

To higher education institutions (HEIs)

Discussions with HEIs during the development of this qualification identified that to succeed in higher study, learners would benefit from basic technical games art and design skills, particularly if the units studied also had embedded research and communication skills development.

In this qualification, learners will learn the fundamental principles of games art and its implementation in a games engine, develop creative thinking when undertaking concept art and be able to demonstrate a clear understanding of animation and VFX. In addition they will be able to demonstrate the transferable skills of research and oral communication to the required standard.

HEIs can therefore be confident that this qualification will have developed both technical and personal skills necessary to study successfully at a higher level.

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6 Level 3 Technical Level Entertainment Technology: Video Games Art and Animation: Unit summary

This qualification is made up of six mandatory units. All units must be completed to achieve the full qualification.

	Unit title	Assessment type	Ofqual unit reference
1	Business for video games	External examination	M/507/6610
3	2D games art	Internally centre assessed	A/507/6612
4	Concept art	Internally centre assessed	F/507/6613
5	3D environment art	Externally set and marked assignment	J/507/6614
8	Games animation and VFX	Internally centre assessed	D/507/6618
10	Games mechanics	Internally centre assessed	H/507/6622

Links with other qualifications

The following units:

M/507/6610 1 Business for video games
A/507/6612 3 2D games art
F/507/6613 4 Concept art
J/507/6614 5 3D environment art
D/507/6618 8 Games animation and VFX
H/507/6622 10 Games mechanics

also appear within:

AQA Level 3 Technical Level Entertainment Technology: Video Games Art and Design
AQA Level 3 Technical Level Entertainment Technology: Video Games Art and Design Production.

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7 Level 3 Technical Level Entertainment Technology: Video Games Art and Design: Statement of purpose

7.1 Qualification objective

The objective of this qualification is:

- preparing learners to progress to a qualification in the same subject area but at a higher level or requiring more specific knowledge, skills and understanding
- meeting relevant programmes of learning
- preparing learners for employment
- giving learners personal growth and engagement in learning.

7.2 Who is this qualification for?

This qualification is aimed at 16 to 18 year-old learners who are in a full-time Level 3 education programme and who wish to pursue a career in the video games industry by studying the core principles of video games art, video game mechanics, animation and design. Whilst centred on video games, the content means it is suitable for other creative media roles in which gaming techniques are applied more generally, including e-learning, participatory arts and arts practice and performance.

There are no formal entry requirements for this qualification but in order to optimise a learner's chances of success, they will typically have achieved four GCSEs at grade C or above, including maths and English and would also benefit from having studied art and design.

This qualification could be taken alongside a Level 3 maths qualification and an EPQ to fulfil the requirements of a Technical Baccalaureate.

7.3 What does this qualification cover?

All of the units in this qualification are mandatory and will provide the core video game arts, mechanics and animation technical knowledge and skills required for progression towards working as a games artist, games designer or a games animator in the video games sector. The learner will cover topics such as:

- Business for video games – essential elements involved in setting up or working within a business in the video games industry, including: how games businesses work today, what knowledge and skills are required to start up a games business, what's needed to work within an existing games business and how to manage the development of games.
- Digital asset management – understanding the nature of assets created, developed and stored using digital media: to learn best practice for storing, assigning versions and archiving, and to be aware of the implications of digital rights management and intellectual property rights.

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- 2D games art – essential drawing skills required by a games artist, covering the use of mixed media, various techniques and processes such as tone, colour, shape, line, perspective and proportion, and the various visual styles achievable through the language of drawing. The visual recording skills that learners develop form the basis for many subsequent units in the associated larger qualifications, such as 3D modelling (character and environment) and Concept art.
- 3D environment art – key construction methods for environment art, focusing on modelling and texturing pipelines required for the creation of a city building.
- Games mechanics – learning the fundamental ideas behind games design, why we play games and how games are designed. This knowledge will be used to drive the technical development of a playable character within a games engine. This character will be built up to participate in a complete playable experience.
- Concept art – essential digital drawing skills required by a games concept artist. Through the use of digital image manipulation and drawing software, learners will investigate the essential elements of composition, perspective, masking and selecting, colour theory, brushes and commonly used tools.
- Animation and VFX – key principles of animation focusing on the development of character and environment animations for games together with an introduction to visual effects for games engines including particle systems and dynamics.
- Level design – focussing on the iterative design process required to take a level from idea through to playable concept, with the use of engine tools and scripting, to build in playable level mechanics in line with a set series of player mechanics. The unit also focuses on the key aspects of testing and analysis of level designs during development.

Transferable skills are those generic 'soft skills' that are valued by employers and higher education alike. The following transferable skills have been contextualised into the content of the qualification:

- communication (oral)
- research.

Units which provide opportunities to achieve these skills are listed below:

Unit code	Unit title	Transferable skill(s)
A/507/6612	2D games art	Communication (oral) and research
F/507/6613	Concept art	Communication (oral)

Opportunities for each available transferable skill will be highlighted in the pass criteria for the unit where appropriate.

There may be more than one opportunity for each transferable skill to be evidenced to the required standard across the units within the qualification. It is important to note that learners **must** demonstrate successful achievement of the identified transferable skill(s) appropriate to the qualification on at least **one** occasion to the required standard.

The Transferable skills standards can be found in Appendix A.

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7.4 What could this qualification lead to?

Learners who achieve this qualification will have a range of options, as studying this qualification does not restrict future progression into one particular role.

Learners may also wish to consider adding further skills relevant to the video games production pipeline by studying one of the three larger qualifications in this suite. This qualification is part of a suite of AQA Level 3 Technical Levels in Entertainment Technology that includes Video Games Art and Mechanics, Video Games Art and Animation, Video Games Art and Design and Video Games Art and Design Production.

Examples of potential career progression opportunities are 2D games artist, concept artist, graphic designer, level designer, technical artist, games designer, games animator, and environment artist.

This qualification could also form part of the learner's basis for application to a higher education course (degree, foundation degree, HNC/HND) in a video games related discipline.

This qualification can be taken alongside a Level 3 maths qualification (including Core Maths) and an EPQ to fulfil the requirements of the Technical Baccalaureate performance table measure that records the achievement of students taking advanced (Level 3) programmes.

7.5 Who supports this qualification?

Name	Website address
Creative Skillset	creativeskillset.org/
Creative and Cultural Skills	ccskills.org.uk/
UKIE	ukie.org.uk/
Staffordshire University	staffs.ac.uk/
Warwickshire College	warwickshire.ac.uk/
Ella Romanos	ellaromanos.com
Creative Assembly	creative-assembly.com
Radiant Worlds	RadiantWorlds.com
FLIX Interactive	flixinteractive.com
Rodeo Games	rodeogames.co.uk/

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7.6 What are the benefits of this qualification?

To learners

Studying this qualification will give you a variety of options. You could choose to use your achievements to contribute towards the larger qualifications in this suite, culminating in an in-depth understanding of the video games production pipeline, or you could use the qualification to contribute towards university entry.

This qualification will give you a solid foundation in understanding how the games industry works, provide you with essential drawing skills required by any games artist, provide you with 3D art skills and a working understanding of what a games engine is and how it functions.

You will understand and be able to apply animation and VFX techniques used in industry, and enhance your creative thinking when developing your own concept art and developing levels within your own game.

You will study the course as part of a learning programme that could also include other subjects, but which will help you to develop the skills and knowledge that are needed in the fast moving video games industry.

You will be working on industry-focused assignments to help you to prepare for work, which will help you to talk confidently about your knowledge and skills in an interview situation.

To employers

This qualification has been developed in consultation with employers, professional bodies, HEIs and FE colleges, who have identified a range of technical and personal skills that are essential for a junior role in this area.

All learners who have achieved this technical qualification will have learned and been assessed using the same content. There are no optional units in this programme and learners will have demonstrated and achieved a range of transferable skills that are essential in this area, such as the ability to research and to learn communication skills.

Employers can therefore be confident that learners have a solid grounding in technical and personal skills in research and communication.

To higher education institutions (HEIs)

Discussions with HEIs during the development of this qualification identified that to succeed in higher study, learners would benefit from basic technical games art and design skills, particularly if the units studied also had embedded research and communication skills development.

In this qualification, learners will learn the fundamental principles of games art and its implementation in a games engine, develop creative thinking when undertaking concept art and be able to demonstrate a clear understanding of level design, animation and VFX, in addition to demonstrating the transferable skills of research and oral communication to the required standard.

HEIs can therefore be confident that this qualification will have developed both technical and personal skills necessary to study successfully at a higher level.

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8 Level 3 Technical Level Entertainment Technology: Video Games Art and Design: Unit summary

This qualification is made up of eight mandatory units. All units must be completed to achieve the full qualification.

	Unit title	Assessment type	Ofqual unit reference
1	Business for video games	External examination	M/507/6610
2	Digital asset management	External examination	T/507/6611
3	2D games art	Internally centre assessed	A/507/6612
4	Concept art	Internally centre assessed	F/507/6613
5	3D environment art	Externally set and marked assignment	J/507/6614
8	Games animation and VFX	Internally centre assessed	D/507/6618
9	Level design	Internally centre assessed	Y/507/6620
10	Games mechanics	Internally centre assessed	H/507/6622

Links with other qualifications

The following units:

M/507/6610 1 Business for video games
T/507/6611 2 Digital asset management
A/507/6612 3 2D games art
F/507/6613 4 Concept art
J/507/6614 5 3D environment art
D/507/6618 8 Games animation and VFX
Y/507/6620 9 Level design
H/507/6622 10 Games mechanics

also appear within:

AQA Level 3 Technical Level Entertainment Technology: Video Games Art and Design Production.

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9 Level 3 Technical Level Entertainment Technology: Video Games Art and Design Production: Statement of purpose

9.1 Qualification objective

The objective of this qualification is:

- preparing learners to progress to a qualification in the same subject area but at a higher level or requiring more specific knowledge, skills and understanding
- meeting relevant programmes of learning
- preparing learners for employment
- giving learners personal growth and engagement in learning.

9.2 Who is this qualification for?

This qualification is aimed at 16 to 18-year-old learners who are in a full-time Level 3 education programme and who wish to pursue a career in the video games industry by studying the core principles of video game art, video game mechanics, animation, level design, user interfaces, games audio and the video games production pipeline. Whilst centred on video games, the content means it is suitable for other creative media roles in which gaming techniques are applied more generally, including e-learning, participatory arts, and arts practice and performance.

There are no formal entry requirements for this qualification but in order to optimise a learner's chances of success, they will typically have achieved four GCSEs at grade C or above, including maths and English and would also benefit from having studied art and design.

This qualification could be taken alongside a Level 3 maths qualification and an EPQ to fulfil the requirements of a Technical Baccalaureate.

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9.3 What does this qualification cover?

All of the units in this qualification are mandatory and will provide the core video game arts, mechanics and animation technical knowledge and skills required for progression towards working as a games artist, games designer or a games animator in the video games sector.

The learner will cover topics such as:

- Business for video games – essential elements involved in setting up or working within a business in the video games industry, including: how games businesses work today, what knowledge and skills are required to start up a games business, what's needed to work within an existing games business and how to manage the development of games.
- Digital asset management – understanding the nature of assets created, developed and stored using digital media: to learn best practice for storing, assigning versions and archiving, and to be aware of the implications of digital rights management and intellectual property rights.
- 2D games art – essential drawing skills required by a games artist, covering the use of mixed media, various techniques and processes such as tone, colour, shape, line, perspective and proportion, and the various visual styles achievable through the language of drawing. The visual recording skills that learners develop form the basis for many subsequent units in the associated larger qualifications, such as 3D modelling (character and environment) and Concept art.
- 3D environment art – key construction methods for environment art, focusing on modelling and texturing pipelines required in the creation of a city building.
- 3D character art – essential modelling skills required by a character artist. Through the use of 3D modelling and drawing software, learners will explore ways to construct a video game character for use in real-time game engines. Learners will also investigate methods for projecting high poly organic surface modelling detail to low polygon meshes.
- Games mechanics – learning the fundamental ideas behind games design, why we play games and how games are designed. This knowledge will be used to drive the technical development of a playable character within a games engine. This character will be built up to participate in a complete playable experience.
- Concept art – essential digital drawing skills required by a games concept artist. Through the use of digital image manipulation and drawing software, learners will investigate the essential elements of composition, perspective, masking and selecting, colour theory, brushes and commonly used tools.
- Animation and VFX – key principles of animation focusing on the development of character and environment animations for games, together with an introduction to visual effects for games engines including particle systems and dynamics.
- Level design – focussing on the iterative design process required to take a level from idea through to playable concept, with the use of engine tools and scripting, to build in playable level mechanics in line with a set series of player mechanics. The unit also focuses on the key aspects of testing and analysis of level designs during development.
- User interface – essential skills for designing a user interface which is suitable for use in games as well as implementing designs on a technical level using a game engine to present work. Learners will be able to de-construct existing user interfaces and gain a knowledge of design principles such as typography, user experience and information architecture.
- Games audio – principles and practicalities of sound recording, digital audio processing, Foley and sound spatialisation, covering important aspects of the structure and working constraints of audio teams within the computer games industry. Learners will apply these ideas to create the sound track for two one minute long clips of in-game footage of different genres and one minute of full-motion video.

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- Collaborative games development project – working as a team to develop a game together, learners will take on a particular development role within the team and work to develop content in line with that role. Learners will produce a finished, working game, which could be released to the public. It will be accompanied by a development journal detailing each team member's contributions throughout the project.

Transferable skills are those generic 'soft skills' that are valued by employers and higher education alike. The following transferable skills have been contextualised into the content of the qualification:

- communication (oral and written)
- research
- teamwork.

Units which provide opportunities to achieve these skills are listed below:

Unit code	Unit title	Transferable skill(s)
A/507/6612	2D games art	Communication (oral) and research
F/507/6613	Concept art	Communication (oral)
R/507/6616	User interface	Communication (oral) and research
M/507/6624	Games audio	Communication (written)
T/507/6625	Collaborative games development project	Communication (oral) and teamwork

Opportunities for each available transferable skill will be highlighted in the pass criteria for the unit where appropriate.

There may be more than one opportunity for each transferable skill to be evidenced to the required standard across the units within the qualification. It is important to note that learners **must** demonstrate successful achievement of the identified transferable skill(s) appropriate to the qualification on at least **one** occasion to the required standard.

The Transferable skills standards can be found in Appendix A.

9.4 What could this qualification lead to?

Learners who achieve this qualification will have a range of options, as studying this qualification does not restrict future progression into one particular role.

Learners may also wish to consider adding further skills relevant to the video games production pipeline by studying one of the three larger qualifications in this suite. This qualification is part of a suite of AQA Level 3 Technical Levels in Entertainment Technology that includes Video Games Art and Mechanics, Video Games Art and Animation, Video Games Art and Design and Video Games Art and Design Production.

Examples of potential career progression opportunities are 2D games artist, concept artist, graphic designer, technical artist, games designer, games animator, environment artist, level designer, games producer, user interface designer and sound designer.

This qualification could also form part of the learner's basis for application to a higher education course (degree, foundation degree, HNC/HND) in a video-games related discipline.

This qualification can be taken alongside a Level 3 maths qualification (including Core Maths) and an EPQ to fulfil the requirements of the Technical Baccalaureate performance table measure that records the achievement of students taking advanced (Level 3) programmes.

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9.5 Who supports this qualification?

Name	Website address
Creative Skillset	creativeskillset.org/
Creative and Cultural Skills	ccskills.org.uk/
UKIE	ukie.org.uk/
Staffordshire University	staffs.ac.uk/
Warwickshire College	warwickshire.ac.uk/
Ella Romanos	ellaromanos.com
Creative Assembly	creative-assembly.com
Radiant Worlds	RadiantWorlds.com
FLIX Interactive	flixinteractive.com
Rodeo Games	rodeogames.co.uk/

9.6 What are the benefits of this qualification?

To learners

Studying this qualification will give you a variety of options. You could choose to use your achievements to start up you own games business or you could use the qualification to contribute towards university entry.

This qualification will give you a comprehensive practical understanding of the complete production pipeline associated with games production, culminating in the production of a fully workable game.

You will understand how the games industry works, learn essential drawing skills required by any games artist, provide you with 3D art skills and a working understanding of what a games engine is and how it functions.

You will understand and be able to apply animation and VFX techniques used in industry and enhance your creative thinking when developing your own concept art and developing levels within your own game. To complete the production process, learners will also learn how to create a fully functional user interface and how to include sound into their game to really bring it to life.

You will study the course as part of a learning programme that could also include other subjects, but which will help you to develop the skills and knowledge that are needed in the fast moving video games industry.

You will be working on industry-focused assignments to help you to prepare for work, which will help you to talk confidently about your knowledge and skills in an interview situation.

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To employers

This qualification has been developed in consultation with employers, professional bodies, HEIs and FE colleges, who have identified a range of technical and personal skills that are essential for a junior role in this area.

All learners who have achieved this technical qualification will have learned and been assessed using the same content. There are no optional units in this programme and they will have demonstrated and achieved a range of transferable skills that are essential in this area, such as the ability to research, communicate (both orally and in writing) and work as part of a team.

Employers can therefore be confident that learners have a solid grounding in technical and personal skills in research, communication (oral and written) and teamwork.

To higher education institutions (HEIs)

Discussions with HEIs during the development of this qualification identified that to succeed in higher study, learners would benefit from basic technical games art and design skills, particularly if the units studied also had embedded research and communication skills development.

In this qualification learners will have a practical understanding of the full games production pipeline. Using visual scripting, learners will, as part of a team, build their own fully functional game, whilst continually reflecting on what improvements could be implemented, in addition to demonstrating the transferable skills of research and oral communication to the required standard.

HEIs can therefore be confident that this qualification will have developed both technical and personal skills necessary to study successfully at a higher level.

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10 Level 3 Technical Level Entertainment Technology: Video Games Art and Design Production: Unit summary

This qualification is made up of 12 mandatory units. All units must be completed to achieve the full qualification.

	Unit title	Assessment type	Ofqual unit reference
1	Business for video games	External examination	M/507/6610
2	Digital asset management	External examination	T/507/6611
3	2D games art	Internally centre assessed	A/507/6612
4	Concept art	Internally centre assessed	F/507/6613
5	3D environment art	Externally set and marked assignment	J/507/6614
6	3D character art	Externally set and marked assignment	L/507/6615
7	User interface (UI)	Internally centre assessed	R/507/6616
8	Games animation and VFX	Internally centre assessed	D/507/6618
9	Level design	Internally centre assessed	Y/507/6620
10	Games mechanics	Internally centre assessed	H/507/6622
11	Games audio	Internally centre assessed	M/507/6624
12	Collaborative games development project	Internally centre assessed	T/507/6625

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11 Meaningful employer involvement

11.1 Introduction

It is important that centres develop an approach to teaching and learning that supports the assessment of the technical focus of a Tech-level qualification. The specification contains a balance of practical skills and knowledge requirements and centres need to ensure that appropriate links are made between theory and practice in a way that is relevant to the occupational sector.

This will require the development of relevant and up-to-date training materials that allow learners to apply their learning to actual events and activity within the sector, and to generate appropriate evidence for their portfolio.

It is a requirement that employers are involved in the delivery and/or assessment of the Tech-level to provide a clear 'line of sight' to work, advanced/higher apprenticeships or higher education. Employer engagement enriches learning, raises the credibility of the qualification in the eyes of employers, parents and learners – as well as also furthering the critical collaboration between the learning and skills sector, and industry.

It is therefore a requirement that all learners undertake meaningful activity involving employers during their study, and this activity will be scrutinised as part of our ongoing quality assurance activities with centres.

Such is the importance of meaningful employer involvement in the delivery of this qualification, should a centre be unable to evidence this, we will impose a sanction, together with an associated action plan. Further information on this process can be found in the AQA *Centre Administration Guide for Technical and Vocational Qualifications*.

AQA will not stipulate the minimum duration or contribution of employer involvement to the overall qualification grade as it is important that centres and employers are allowed flexibility in how best to work together to support learning, and in which units – but this collaboration must be significant.

11.2 Definition of meaningful employer involvement

In order to meet our requirements, meaningful employer involvement must take at least one of the following forms:

- learners undertake structured work experience or work placements that develop skills and knowledge relevant to this qualification
- learners undertake project work, exercises and/or assessments set with input from industry practitioners – such as getting employers involved in developing real life case studies, or assignments
- learners take one or more units delivered or co-delivered by an industry practitioner – this could be in the form of masterclasses or guest lectures
- industry practitioners operating as 'expert witnesses' that contribute to the assessment of a learner's work or practice, operating within a specified assessment framework. This may be for specific project work, exercises or examinations, or all assessments for a qualification.

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For the purpose of clarity, the following activities, whilst valuable, would **not** be considered as meaningful employer involvement:

- employers hosting visits, providing premises, facilities or equipment
- employers or industry practitioners providing talks or contributing to delivery on employability, general careers advice, CV writing and interview training
- learner attendance at career fairs, events or other networking opportunities
- simulated or centre-based working environments
- employers providing learners with job references.

More information on employer involvement in the delivery of technical level qualifications can be found at:

Employer Involvement in Qualifications Delivery and Assessment – Research report (April 2014)

gov.uk/government/uploads/system/uploads/attachment_data/file/306280/RR341_-_Employer_Involvement_in_Qualifications_Delivery_and_Assessment_Research_Report.pdf

Post-16 work experience as a part of 16 to 19 study programmes and traineeships – departmental advice for post-16 education and training providers:

gov.uk/government/uploads/system/uploads/attachment_data/file/268624/document.pdf

11.3 Employer involvement in quality assurance

We need to make sure that the assessment remains relevant and valid, and that learning outcomes are what employers and higher education institutions are expecting of a learner who has achieved a Level 3 Tech-level qualification.

Each year a panel, including representatives from employers and HE, will be brought together to review outcomes from the units and we will ask for samples of learner's work from your centre at each AQA external quality assurer (EQA) visit.

We are keen to work collaboratively with employers and HE to make sure that whatever the progression route chosen by the learner, this qualification will be recognised and valued.

If you have a local employer that would like to be involved in this review, we would be very pleased to consider them. Please email their contact details to techlevels@aqa.org.uk

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12 Synoptic delivery and assessment

The definition of synoptic assessment used by AQA is:

'A form of assessment which requires a learner to demonstrate that they can identify and use effectively, in an integrated way, an appropriate selection of skills, techniques, concepts, theories, and knowledge from across the whole qualification or unit, which are relevant to a key task'.

The design of this qualification allows learners to develop knowledge, understanding and skills from some units and then evidence this learning in the performance outcomes contained within other units.

The significant amount of synoptic content within the Tech-level supports synoptic learning and assessment by:

- showing teaching and learning links between the units across the specification
- giving guidance or amplification relating to the grading criteria for the internally assessed units, about where learners could apply the knowledge and understanding from other units
- providing a coherent learning programme of related units
- allowing holistic delivery and the application of prior or concurrent learning
- providing opportunities for the learning and assessment of multiple units combined together to promote holistic delivery
- developing and assessing learners use of Transferable skills in different contexts.

Whilst we do not prescribe in which order the units should be delivered or assessed, it is important for centres to be aware of the links between the units so that the teaching, learning and assessment can be planned accordingly. This way, when being assessed, learners can apply their learning in ways which show they are able to make connections across the qualification.

Within each unit we provide references to where the unit content maps from or to other units within the qualification. This will help the learner understand where there are explicit opportunities for synoptic learning as well as synoptic assessment.

For example, learners will be able to see very clearly how they can apply the under-pinning knowledge and theory from the core units into real life or work-related tasks – such as projects and work experience – within the specialist units.

This approach will also enable learners to integrate transferable skills, much valued by employers and HE, into their assignments.

It is therefore a requirement that all learners undertake meaningful synoptic learning and assessment during their study.

Plans for how this will be undertaken will be scrutinised as part of our centre approval process and its implementation monitored during our ongoing quality assurance activities with centres.

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The following grids demonstrate the overall synoptic coverage in each unit of the qualification:

Foundation Technical Level (360 GLH) Entertainment Technology: Video Games Art and Mechanics (TVQ01022)

Unit	Pass criteria	Synoptic links to other units	% of synoptic assessment
Business for video games	n/a	2D games art 3D environment art Games mechanics	n/a
2D games art	P1, P11, P12, P13	Business for video games 3D environment art Games mechanics	4/13 Pass criteria (30%)
3D environment art	n/a	Business for video games 2D games art Games mechanics	n/a
Games mechanics	P1, P7, P10	Business for video games 3D environment art 2D games art	3/12 Pass criteria (25%)

Technical Level (540 GLH) Entertainment Technology: Video Games Art and Animation (TVQ01023)

Unit	Pass criteria	Synoptic links to other units	% of synoptic assessment
Business for video games	n/a	2D games art 3D environment art Games mechanics	n/a
2D games art	P1, P2, P3, P4, P5, P6, P8, P11, P12, P13	Business for video games Concept art 3D environment art Games mechanics	10/13 pass criteria (76%)
Concept art	P1, P2, P3, P7, P8	Business for video games 2D games art	5/12 pass criteria (41%)
3D environment art	n/a	Business for video games 2D games art Concept art Games mechanics	n/a
Games animation and VFX	P4, P5, P9, P10, P11, P12	2D games art Games mechanics	6/12 pass criteria (50%)
Games mechanics	P1, P2, P4, P5, P7, P10	Business for video games 2D games art 3D environment art Animation and VFX	5/12 pass criteria (41%)

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Technical Level (720 GLH) Entertainment Technology: Video Games Art and Design (TVQ01024)

Unit	Pass criteria	Synoptic links to other units	% of synoptic assessment
Business for video games	n/a	Digital asset management 2D games art 3D environment art Games mechanics	n/a
Digital asset management	n/a	Business for video games 2D games art Concept art 3D environment art Games mechanics	n/a
2D games art	P1, P2, P3, P4, P5(4), P6, P8, P11, P12, P13	Business for video games Concept art 3D environment art Games mechanics	10/13 pass criteria (76%)
Concept art	P1, P2, P3, P7, P8	Business for video games Digital asset management 2D games art	5/12 pass criteria (41%)
3D environment art	n/a	Business for video games Digital asset management 2D games art Concept art Level design Games mechanics	n/a
Games animation and VFX	P4, P5, P9, P10, P11, P12	2D games art 3D character art Games mechanics	6/12 pass criteria (50%)
Level design	P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12	Business for video games Digital asset management 2D games art 3D environment art Games mechanics	12/12 pass criteria (100%)
Games mechanics	P1, P2, P4, P5, P7, P10, P12	Business for video games Digital asset management 2D games art 3D environment art Animation and VFX	7/12 pass criteria (58%)

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Technical Level (1080GLH) Entertainment Technology: Video Games Art and Design Production (TVQ01025)

Unit	Pass criteria	Synoptic links to other units	% of synoptic assessment
Business for video games	n/a	Digital asset management 2D games art 3D environment art Games mechanics Collaborative games development project	n/a
Digital asset management	n/a	Business for video games 2D games art Concept art 3D environment art User interface Games mechanics Games audio Collaborative games development project	n/a
2D games art	P1, P2, P3, P4, P5, P6, P7, P8, P11, P12, P13	Business for video games Concept art 3D environment art 3D character art User interface	11/13 pass criteria (84%)
Concept art	P1, P2, P3, P7, P8, P9, P10	Business for video games Digital asset management 2D games art 3D character art Collaborative games development project	7/12 pass criteria (58%)
3D environment art	n/a	Business for video games Digital asset management 2D games art Concept art 3D character art Level design Games mechanics Collaborative games development project	n/a
3D character art	n/a	Business for video games Digital asset management 2D games art 3D environment art Concept art Level design	n/a

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Unit	Pass criteria	Synoptic links to other units	% of synoptic assessment
User interface (UI)	P2, P5, P9, P10, P11, P12	Business for video games Digital asset management 2D games art Concept art Games mechanics Collaborative games development project	6/12 pass criteria (50%)
Games animation and VFX	P4, P5, P6, P7, P8, P9, P10, P11, P12	2D games art 3D character art User interface Games mechanics Collaborative games development project	9/12 pass criteria (75%)
Level design	P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12	Business for video games Digital asset management 2D games art 3D environment art Games mechanics Collaborative games development project	12/12 pass criteria (100%)
Games mechanics	P1, P2, P3, P4, P5, P7, P10, P11, P12	Business for video games Digital asset management 2D games art 3D environment art User interface Animation and VFX Games audio	9/12 pass criteria (75%)
Games audio	P1, P2, P3, P4, P5, P6, P7, P8, P12	Business for video games Digital asset management Collaborative games development project	9/12 pass criteria (75%)
Collaborative games development project	P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12	Business for video games Digital asset management Concept art Games mechanics	12/12 pass criteria (100%)

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13 Total qualification time

For any qualification which it makes available, Ofqual requires an awarding organisation to:

a assign a number of hours for total qualification time to that qualification, and

b assign a number of hours for guided learning to that qualification.

Total qualification time is the number of notional hours which represents an estimate of the total amount of time that could reasonably be expected to be required in order for a learner to achieve and demonstrate the achievement of the level of attainment necessary for the award of a qualification.

Total qualification time is comprised of the following two elements:

a the number of hours which an awarding organisation has assigned to a qualification for guided learning (GLH)

AQA has assigned GLH to the overall qualification and the individual units.

b an estimate of the number of hours a learner will reasonably be likely to spend in preparation, study or any other form of participation in education or training, including assessment, which takes place as directed by – but, unlike guided learning, not under the immediate guidance or supervision of – a lecturer, supervisor, tutor or other appropriate provider of education or training.

AQA has assigned the following GLH and TQT values to its qualifications:

Qualification	Guided learning hours (GLH)	Total qualification time (TQT)
Entertainment Technology: Video Games art and Mechanics (TVQ01022)	360	380
Entertainment Technology: Video Games Art and Animation (TVQ01023)	540	570
Entertainment Technology: Video Games Art and Design (TVQ01024)	720	760
Entertainment Technology: Video Games Art and Design Production (TVQ01025)	1080	1140

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14 Transferable skills

These valued 'employability' skills are an integral and explicit element within the design and structure of all AQA Level 3 Technical Level qualifications.

Discussions and collaboration with centres, employers and stakeholders (such as further education (FE) colleges, university technical colleges (UTCs), sector-skills councils, professional/trade bodies and HE), made it clear that the inclusion of these skills is regarded as a priority, and that they should be included through contextualisation within the core subject content.

Employers and stakeholders prioritised the skills they required from employees in the sector as follows:

- teamwork
- communication
- research.

Rather than force the inclusion of these skills across a random selection of units or across the qualification as a whole, specific units have been identified as being most appropriate and suitable for the inclusion of a transferable skill within the subject context. The skill becomes the driver for the assessment rather than the subject content, and this will be demonstrated by producing evidence to meet the required standard[1]. Not every unit within the qualification has a skill contextualised within the subject content.

Unit code	Unit title	Transferable skill(s)
A/507/6612	2D games art	Communication (oral) and research
F/507/6613	Concept art	Communication (oral)
R/507/6616	User interface	Communication (oral) and research
M/507/6624	Games audio	Communication (written)
T/507/6625	Collaborative games development project	Teamwork and communication (oral)

The skill is assessed as a performance outcome of the unit, at the Pass grade. It is assessed in the same way as any other assessment criteria within the unit.

The formal inclusion of a contextualised transferable skill does not preclude the inclusion of other 'soft' or 'employability' skills within the unit at the point of delivery, for example those which employers and HE also value, such as critical thinking, project management, leadership, time management etc. However, these additional 'employability' skills will not be formally assessed as part of the unit performance outcomes.

The Transferable skills standards can be found in Appendix A.

The AQA Skills statement

Upon the successful completion of a qualification, each learner will be issued with a Skills statement that will sit alongside their formal qualification certificate.

This Skills statement records the transferable skills that were contextualised within the units of the qualification and is an explicit way for learners to showcase the skills that have been formally assessed as part of the qualification. This Skills statement can then be used by a learner as evidence of this achievement within their CVs or HE applications.

[1]Please visit the specification homepage to access the transferable skill standards and associated guidance and recording documentation.

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15 Support materials and guidance

The following delivery resources and support materials are available from AQA.

- A full Scheme of work (SOW) has been provided for each of the units in this programme. The SOW breaks down the unit content across a 30 teaching week academic year, although this is not mandated. Suggestions have been made for activities both for the tutor and the learner, and the document also contains links to external resources such as videos, task sheets, pdfs, PowerPoint presentations etc. Opportunities to develop English and maths skills have been identified and flagged, and SOWs include some mapping for stretch and challenge, and equality and diversity, although tutors will benefit from making this much more class relevant. Assignment handouts have been identified and the assessment points for transferable skills have been highlighted in the final column.
- A sample Lesson plan has also been provided corresponding to the SOW, as a guide for good practice.
- A sample assignment has been provided for each of the internally assessed units. These are not mandated in the assessment of this qualification, but do provide a good starting point to help tutors who would benefit from assessment support. These assessments do not necessarily cover all of the criteria that need to be assessed within a unit and it is the tutor's responsibility to ensure that all criteria are assessed across the unit and qualification.
- Sample question papers and mark schemes have been made available for each of the examined units.

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16 Qualification units

16.1 Unit 1: Business for video games

Title	Business for video games
Unit number	M/507/6610
Unit assessment type	Externally assessed
Guided learning hours	90
Transferable skill(s) contextualised within this unit	n/a
Resources required for this unit	It would be advantageous for learners to have access to resources on setting up and planning businesses, production processes for games, the history of the games industry and market-led strategies.
Synoptic assessment within this unit	It is a requirement that all learners undertake meaningful synoptic learning and assessment during their study. Depending upon the order in which the units are delivered, there are opportunities for learners to use elements of other units to support the development of knowledge and learning for this unit. This unit would logically be one of the first units taught; however it could be taught concurrently with Units 3, 5 and 10 as part of the 360 GLH Tech-level Video Games Art and Mechanics. The assessment amplification within the unit identifies where the centre should consider synoptic links with other units.

Aim and purpose

The unit aims to develop the learner's knowledge of the games industry, setting up and running a games business, working in a games business and managing the production process of making games.

Unit introduction

In this unit learners will be introduced to the essential elements that are involved in setting up or working within a business in the games industry. They will explore the logistics of setting up a game development studio and understand how games businesses work so that they can work within them. They will also investigate the production of games, including how to plan and execute the development and release of a commercial game.

Through this process, learners will explore how games businesses work, and have the knowledge and skills to start up their own games business, work within an existing games business and manage the development of games.

The knowledge and skills that learners learn, particularly in terms of production of games, will relate closely with the other units where they learn the skills to make games.

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Unit content

The logistics of setting up a business in the games industry	

Types and functional areas of a games business	• Types and structures of typical games businesses:
	  • sole trader
	  • partnerships including limited liability partnerships (LLPs)
	  • private limited companies
	  • public limited companies.
	• Benefits and drawbacks of each type.
	• The legal responsibilities of each type of games business:
	  • of the business
	  • of shareholders
	  • of directors.
	• Likely operational functions of a typical games business:
	  • sales and marketing
	  • finance and accounting
	  • administration
	  • purchasing
	  • research
	  • development
	  • distribution
	  • human resources (HR)
	  • customer services
	  • IT and support.

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The logistics of setting up a business in the games industry

Set-up activities	• Key set-up activities:
	  • sole trader:
	  • bank account
	  • registration with Inland Revenue for personal tax
	  • VAT registration (including threshold)
	  • partnerships including limited liability partnerships (LLPs):
	  • partnership agreement
	  • bank account
	  • registration with companies house (if LLP)
	  • registration with inland revenue for partnership tax and payroll
	  • VAT registration (including threshold)
	  • private and public limited companies:
	  • bank account
	  • registration with companies house
	  • registration with inland revenue for corporate tax and payroll
	  • VAT registration (including threshold)
	  • additional responsibilities of limited businesses:
	  • dividends
	  • shareholders and shareholder agreements
	  • types of shares:
	  • ordinary
	  • preference
	  • redeemable
	  • convertible.
	• Additional considerations:
	  • start up capital and initial costs
	  • HR processes and requirements
	  • trade bodies and other industry associations
	  • health and safety requirements
	  • the role of a lawyer
	  • insurance types:
	  • professional indemnity
	  • employers liability
	  • public liability
	  • buildings insurance
	  • contents insurance
	  • getting an office:
	  • finding an office (science parks, business parks etc)
	  • consideration of stakeholder needs (eg employees)
	  • renting, leasing, buying
	  • using hot desks
	  • incubators and accelerators
	  • buying hardware, software and equipment.

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The logistics of setting up a business in the games industry	

Managing finances of a games studio	• Key financial tools:
	  • cash flow
	  • payroll
	  • VAT
	  • invoicing
	  • credit control.
	• Additional financial tools:
	  • management accounts (P&L and balance sheets)
	  • books and bookkeepers
	  • accountants (what they do, what to look for)
	  • financial accounts
	  • expenses.

How to develop a business plan for a game development studio	

Writing a business plan	• Different business plan formats:
	  • traditional long business plans
	  • business model canvas.
	• Sections of a business plan:
	  • vision statement
	  • business objectives
	  • market segments
	  • channels to reach the market segments
	  • value proposition/unique selling points (USPs)
	  • key activities eg production
	  • resources
	  • key partners
	  • costs
	  • revenue streams
	  • market/competitor analysis.
	• Exit strategies:
	  • management buyout (MBO)
	  • initial public offering (IPO)
	  • merger
	  • trade sale.
	• Analysis tools such as:
	  • Porter's five forces
	  • SWOT.

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How to develop a business plan for a game development studio	

Raising funding	• Different ways to raise money:
	  • equity versus debt
	  • crowdsourcing
	  • angel investors
	  • investment funds
	  • friends/family
	  • venture capital funds
	  • private equity funds
	  • project finance (and joint venture companies)
	  • banks:
	  • overdrafts
	  • loans
	  • invoice financing
	  • credit cards
	  • personal guarantees
	  • public money (EU/UK)
	  • publishers
	  • work for hire.
	• The role of government through tax breaks:
	  • games tax relief
	  • research and development (R&D) tax credits
	  • Seed enterprise investment scheme, and enterprise investment scheme SEIS/EIS
	  • small business rate relief.
	• What investors are looking for:
	  • risk versus reward
	  • making more money that they would if they put the money in a bank
	  • internal rate of return (IRR)
	  • cash on cash return
	  • gearing (debt versus equity)
	  • a business not just a game
	  • trust in the team
	  • share structures as a way to reduce risk.

Intellectual property (IP)	• Types:
	  • trademarks
	  • patents
	  • copyright.
	• Intellectual property (IP) ownership in the games industry:
	  • what is the IP in a game
	  • giving up IP to publishers
	  • Special purpose vehicles (SPV).

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How to manage the development of a game	
Team skills	• Personal skills audit. • Team skills audit. • Strategies for addressing perceived skills gaps.

Production elements of making games	• Team roles in each department:
	  • technical
	  • art
	  • production
	  • design
	  • quality assurance (QA)
	  • audio
	  • community management
	  • analytics
	  • marketing.
	• Understand how those roles vary depending on studio size:
	  • generalist
	  • specialist.

Game design	• How to design a game, including the key elements:
	  • the evolution of games:
	  • the first video games
	  • arcade machines
	  • console generations
	  • online gaming
	  • Facebook and social gaming
	  • PC gaming
	  • mobile gaming
	  • 'Triple A' games
	  • 'Indie' games
	  • concept
	  • paradigm
	  • features
	  • mechanics
	  • interface
	  • controls
	  • game loops (core game loop, retention loop)
	  • monetisation/business model:
	  • premium
	  • free to play
	  • subscription
	  • market and competitor analysis.
	• Types of design documents:
	  • high concept documents
	  • full game design documents.

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How to manage the development of a game	

Game design	• Traditional versus modern approaches/detailed versus lightweight and iterative:
	  • proposal documents
	  • pitch decks
	  • technical design documents
	  • art style guides.

Project planning	• The key stages of game development:
	  • client or project brief
	  • design
	  • prototyping
	  • first playable/pre-alpha
	  • alpha
	  • beta
	  • soft launch
	  • gold/full launch.
	• Key processes for planning development:
	  • schedules
	  • critical path
	  • task lists
	  • asset lists (art and audio)
	  • scripts
	  • wish lists
	  • budget spreadsheets.

Project management	• Main project management styles:
	  • Agile
	  • Waterfall.
	• Tracking projects:
	  • development log
	  • meetings
	  • written reports
	  • project management software/tools.
	• Reviewing and evaluating project:
	  • the outcome against the brief
	  • what went well, and what did not
	  • how issues were overcome
	  • what could have been done differently to improve the management of the project.

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How to release a game and grow a business	

Marketing your game and business	• Ways to market your game or business:
	  • strategy
	  • public relations (PR)
	  • business development
	  • advertising
	  • branding
	  • game design
	  • building a community/community management.
	• Getting your game to market:
	  • self publishing
	  • first party publishers
	  • third party publishers
	  • funding deals
	  • marketing and distribution deals.
	• Platforms:
	  • digital versus retail
	  • open versus closed
	  • PC – Steam
	  • consoles:
	  • PlayStation 4
	  • Xbox One
	  • Nintendo Wii/U
	  • web browser
	  • mobile:
	  • app store
	  • Google.

Forecasting and analytics	• Creating forecasting spreadsheets. • The role of analytics in games. • Standard analytics tools. • Using analytics to understand your audience, translate it into business intelligence, and use that to improve your game, pre-release and post-release.

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How to release a game and grow a business	
Growing a business in the games industry	• Challenges faced, and skills needed, by company directors: • handling risk – dealing with the fact that you have to make decisions every day that you can't be sure are right • communicating with stakeholders • the realities of starting up and getting through the first twelve months, including dealing with contradictions (eg you need a portfolio to get work, but you can't get work without a portfolio) • managing people and building teams (including delegating, leadership and management) • entrepreneurial and enterprising attitudes • managing your own time • proactive versus reactive strategy • adaptability and flexibility.

Assessment outcomes

Learners will be able to:

Assessment outcome 1: Understand the logistics of setting up a business in the games industry	
a	Apply knowledge and understanding of different types of games businesses, the differences between them, and the benefits and drawbacks of each.
b	Apply knowledge and understanding of the operational functions of a typical games business.
c	Apply knowledge and understanding of the steps involved in setting up a business and of additional considerations.
d	Apply knowledge and understanding of all of the key tools within financial management of a business and the financial tools that can assist in this.

Assessment outcome 2: Understand how to develop a business plan for a game development studio	
a	Apply knowledge and understanding of the key sections that should be included in a business plan.
b	Outline methods for raising funding.
c	Explain the role of government in raising funding.
d	Outline key factors investors consider when assessing investment opportunities.
e	Outline the types of intellectual property that games businesses generally have to consider.
f	Assess the benefit and drawbacks of retaining IP versus selling it in a games business.

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Assessment outcome 3: Understand how to manage the development of a game	
a	Explain the role of the skills audit, and the need to develop strategies to manage perceived skills gaps.
b	Outline team roles within a games company.
c	Outline key evolutions in the games industry with examples of businesses that have been key players.
d	Outline key elements of a game design and discuss different types of design documents.
e	Outline key stages in a game development process, and key processes that need to be undertaken to plan development.
f	Discuss project management styles in the games industry and assess the best way to track, review and evaluate a project.

Assessment outcome 4: Understand how to release a game and grow a business	
a	Apply knowledge and understanding of ways to market a game or a business and routes to market, considering different platforms.
b	Understand how to forecast revenue from a game and how to use analytics to improve revenue.
c	Discuss the key factors in growing a games business, in terms of the challenges faced and the skills needed by company directors.
d	Understand the importance of a proactive versus reactive strategy and the adaptability and flexibility needed to grow in a volatile market.

Assessment

This unit is assessed by an external examination set and marked by AQA. The examination takes place under controlled examination conditions and the exam dates are published at the start of each academic year.

Learners are allowed to use a non-programmable scientific calculator in the examination.

The examination consists of a written paper with two sections, A and B. Learners have to complete both sections and there are no optional questions within either section.

The examination is 2 hours duration and the total number of marks available in the examination is 80.

Section A is worth 50 marks and consists of relatively short questions based on the whole of the specification for this unit. Learners are required to answer all of the questions in Section A.

Section B is worth 30 marks and includes longer questions worth up to 15 marks each. The questions in Section B do not necessarily cover the whole of the specification for this unit at each assessment. Learners are required to answer all of the questions in Section B.

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Synoptic assessment

This is an externally assessed unit. Depending upon the order in which the units are delivered, there are opportunities for learners to use elements of other units to support the development of knowledge and learning for this unit.

The amplification below identifies where the centre could consider synoptic learning and where learning from other units can be used to support the production of evidence for this unit.

AO1 Understand the logistics of setting up a business in the games industry

When considering the types of game development businesses, this could be taught concurrently with Unit 12 Collaborative games development project PO2 and PO4.

AO2 Understand how to develop a business plan for a game development studio

When learning about intellectual property, this could be taught concurrently with Unit 2 Digital asset management AO5.

AO3 Understand how to manage the development of a game

When considering the various job roles within a game development team, designing games and project management techniques, this could be taught simultaneously with Unit 10 Games mechanics PO3 and PO4 and Unit 12 Collaborative games development project PO2.

The history and evolution of games and game mechanics could be taught concurrently with Unit 10 Games mechanics PO1.

AO4 Understand how to release a game and grow a business

When considering ways to market a game or concept, this could be taught concurrently with Unit 10 Games mechanics PO3.

When evaluating the success of a game or feature through analytics and user feedback, this could be taught concurrently with Unit 10 Games mechanics PO3.

Delivery guidance

A significant part of this entire unit could be taught by getting learners to create a business plan for a games company and how they would go about setting up that business. For that business they could then design a game – and could potentially develop part of that game in the other units – plan the development, production, marketing and financial aspects for that game, including how they would raise the money to develop it and how much money they would expect to make.

AO1 Understand the logistics of setting up a business in the games industry

Learners should be introduced to the practical processes and decisions when setting up a business, looking at how businesses are run in terms of structure and the operational functions that exist in businesses regardless of size or structure. In particular, learners should understand that as a sole trader they will need to have a range of skills, or access to these in other ways. If visitors from games companies could be found (or if not, visitors from other small businesses) to explain how their business is structured and how they manage their business financially, this would be a useful way for learners to gain an understanding of how business structures work in practice.

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AO2 Understand how to develop a business plan for a game development studio

To introduce the learners to business planning, they should write a business plan for a games business. They could do this in groups, analysing their business idea and completing a business model canvas. They could also have *Dragon's den* style exercises, where they must convince the panel of their business idea to secure funding. They must therefore decide what funding route is suitable for their business and why, as well as explaining what the value and intellectual property of their business will be. Another task could be for learners to be given up to three current games businesses to analyse in terms of the business models they use, and why they use them.

An important aspect of business plans, particularly to investors, is understanding that a business exit strategy is as important as the concept and implementation of the business itself. Even if this is not included directly in the plan, it is likely that investors will want to be reassured that this has been considered and that their investment will be protected.

AO3 Understand how to manage the development of a game

Fundamental to the development of games is gaining an understanding of the skills of the team that will be involved in the development. Learners should begin by auditing their own skills and then considering these skills in the context of the skills of other members of the team, identifying any skills gaps, and then planning strategies to overcome them. This could involve bringing in others from outside the team (either within the business or buying in expertise from other businesses) at relevant points in the development process.

Learners could be introduced to the ideas of production and game design by demonstrating an understanding of the evolution of games, having to design a game and then put together a plan for the development/production of the game. This could then be part of the same *Dragon's den* exercise described in AO2, where, along with pitching their overall business plan, they also pitch their product/service idea and plan.

Where possible, a talk by an industry visitor on how they develop games would be advantageous at this point. To fulfil the requirements of meaningful employer involvement – the visitor would also have to engage the learners in activities and or tasks.

Learners should understand the role of project development tracking and the importance of the final review and evaluation of the outcome, and the process.

AO4 Understand how to release a game and grow a business

Learners could be introduced to the idea of marketing by writing a marketing plan for their game and analysing the marketing strategies of a few different games that have been released within the last 12–24 months. They could also have talks from business owners (games or other small businesses) on the challenges of growing a business and write an essay on the subject.

Learners should understand that it is unlikely that a single growth strategy will reap the intended rewards and that, more realistically, they will need to take a range of actions and implement a number of strategies, being responsive to the outcomes of each and adapting their activities accordingly.

Employer engagement guidance

It would be useful to have guest speakers from local studios involved in production roles such as producers, project managers or lead artists/programmers, as well as business owners or people in business development, marketing or strategic roles.

To fulfil the requirements of meaningful employer involvement – the visitor would also have to engage the learners in activities and or tasks.

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Useful links and resources

Types of companies

- gov.uk/business-legal-structures/overview

Setting up a company

- Companies House website: gov.uk/government/organisations/companies-house
- HMRC website: gov.uk/government/organisations/hm-revenue-customs
- The Prince's Trust, *Make it Happen: The Prince's Trust Guide to Starting Your Own Business*
- Job roles: creativeskillset.org/creative_industries/games/job_roles
- Director responsibilities: gov.uk/running-a-limited-company
- Example of basic HR documents: juliekellyhr.co.uk/hr-basics/hr-for-small-businesses/
- Incubator and accelerator examples:
- playhubs.com/
- bristolgameshub.com/
- techstars.com/program/locations/london/
- Shareholders agreement basics: ukie.org.uk/sites/default/files/cms/docs/need%20to%20know%20-%20Shareholders%E2%80%99%20Agreement%20Key%20Issues%20List.pdf
- Indie Legals 101: gamesbrief.com/2011/10/indie-legals-1-01-starting-an-indie-game-company/

Managing the finances of a company

Example of how to create a cash flow spreadsheet:

- knowhownonprofit.org/how-to/how-to-set-up-a-cash-flow-forecast-in-a-spreadsheet
- Payroll basics: gov.uk/business-tax/paye
- VAT basics: gov.uk/vat-businesses/how-vat-works
- Invoice template examples: crunch.co.uk/resources/invoice-templates/
- Management accounts, books and cash flow: mindtools.com/pages/article/newCDV_45.htm
- Summary of management accounts vs financial accounts: accountingcoach.com/blog/financial-accounting-management-accounting

Overview of business expenses:

- smallbusiness.co.uk/financing-a-business/accounts-and-tax/2387518/what-expenses-can-i-claim-through-my-business.thtml

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Writing a business plan

- Business model canvas: businessmodelgeneration.com/canvas/bmc
- Kawasaki Guy, *The art of the start*
- startupdonut.co.uk/startup/business-planning/writing-a-business-plan
- princes-trust.org.uk/need_help/enterprise_programme/explore_where_to_start/business_plans/business_plan_templates.aspx

Raising funding

- Games industry guides on IP, R&D tax credits, games tax relief, EIS/SEIS and more: ukie.org.uk/guides
- Game tax relief: bfi.org.uk/film-industry/british-certification-tax-relief/about-tax-relief#video-games
- Small business rate relief: gov.uk/apply-for-business-rate-relief/small-business-rate-relief
- Types of investors: fundable.com/learn/resources/guides/investor-guide/types-of-investors
- Valuing a startup: gamesindustry.biz/articles/2015-04-29-valuing-a-startup-for-investment
- What is an investor: gamesbrief.com/2010/11/what-exactly-is-an-investor/

Intellectual property

Boyd S Gregory and Green Brian, *Business and Legal Primer for Game Development*

Production elements of making games/project planning/project management

- Irish Daniel, *The Game Producer's Handbook*
- uk.ign.com/articles/2006/03/16/the-game-production-pipeline-concept-to-completion
- gamecareerguide.com/features/414/game_production_an_introduction.php

Examples of common project management tools for games:

- JIRA: atlassian.com/software/jira (for larger teams)
- Trello: trello.com/ (for small teams)
- Basecamp: basecamp.com/ (for medium teams)
- Hansoft: hansoft.com/en (for larger teams)

Source control:

- perforce.com/ (premium product)
- subversion.apache.org/ (free)
- Agile project management: dummies.com/how-to/content/agile-project-management-for-dummies-cheat-sheet.html
- Agile versus Waterfall project management: manifesto.co.uk/agile-vs-waterfall-comparing-project-management-methodologies/

Evolution of the games industry

- museumofplay.org/icheg-game-history/timeline/
- Kent Steven L, *The Ultimate History of Video Games*
- Mott Tony, *1001: Video Games You Must Play Before You Die*
- Zackariasson P and Timothy Wilson, *The Video Game Industry: Formation, Present State, and Future*

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Game design

- Koster Raph, *A theory of fun*
- ellaromanos.com/?p=1947
- ellaromanos.com/?p=2005
- gamasutra.com/blogs/NicholasLovell/20130919/200606/The_Pyramid_of_FreetoPlay_game_design.php?utm_source=twitterfeed&utm_medium=twitter&utm_campaign=Feed%3A+GamasutraNews+%28Gamasutra+News%29
- gamasutra.com/view/feature/132427/the_four_perspectives_of_game_.php
- Clark Oscar, *Games as a service*

Marketing your game and business

- Deskin Joel, *A Practical Guide to Indie Game Marketing*
- pixelprospector.com/the-big-list-of-indie-game-marketing/

Forecasting and analytics

- Seif El-Nasr Magy, *Game Analytics: Maximizing the Value of Player Data*
- gamasutra.com/blogs/DmitriWilliams/20140924/226306/Game_Analytics_101_Part_1_Should_I_deal_with_this_How_do_I_start.php

Growing a business in the games industry

- Fuller Keith, *Beyond Critical: Improving Leadership in Game Development*
- ellaromanos.com/?p=2056
- ellaromanos.com/?p=1975
- indiegamegirl.com/
- develop-online.net/news/managing-your-time/0206394
- Cowey S, *The 7 Habits of Highly Effective People*

General

- gamasutra.com
- develop-online.net
- gamesindustry.biz
- Edge-online.com
- whatgamesare.com
- gamesbrief.com
- gamecareerguide.com

Hill-Whittall Richard, *The Indie Game Developer Handbook*

Cohen DS, Bustamante Sergio A, *Producing Games: From Business and Budgets to Creativity and Design*

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16.2 Unit 2: Digital asset management

Title	Digital asset management
Unit number	T/507/6611
Unit assessment type	Externally assessed
Guided learning hours	90
Transferable skill(s) contextualised within this unit	n/a
Resources required for this unit	It would be advantageous for learners to have access to resources on setting up and planning businesses, production processes for games, the history of the games industry and market-led strategies.
Synoptic assessment within this unit	It is a requirement that all learners undertake meaningful synoptic learning and assessment during their study. Depending upon the order in which the units are delivered, there are opportunities for learners to use elements of other units to support the development of knowledge and learning for this unit. This is an externally assessed unit, however some aspect to the unit could be taught concurrently with Units 3, 5, 7, 11 and 12. The assessment amplification within the unit identifies where the centre should consider synoptic links with other units.

Aim and purpose

The purpose of this unit is to develop the learner's understanding of the nature of assets created, developed and stored using digital media; to learn best practice for storing, versioning and archiving them, and to be aware of the implications of digital rights management and intellectual property rights.

Unit introduction

Many industries require the creation of many different types of assets using computer-based tools. In this unit, learners will develop knowledge and understanding of the lifecycle and maintenance of these assets.

In particular, the learner will develop knowledge of:

- file storage
- asset classes
- version control
- data backup strategies
- intellectual property rights.

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Unit content

File storage	

The nature of data	• Binary and hexadecimal notation compared with decimal notation.
	• Typical creation, storage and retrieval cycle of data:
	  • common features of software used in creating data
	  • introduction to version control.

Storage media	• The properties of storage media:
	  • bandwidth
	  • cost
	  • longevity
	  • capacity
	  • viability
	  • obsolescence
	  • susceptibility
	  • Mean Time Between Failure (MTBF).
	• Transferring data through external computer buses:
	  • USB
	  • SATA
	  • FireWire
	  • Thunderbolt
	  • SCSI.
	• Different kinds of storage media, their mechanisms of operation and typical applications:
	  • hard disk drive:
	  • typical properties
	  • mechanical operation:
	  • platter and spin speed
	  • read/write heads
	  • typical bus interfaces
	  • flash memory
	  • typical properties
	  • electronic operation:
	  • limits on number of read/write operations
	  • typical bus interfaces
	  • optical disk
	  • typical properties
	  • mechanical operation:
	  • platter and spin speed
	  • read/write heads
	  • typical bus interfaces
	  • tape
	  • typical properties
	  • mechanical operation:

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File storage	
Storage media – continued	• read/write heads • typical bus interfaces.
Compression	• File compression: • information theory and lossless compression algorithms: • run–length encoding • Lempel-Ziv encoding • Lempel-Ziv-Welch encoding • Neville-Manning encoding • rate–distortion theory and lossy compression algorithms: • audio compression: • MPEG layer 3 (MP3) • Vorbis • Advanced Audio Coding (AAC) • image and video compression: • JPG (Joint Photographic Experts Group) • VP8 • H.264.

Asset classes	
Historical storage	• How assets have historically been created and stored prior to the development of computer based tools: • books • drawings • plans • photographs • songs • music • film • video.
File formats	• Typical properties and applications of file formats: • Metadata • text: • ASCII • Unicode • UTF-8 • Hypertext Markup Language (HTML) • raster graphics: • Graphics Interchange Format (GIF) • Joint Photographic Experts Group (JPEG, JPG) • Portable Network Graphic (PNG) • RAW

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Asset classes	

File formats – continued	• vector graphics:
	  • Computer Graphics Metafile (CGM)
	  • Scalable Vector Graphics (SVG)
	  • Open Document Drawing (ODG)
	• documents:
	  • Open Office XML Document (DOCX)
	  • LaTeX (TeX)
	  • Extensible Markup Language (XML)
	  • Rich Text Document (RTF)
	• audio:
	  • Audio Interchange File Format (AIFF)
	  • Broadcast Wave Format (BWF)
	  • Free Lossless Audio Codec (FLAC)
	  • MPEG Layer 3 (MP3)
	  • Advanced Audio Coding (AAC, M4A, MP4)
	• video:
	  • 3GP
	  • M4V
	  • YUV
	  • WMV.

Codecs	• The role of codecs when creating time-based media:
	  • availability for target platforms
	  • costs and licensing.

Container file formats	• The use of container file formats when dealing with time based media:
	  • ISO base media file format
	  • QuickTime
	  • Ogg
	  • Matroshka
	  • MP4
	  • 3GP.

Standards bodies	• The role of standards bodies in enabling interoperability of data between different tools and applications:
	  • ISO
	  • ANSI
	  • W3C.

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Version control	

How version control works	• Version control versus revision control.
	• Benefits of using version control.
	• Atomic operations.
	• Graph structure.
	• Labels.
	• Manipulating and modifying a version-control repository:
	  • submitting requests to the repository
	  • branching and forking
	  • pushing, pulling and merging.
	• Models and examples of version control tools:
	  • local:
	  • Revision Control System (RCS)
	  • Source Code Control System (SCCS)
	  • client–server
	  • Concurrent Versions System (CVS)
	  • Subversion (SVN)
	  • distributed
	  • Git
	  • decentralised and CVS-based (DCVS).

Data backup strategies	

Lost data	• Causes of data loss:
	  • unintentional action
	  • failure
	  • disaster
	  • crime.
	• Backup strategies:
	  • unstructured
	  • incremental
	  • differential.

The choices of storage media	• The choices of storage media when archiving backups:
	  • environmental considerations
	  • Mean Time Between Failure (MTBF)
	  • remote and offsite backup mechanisms
	  • hard disk drive
	  • flash memory
	  • optical disk
	  • tape.

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Data backup strategies	

Purpose	• The purpose of disaster recovery:
	  • recovery time objective
	  • recovery point objective
	  • documentation.
	• Physical media recovery options.

Intellectual property rights	

Ownership and copyright	• Ownership and copyright:
	  • purpose
	  • Berne Convention
	  • exclusive rights
	  • fair use
	  • duration
	  • public domain
	  • model and property release
	  • copyright, designs and patents act 1988.

Types of works	• Literary. • Dramatic. • Musical. • Artistic. • Sound recordings. • Film. • Broadcasts. • Typography.

Permission and licensing	• GNU General Public License (GPL)
	• GNU Lesser General Public License (LGPL)
	• Creative Commons license:
	  • attribution
	  • share-alike (copyleft)
	  • non-commercial
	  • no derivative works.

Infringement	• Infringement:
	  • piracy
	  • theft
	  • file sharing
	  • penalties.
	• Digital Rights Management (DRM).

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Assessment outcomes

Learners will be able to:

Assessment outcome 1: Understand file storage	
a	Describe the nature of files as constituted by data.
b	Identify different kinds of data storage media.
c	Evaluate the different properties of data storage media.
d	Explain how to choose storage media for an application.
e	Explain how to choose compression algorithms for data storage.

Assessment outcome 2: Understand asset classes	
a	Differentiate between types of asset.
b	Describe the purpose of file formats and their applications.
c	Compare and contrast the implications of codec choices.
d	Evaluate the importance of containers to time-based file formats.
e	Describe the role of standards bodies in defining and maintaining open file formats.

Assessment outcome 3: Understand version control	
a	Describe the importance of version control.
b	Describe how version control works.
c	Identify the different models of version control.
d	Create and use a repository.

Assessment outcome 4: Understand data backup	
a	Identify the causes of data loss.
b	Differentiate between backup strategies.
c	Explain how to choose backup media.
d	Explain how to plan for disaster recovery.

Assessment outcome 5: Understand intellectual property rights	
a	Evaluate the importance of copyright.
b	Compare and contrast different licensing models.
c	Identify the different types of infringement.
d	Describe digital rights management.

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Assessment

This unit is assessed by an external examination set and marked by AQA. The examination takes place under controlled examination conditions and the exam date will be are published at the start of each academic year.

Learners are allowed to use a non-programmable scientific calculator in the examination.

The examination consists of a written paper with two sections, A and B. Learners have to complete both sections and there are no optional questions within either section.

The examination is 2 hours duration and the total number of marks available in the examination is 80.

Section A is worth 50 marks and consists of relatively short questions based on the whole of the specification for this unit. Learners are required to answer all of the questions in Section A.

Section B is worth 30 marks and includes longer questions worth up to 15 marks each. The questions in Section B do not necessarily cover the whole of the specification for this unit at each assessment. Learners are required to answer all of the questions in Section B.

Synoptic assessment

This is an externally assessed unit. Depending upon the order in which the units are delivered, there are opportunities for learners to use elements of other units to support the development of knowledge and learning for this unit.

The amplification below identifies where the centre could consider synoptic learning and where learning from other units can be used to support the production of evidence for this unit.

A01 Understand file storage

The use of storage media and file types is inherent throughout all units within the course, however when considering compression of audio, video, and images, this could be taught concurrently with Unit 11 Games audio PO1, Unit 10 Games mechanics PO4, and Unit 7 User interface PO3.

Management of assets could also be taught alongside Unit 12 Collaborative games development project PO2.

A02 Understand asset classes

When learning about file formats, this could be taught concurrently with Unit 11 Games audio PO1 and PO3, in addition to Unit 7 User interface PO3 and Unit 4 Concept art PO2.

A03 Understand revision control

Learning about revision control could be integrated into any unit when the learners are creating digital work using an iterative development process, such as Unit 5 3D environment art or Unit 7 User interface. Revision control will also be used for Unit 12 Collaborative games development project.

A04 Understand data backup

Learning about the purpose and strategies of data backup is an essential requirement for all digital artists and can be taught concurrently with any practical unit, such as Unit 3 2D games art, Unit 5 3D environment art or Unit 10 Games mechanics. Learners should be expected to apply these working practices to all future practical projects.

A carefully planned and robust data backup strategy is also essential for Unit 12 Collaborative games development project PO4.

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AO5 Understand intellectual property rights

When learning about ownership and copyright, and types of licensing agreements, this can be taught concurrently with Unit 1 Business for video games AO2 and AO4.

The effects of copyright infringement can also be taught concurrently with Unit 1 Business for video games AO4.

Delivery guidance

AO1 Understand file storage

Having introduced learners to the concept of data and its storage and retrieval, they could then be introduced to the electro-mechanical and electronic storage of data simply through historical survey, observing how innovations have led to mechanisms with improved bandwidth and density.

The importance of cost versus capacity will become apparent as the struggle to fit more and more data into a particular device or form factor unfolds. This should lead to an understanding of the value of compression, at which point compression choices – lossy versus lossless – can be discussed.

Although organisation of data isn't specifically assessed, it would be valuable for the learners to spend time considering how they organise their data within a file system.

AO2 Understand asset classes

Again, this is a historical survey. Starting with the creative endeavours of man through history and how we know about them, learners can research the mechanisms by which those endeavours have been committed to 'long term storage' such as printing or cave painting. Compare the nature of those mechanisms: how printing and painting both involve leaving marks on a medium. Look also at music, manuscript and audio recording. Consider photography, cinematography and videography.

Then look at how to represent this long-term storage digitally. Cycle through the list of asset classes, observing what, where and how information about the data is stored with the data itself.

Be sure to distinguish between container formats and data formats. Identify which file formats are owned by public or private standards bodies and consider the licensing implications.

When looking at codecs, consider the role of the VP8 patent battle that took place between MPEG-LA and Google.

AO3 Understand revision control

The best way to learn about version control is to actually do it. Ultimately, learners should keep their files under source control, either remotely or locally depending on the facilities of the teaching institution, and use the repository to learn how to push, pull, fork and merge. Multiple solutions should be offered. At time of writing Git is the most popular, but Perforce and Subversion are still in common use and available to anyone without a server free of charge. Indeed, creating a private local Git repository is not a hard task and should be encouraged, albeit with the proviso that backup is still important.

If the rest of the course, of which this unit is a part, should feature team project-based work, then version control should be used from the outset. Regular discussion of contributions to a repository will highlight the workings of revision control.

AO4 Understand data backup

As with version control, the learners should be encouraged to maintain backups of their data as the course progresses. The good practice of backup should be instilled from the outset. When delivering

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the unit, revisit the history of long-term storage, of scribes duplicating books and artists recreating artworks. Again, look at the storage technologies and consider their roles in the short and long term.

Where possible, find case studies of data loss and disaster recovery; investigate them, emphasising that it can strike at any time from unexpected places. Consider also any legal implications or requirements to meet disaster-recovery standards set by insurers, employers or contractors. Highlight the importance of setting a point in time and/or a duration for a recovery process.

AO5 Understand intellectual property rights

Learners should investigate the nature of property law and how it has changed since the 1990s. They should study the development of the GNU Public License as well as the Creative Commons license and the Berkeley Software Distribution licenses.

The growth of piracy due to the simplicity of the task of duplication should be considered. Mechanisms for preventing piracy, Digital Rights Management (DRM), should be compared and contrasted; if the learner is of a technical bent, typical strategies deployed by pirates to counter them would make interesting reading.

Employer engagement guidance

Guest speakers from local studios. To fulfil the requirements of meaningful employer involvement – the visitor would also have to engage the learners in activities and or tasks.

Useful links and resources

Data compression

- Salomon David, *A Concise Introduction to Data Compression, (*2008).
- Stone JV, *Information Theory: A Tutorial Introduction,* University of Sheffield, England, (2014).
- jim-stone.staff.shef.ac.uk/BookInfoTheory/InfoTheoryBookMain.html

Data formats

- unicode.org/
- en.wikipedia.org/wiki/VP8
- w3.org/Graphics/GIF/spec-gif89a.txt

The world wide web is full of details about file formats using simple searching.

Version control

- git-scm.com/doc (Git documentation)
- perforce.com/perforce/r15.1/manuals/intro/index.html (Perforce introduction)
- svnbook.red-bean.com/ (Subversion documentation)

Backup strategies

Search the web using ‘Backup case study’ for a wealth of shocking stories and useful information.

Intellectual property rights

- Be vigilant about sources: some may refer to laws in jurisdictions other than the UK. gov.uk/intellectual-property-an-overview
- (UK government advice) gnu.org/licenses/gpl-3.0.en.html (GPL version 3)
- freebsd.org/copyright/freebsd-license.html (BSD license)
- creativecommons.org/ (Creative Commons)

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16.3 Unit 3: 2D games art

Title	2D games art
Unit number	A/507/6612
Unit assessment type	Centre assessed and externally quality assured
Recommended assessment method	Practical assignment This is the preferred assessment method for this unit. A centre may choose an alternative method of assessment, but will be asked to justify this as part of the quality assurance process.
Guided learning hours	90
Transferable skill(s) contextualised within this unit	Research Communication (oral)[2]
Resources required for this unit	Learners should have access to a range of materials and media, including paint, pastel, graphite, ink etc. It may also be advantageous to have access to reference material that provides information about the core principles of art for analysis, to assist learners in developing their understanding of the processes used in traditional art.
Synoptic assessment within this unit	It is a requirement that all learners undertake meaningful synoptic learning and assessment during their study. Depending upon the order in which the units are delivered, there are opportunities for learners to use elements of other units to support the development of knowledge and learning for this unit. This unit would logically be taught prior to Unit 5, however it could also be taught concurrently with Units 1, 4, 5 and 7. The assessment amplification within the unit identifies where the centre should consider synoptic links with other units.

Aim and purpose

This unit aims to develop the learner's visual library, to increase the depth of their knowledge with regard to art and design, and to improve the learner's ability to use a range of media and techniques in order to communicate visually to different audiences.

Unit introduction

Game artists, whether working on 2D or 3D games, still rely upon understanding the basic elements of a 'traditional' visual language. This unit aims to introduce learners to essential drawing skills required by a games artist. Through the use of mixed media, learners will investigate basic elements of perspective, proportion, colour theory and the various visual styles achievable through the language of drawing.

In this module, learners will create, review and present their own portfolio of traditional and contemporary art, understanding disciplines of perspective and figure drawing, as well as exploring their personal art style of drawing.

[2]Please refer to Appendix A or visit the specification homepage to access the Transferable Skills standards and associated guidance and recording documentation

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Through the study and research of past and present artists, learners will investigate and explore techniques of utmost importance and still used in games today.

Note that the centre's access to traditional art facilities may affect the learner's ability to utilise the full range of techniques and processes available to current industry artists.

The visual recording skills that learners develop throughout this unit will form the basis for many subsequent units, such as 3D character art and Concept art. This unit will allow learners to build their visual language skills and understanding through the use of various techniques and processes, such as line, tone, colour, shape, perspective and proportion.

Unit content

Traditional industry techniques and processes	

Basic industry principles	• Proportion:
	  • measured line, angle and spanning from references
	  • measured proportion
	  • selection of viewpoint for compositions (foreshortening and elevation).
	• Rules of composition:
	  • rule of thirds
	  • diagonal rule
	  • triangle rule
	  • golden ratio/spiral
	  • framing
	  • negative space.
	• Perspective:
	  • 1 point perspective
	  • 2 point perspective
	  • 3 point perspective
	  • horizon line
	  • perspective grid.

Conveying a sense of meaning to a specific audience	• Specified audience:
	  • game players
	  • age range
	  • gender
	  • religion
	  • sexuality
	  • class
	  • culture
	  • public
	  • private.
	• Convey meaning:
	  • information
	  • expression
	  • feeling
	  • mystery
	  • style
	  • atmosphere
	  • mood.

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Traditional industry techniques and processes	
In others' work	• Traditional. • Historical. • Contemporary.

Creatively and critically interpret data from primary and secondary sources	

Primary and secondary sources	• Primary:
	  • natural world:
	  • humans
	  • animals
	  • plants
	  • water
	  • fire
	  • earth
	  • constructed world:
	  • architecture
	  • street furniture
	  • machinery
	  • manufactured objects
	  • electronic devices
	  • art and design:
	  • paintings
	  • sculpture
	  • drawings
	  • photographs.
	• Secondary:
	  • books
	  • journal and magazine articles
	  • internet
	  • films
	  • video games.

Experimenting with two dimensions, in a wide range of media	

A wide range of media	• Use of materials:
	  • pencil
	  • marker pens
	  • pastel
	  • charcoal
	  • pen and ink
	  • paint
	  • watercolour
	  • printing
	  • mixed media drawing.

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Observing colour, value, light and shade	

Colour	• The colour wheel:
	  • hue
	  • saturation
	  • primaries
	  • secondaries
	  • tints
	  • shades
	  • tones
	  • mixing.
	• Colour theory:
	  • complementary
	  • split-complementary
	  • analogous
	  • tetradic
	  • temperature
	  • harmony
	  • dischord
	  • neutrals.

Value/light/shading	• Direction of light:
	  • light source
	  • highlights
	  • midtones.
	• Object surface:
	  • absorption
	  • reflection.
	• Shadows:
	  • core shadow
	  • occlusion shadow
	  • cast shadow.
	• Light bounce:
	  • key light
	  • fill light
	  • rim light.
	• Lighting and shading:
	  • chiaroscuro
	  • cross hatching
	  • smudging
	  • shading and erasing.

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Presenting a visual portfolio of art to peers	
Produce and prepare	• Presentation. • Show. • Commentary. • Video. • Exhibit.

Performance outcomes

On successful completion of this unit learners will be able to:

Performance outcome 1:	Understand the traditional industry techniques and processes.
Performance outcome 2:	Identify and create work from primary and secondary sources.
Performance outcome 3:	Produce work in two dimensions using a wide range of media.
Performance outcome 4:	Demonstrate an understanding of colour, value, light and shade.
Performance outcome 5:	Prepare and present to peers a visual portfolio of art.

Grading criteria

Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO1 **Understand the traditional industry techniques and processes**	**P1** Describe the basic traditional techniques and processes useful to an artist in the games industry today.		
	P2 **Research** a separate traditional/ contemporary artist for each of the following techniques: **proportion, composition and perspective**.	**M1** Evaluate **four** techniques used in others' work to convey a sense of meaning.	
	P3 Produce and reflect on **three** pieces of artwork making use of **composition, proportion and perspective** in your own work.	**M2** Demonstrate throughout a visual portfolio of own artwork, the use of industry techniques and processes to **convey meaning to a specific audience**.	**D1** Evaluate and analyse a portfolio of own artwork, through annotation, the processes and techniques used.

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Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO2 **Identify and create work from primary and secondary sources**	**P4** Identify and describe the difference between primary and secondary source materials with regard to traditional/ contemporary art using at least **two** examples.	**M3** Identify and explain the use of primary and secondary source material in other's work.	
	P5 Summarise the advantages of using primary and secondary source material in traditional/ contemporary art.		
	P6 Produce with annotation **two** pieces of artwork which demonstrate the use of primary and secondary source materials.		
PO3 **Produce work in two dimensions using a wide range of media**	**P7** Produce **three** pieces of artwork evidencing experimentation with **five** different media.	**M4** Analyse media used in P7 listing **three** advantages and disadvantages for each.	**D2** Evaluate artwork produced for P7 with suggestions for improvement through the use of different media, techniques and processes.

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Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO4 **Demonstrate an understanding of colour, value, light and shade**	**P8** **Research** a separate traditional/ contemporary artist for each of the following techniques: **value, light, shade** and **colour**.		
	P9 Explain the difference between primary, secondary and tertiary colours.		
	P10 Create a wheel in paint starting only with primary colours. **Minimum 12 colours**.	**M5** Produce artwork making use of further colour theory, such as, but not limited to, complementary, split-complementary and analogous colours.	**D3** Evaluate and analyse artwork created showing a clear understanding of colour theory, value study and use of lighting.
	P11 Use techniques researched to produce an A2 piece of artwork that demonstrates a basic understanding of value, light and colour.		
PO5 **Prepare and present to peers a 'visual portfolio of art'**	**P12** Collate all work completed throughout this unit and produce a 'visual portfolio of art'.		
	P13 **Present** a 'visual portfolio of art' demonstrating your own understanding of proportion, scale, correct anatomical form, value and colour.		

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Assessment amplification

This section provides amplification of what is specifically required or exemplification of the responses learners are expected to provide.

In completing this unit learners will be presented with an opportunity to demonstrate the transferable skill of research when completing P2 and P8, and communication (oral) when completing P13.

Assessment of a 'visual portfolio of artwork' allows the learners to collate their art in one place and also the ability to attach any written work. For example, the research of separate artists for proportion, composition and perspective in P2 could be attached to the visual portfolio of artwork alongside P3 where the learner creates their own artwork which involves proportion, composition and perspective. This can also be done with M1 and M2 also with P4, P5, P6 and P9, and again with P8, P10, P11, M5 and D3.

PO1 Understand the traditional industry techniques and processes

P1 This criterion is asking the learners to write a paragraph describing the basic traditional techniques used today in industry referencing the following: angle and proportion, composition and perspective.

P2 This criterion is requesting that the learner writes a research paper of no more than 500 words with illustrative examples, researching two traditional artists and their use of traditional techniques and processes such as Leonardo Da Vinci (perspective), Michelangelo (proportion), Jan Vermeer (composition).

P3 Learners must produce three pieces of artwork, each showcasing one of the following; composition, perspective, proportion. Learners are to write a reflective account on each piece explaining where the technique can be seen and how if possible the artwork can be bettered.

M1 Learners choose a piece of traditional artwork and evaluate techniques used to convey an emotion or sense of meaning. For example, in David Alfaro Siqueiros *The Sob* – 1939, the meaning in the artwork is sadness. The emotion is clear in the line art and tension in the knuckles covering the face, combined with tight framing, further exaggerates the feeling of depression and loneliness.

M2 A specific audience is a group of individuals that are united by distinguishable and noticeable aspects. For example, gender, age, income, education, geographic location etc.

D1 Learners should write an evaluation of their portfolio of artwork so far. This task could be completed later in the unit once the learner has more work to comment on. Learners should make comment and annotation with illustrative examples of their own and others' work on the processes and techniques they have used.

PO2 Identify and create work from primary and secondary sources

P4 Learners are required to identify primary and secondary sources and to write a paragraph explaining the difference with illustrative examples. At least two examples of each are required to pass this criterion. eg, newspaper, internet search, book, photograph taken themselves.

P5 In addition to the work completed for P4, learners should write a small paragraph explaining why there is a need for primary and secondary sources and the advantages these bring to the production of art.

P6 Two pieces of artwork created by the learner, one from primary sources, the second from secondary sources.

M3 Continuing on from P6, learners are to identify and explain the use of primary and secondary sources in others' art. For example, the artwork *Sunflowers* by Vincent Van Gogh must have come from Vincent analysing and observing the flower himself as a primary source.

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PO3 Produce work in two dimensions using a wide range of media

P7 Types of media; pencil, marker pens, pastel, charcoal, pen and ink, paint, watercolour, chalk, etc. Learners are to produce three pieces of artwork.

M4 This assessment criterion could be achieved in the form of an evaluation of media and materials once a minimum of five media have been used.

D2 This assessment criterion could be achieved by expanding upon the evaluation for M4, to include learners' suggestions of how to improve artwork through use of techniques and processes.

PO4 Demonstrate an understanding of colour, value, light and shade

P8 In order to achieve this criterion learners are asked to research a different artist for value, light and colour eg, *Starry Night* by Vincent van Gogh for colour and *Portrait of a Young Lady in Profile* by Joseph Benoit Suvée for value etc.

P9 This criterion is asking learners to write a small paragraph (250 words) explaining the difference between primary, secondary and tertiary colours. Learners could use illustrative examples here.

P10 Creation of a colour wheel using traditional paint and starting with only the primary colours, (blue, red, yellow).

P11 This criterion is asking learners to produce a final piece of artwork which is clearly making use of value, light and colour. The piece of art should be created on A2 paper.

M5 Creation of artwork using only complementary colours, or only split complementary colours, etc.

D3 Once artwork has been created for P11 and M5, an evaluation analysing the artwork showing a clear understanding of colour theory, value study and use of lighting should be completed by the learner.

PO5 Prepare and present to peers a 'visual portfolio of art'

P12 All artwork created by learners throughout this unit must now be compiled into a visual portfolio of art for presentation and submission.

P13 The visual portfolio of art created in P12 is to be presented. The presentation should last no longer than 10 minutes.

Synoptic assessment

This unit would logically be taught prior to Unit 5 however there are opportunities for learners to demonstrate synoptic knowledge and learning from other units in their evidence for this unit.

The amplification below identifies where the centre should consider synoptic assessment and where learning from other units can be assessed within this unit.

PO1 Understand traditional industry techniques and processes

When considering traditional principles of art such as composition, perspective, and proportion, this could be taught concurrently with Unit 4 Concept art PO2.

PO2 Identify and create work from primary and secondary sources

When identifying and working with primary and secondary sources, this could be taught concurrently with Unit 5 3D environment art PO2, Unit 6 3D character art PO2, and Unit 7 User interface PO1.

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PO3 Produce work in two dimensions, using a wide range of media

When producing two-dimensional artwork and considering elements of colour theory, this could be taught concurrently with Unit 7 User interface PO2.

PO4 Demonstrate an understanding of colour, value, light and shade

The understanding and application of colour, value and light could be taught concurrently with Unit 4 Concept art PO3, Unit 5 3D environment art PO2, and Unit 7 User interface PO2.

PO5 Prepare and present to peers a 'visual portfolio of art'

The skills required to prepare and present a professional looking portfolio of work could be taught concurrently with Unit 1 Business for video games AO3 and AO4. Furthermore, learners should be encouraged to present all final outcomes from practical units to professional standards through a continually updated online portfolio, which may present additional evidence for this assessment outcome.

Delivery guidance

The overall outcome for Unit 3 will be a learner generated portfolio (referred to herein as 'visual portfolio of art'). This portfolio will encompass all artwork from all performance outcomes, together with annotations, reviews and evaluations throughout.

PO1 Understanding of traditional industry techniques and processes

Learners are required to research and describe traditional artists' use of techniques and processes. Learners then produce artwork based on their own understanding of traditional and contemporary techniques and processes formed from prior research. PO1 is completed with an evaluation and annotation of artwork produced for the visual portfolio of art.

PO2 Identify and create work from primary and secondary sources

Learners should understand the high importance of primary and secondary sources, identifying the differences between the two and summarising the advantages of using such reference. Taking the work of others, learners should then identify use of primary and secondary sources in others' work.

The creation of two artworks by the learner which demonstrate through annotation the use of primary and secondary reference sources completes the practical criteria for Performance outcome 2.

PO3 Experiment with two dimensions, in a wide range of media

Learners will produce a minimum of five pieces of art, each using a different media. Learners should be introduced to traditional artists' use of differing media, techniques and processes, allowing them to evaluate the advantages of each, whilst making a connection to their own work.

PO4 Observation of colour, value, light and shade

Learners will become familiar with colour theory, through examples of traditional and contemporary artists use of colour, and tutor led analysis of the colour wheel. Learners should understand the various uses for the colour wheel with particular emphasis on use of primary, secondary and tertiary colours. They should understand the importance of colour theory by defining it and making use of it throughout research of traditional artists. Learners will produce and evaluate artwork ensuring colour theory, value and shading were taken into consideration throughout.

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P05 Prepare and present to peers a 'visual portfolio of art'

Learners should become familiar with techniques of presentation. An overall understanding of presentation techniques and portfolio creation will enable learners to complete a five minute presentation of their work. To achieve the transferable skills of communication (oral), the presentation should be at least eight minutes.

Employer engagement guidance

Guest speakers from local studios and, if at all possible, any course tasks or assignments given to learners should be set within real-world situations. Tutors may wish to contact an appropriate local business to enquire whether they could provide industry-relevant assignments for learners.

Useful links and resources

Textbooks

- Hale B, *Drawing Lessons from the Great Masters,* Watson-Guptill, (1989).
- Hogarth B, *Dynamic Anatomy Revised and Expanded.* Watson-Guptill Publications, (2003).
- Horton J, *An introduction to Drawing,* Dorling Kindersley Ltd, (1994).
- Krefta B, *The Art of Drawing Manga,* Arcturus Publishing Ltd, (2003).
- Muybridge E, *The Human Figure in Motion,* Dover, (1989).
- Raynes J, *Human Anatomy for the Artist,* The Hamlyn Publishing Group Ltd, (1984).
- Simblet S, *The Drawing Book,* Dorling Kindersley Ltd, (2005).
- Dorling Kindersley Ltd, *The Artists Handbook, (*1987).

Weblinks

- oca-uk.com/courses/drawing-courses
- easydrawingtutorials.com/
- onlypencil.com/blog/
- smashingmagazine.com/2009/09/08/50-clever-tutorials-and-techniques-on-traditional-drawing/
- colormatters.com/color-and-design/basic-color-theory
- en.wikipedia.org/wiki/Color_theory
- wikihow.com/Draw-Perspective
- drawsketch.about.com/od/perspectivetechdrawing/ss/aerialperspect.htm

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16.4 Unit 4: Concept art

Title	Concept art
Unit number	F/507/6613
Unit assessment type	Centre assessed and externally quality assured
Recommended assessment method	Practical assignment This is the preferred assessment method for this unit. A centre may choose an alternative method of assessment, but will be asked to justify this as part of the quality assurance process.
Guided learning hours	90
Transferable skill(s) contextualised within this unit	Communication (oral)[3]
Resources required for this unit	Learners should have access to digital painting software such as Photoshop, Pixlr or GIMP. It may also be advantageous to have access to reference material (textbooks and internet access) which provides information about the core principles of concept art for analysis, to assist learners in developing their understanding of the processes used.
Synoptic assessment within this unit	It is a requirement that all learners undertake meaningful synoptic learning and assessment during their study. Depending upon the order in which the units are delivered, there are opportunities for learners to use elements of other units to support the development of knowledge and learning for this unit. This unit would logically be taught after Unit 3, however it could also be taught concurrently with Units 5 and 6. The assessment amplification within the unit identifies where the centre should consider synoptic links with other units.

Aim and purpose

In this unit, learners will be encouraged to expand their creativity and stretch their imagination. Learners will analyse the creative processes of planning and developing concept art and through a variety of digital techniques, create concept art for imagined characters, objects and environments whilst reflecting on the quality of the final outcomes.

Unit introduction

In this unit, learners will develop essential digital drawing skills required by a games concept artist. Through the use of digital image manipulation and drawing software, learners will investigate the essential elements of composition, perspective, masking and selecting, colour theory, brushes and commonly used tools. Learners will also investigate various art styles and develop one of their own.

Through this study and research of current professional concept artists, learners will investigate and explore visual communication techniques used in games today.

This unit will allow learners to build on their digital painting skills and gain a greater understanding of the role of a concept artist in today's fast paced competitive video game industry.

[3]Please refer to Appendix A or visit the specification homepage to access the Transferable Skills standards and associated guidance and recording documentation

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Unit content

Understanding concept art for video games	

Hardware/software	• Hardware:
	  • PC specs
	  • RAM
	  • GPU
	  • graphics tablets/mouse
	  • keyboard.
	• Software:
	  • Photoshop
	  • Pixlr
	  • Google Sketchup
	  • layout/page setup.

Artists/employment	• Purpose of concept art:
	  • visualisation of concepts:
	  • line
	  • shape
	  • value
	  • colour
	  • communication of ideas:
	  • style
	  • mood
	  • colour palette.
	• Artists:
	  • job roles:
	  • contract
	  • freelance
	  • duties
	  • salary
	  • art styles:
	  • realistic
	  • abstract
	  • stylised.
	• Constraints:
	  • client brief
	  • target audience
	  • legal issues: IP
	  • ethical issues.
	• Representation:
	  • race
	  • gender
	  • religion
	  • sexuality.

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Experimenting with industry tools and techniques

Toolset/techniques	• Techniques:
	  • rules of composition:
	  • rule of thirds
	  • diagonal rule
	  • triangle rule
	  • golden ratio/spiral
	  • framing
	  • negative space
	  • perspective:
	  • 1 point perspective
	  • 2 point perspective
	  • 3 point perspective
	  • horizon line
	  • perspective grid
	  • proportion:
	  • scale
	  • digital techniques:
	  • matte painting
	  • photobashing.
	• Organisation of workspace:
	  • saving work
	  • managing files
	  • menus.
	• Basic digital tools:
	  • selection tool
	  • move tool
	  • magic wand
	  • paint bucket
	  • crop
	  • notes
	  • pen tool
	  • quick mask
	  • clone tool
	  • history brush
	  • eraser
	  • healing brush
	  • dodge/burn
	  • smudge/sharpen
	  • eyedropper
	  • text tool
	  • background/foreground colour.

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Experimenting with industry tools and techniques	

Toolset/techniques – continued	• Palettes:
	  • masking
	  • brushes
	  • layers
	  • history
	  • adjustment layers
	  • guides/rulers
	  • colour picker
	  • filters.

Creating concept art for video games	

Concepts	• Initial concepts:
	  • thumbnails
	  • sketches.
	• Referencing:
	  • primary
	  • secondary.
	• Silhouettes:
	  • value
	  • colour.
	• Turnaround sheets/3rd angle orthographic projection.
	• Polished concept.

Presenting concept art for video games	

Producing and presenting concept art	• Presentation:
	  • online tools
	  • office tools
	  • to peers.
	• Layout:
	  • game box
	  • poster.
	• Exhibition.

Performance outcomes

On successful completion of this unit, learners will be able to:

Performance outcome 1:	Understand concept art for video games.
Performance outcome 2:	Understand industry tools and techniques for creating concept art.
Performance outcome 3:	Create concept art for video games.
Performance outcome 4:	Produce and present concept art for video games.

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Grading criteria

Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO1 **Understand concept art for video games**	**P1** Identify hardware and software requirements for digital concept art.		
	P2 Compare and contrast the role of a concept artist in video games, with respect to contracted and freelance jobs, analysing the duties and salaries.	**M1** Using two examples of concept art from others' work, analyse the art style used to appeal to a specific target audience, making reference to: • race • Gender • Religion • communication of ideas.	**D1** Demonstrate understanding of the range of styles available to a concept artist. Expand on M1 by explaining the form of **three** styles and the subtle variations achieved by adapting each style to appeal to a variety of target audiences.
	P3 Summarise the purpose of concept art with illustrative examples, taking into account communication of ideas through **mood, style and colour palette**.	**M2** Using one game studio of your choice, evaluate how the following can constrain the concept art produced; client brief, target audience, legal and ethical issues.	

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Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO2 **Understand industry tools and techniques for creating concept art**	**P4** Identify and explain **three** ways to better organise your digital workspace.		
	P5 Summarise **twelve** basic digital tools available to a concept artist.	**M3** Identify and explain **three** advantages of a digital painting toolset, with focus on the differences to a traditional toolset.	
	P6 Demonstrate and evaluate three digital palettes used by concept artists today.		
	P7 Taking **two** examples of contemporary video game concept art from the work of others, summarise the visual communication techniques used with regards to **composition, perspective, proportion and digital techniques**.		

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Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO3 **Create concept art for video games**	**P8** Using a minimum of ten carefully selected and annotated reference materials, draw **six** initial ideas for a piece of concept art.	**M4** Improve on initial ideas and silhouettes by introducing value and colour to **three** designs.	
	P9 Produce **six** silhouette designs for a piece of concept art.		
	P10 Produce concept art for a character, showing a basic understanding of **perspective, compositional, and proportional rules**.	**M5** Take **one** concept and create a turnaround/ orthographic drawing for use in 3D modelling.	**D2** Independently draw concept art for a character, object and an environment, whilst demonstrating an understanding of **perspective, compositional, and proportional rules**.
PO4 **Prepare and present to peers a 'visual portfolio of art'**	**P11** Prepare a presentation of **ten** slides, outlining tools and techniques learnt.	**M6** Produce an A3 print of the final character concept.	**D3** Evaluate artwork produced for **P9/M5/ D2** with suggestions for improvement through use of different media, techniques and processes.
	P12 **Present** a presentation, outlining tools and techniques learnt.		

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Assessment amplification

This section provides amplification of what is specifically required or exemplification of the responses learners are expected to provide.

In completing this unit learners will be presented with an opportunity to demonstrate the transferable skill of communication (oral) when completing P12.

P01 Understand concept art for video games

P1 To meet this criterion, learners should write a paragraph of 250–300 words identifying the hardware and software required to produce digital concept art. Learners should mention computer specs required to run digital image making software, CPU, RAM, hard drive etc. Learners should also mention hardware such as the mouse, keyboard and Wacom tablets. Finally learners should list the available software, Photoshop, Krita, GIMP, Pixlr etc.

P2 To achieve this criterion, learners write 250–300 words examining the role of a concept artist and detailing their duties and average salary, who the concept artist reports to and what is the difference between a freelance concept artist and a contracted studio based artist.

P3 Achieving this criteria requires the learner to summarise the purpose of concept art. Here they will explain that concept art is a communication tool and is used to express ideas. Learners will use examples of concept art to show how the piece is communicating ideas through its use of style and colour palette to create a mood.

M1 This criterion is achieved through gathering two examples of concept art from different genres of video game. Learners are to analyse these artworks and explain how the image is communicating to a specific audience; be that targeting a particular race, gender or religion.

M2 This criterion is asking the learner to choose a game studio and to evaluate in a short paragraph how the concept art produced by the studio might be constrained by their publishers, target audience, legal issues and ethical issues.

D1 In order to meet distinction criteria, a learner must be able to demonstrate understanding through, for example, a presentation or essay, by describing the styles and the subtle variations in their intended target audiences. For example one style, with slight modification, could appeal to more than one target audience.

P02 Understand industry tools and techniques for creating concept art

P4 This criterion is asking the learner to look closely at the software package they are using for digital art and identify three ways to better organise their workspace. This might be the positioning of windows, which palettes are essential for concept art or how to set up a document with the correct size and resolution.

P5 This criterion is asking learners to summarise twelve basic digital tools. A sentence or two per tool will suffice. For example; 'the eraser tool will erase anything created on the layer selected. The eraser tool can be either a square block or the user can opt for a brush type, allowing the user to erase with creativity.'

P6 This criterion is asking the learner to demonstrate using three digital palettes. Digital palettes are used to order layers, choose colours, make adjustments, navigate the canvas, arrange and set-up brushes and more.

P7 Here learners must summarise the visual communication techniques used by an artist currently working in video games. Choosing two examples of art, learners are to write about the use of composition and proportion and uncover the digital techniques used.

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M3 To achieve this criterion learners are asked to identify and explain the advantages of using a digital painting toolset. Learners should focus on the differences between a digital canvas and a traditional one. For example, the ability to change brushes and colours with the click of a button as opposed to cleaning and mixing paint in the traditional world.

P03 Create concept art for video games

P8 Learners are asked to gather ten reference materials from book, film, internet and their own primary sources, and annotate these references explaining their relevance to the concept art they are producing. Learners should then draw six initial sketches/ideas for a piece of concept art. These sketches should only be thumbnails.

P9 This criterion is asking learners to create six silhouettes for their concept. Designing with silhouettes is very important as it allows a much faster read of the asset once in game.

P10 Here learners are asked to produce the final concept art for a character. This piece of art should show clearly that the learner has understood composition, proportion and perspective.

M4 Following on from P9, learners are to take the silhouette drawings and add value and colour to three designs, thus giving the three drawings depth and some idea of colour.

M5 This criterion is asking the learner to draw a turnaround of their concept. This means drawing the concept from the front, side and back views, essential for 3D modelling accurately.

D2 Learners are asked to create the concept art for an environment and a prop in addition to the character concept created in P10.

P04 Prepare and present to peers a 'visual portfolio of art'

P11 This criterion is asking learners to prepare a presentation of ten slides. This presentation should outline the tools and techniques learnt, from how to open a document, using various tools and techniques used for creating their own artworks etc.

P12 Learners are to present to their peers an eight minute presentation created in P11.

M6 To achieve this criterion, learners are to produce an A3 print of their final character concept.

D3 To achieve D3, learners must write an evaluation of 500 words. This evaluation should cover all artwork produced and suggestions or improvement. The evaluation should show an understanding for technical vocabulary and also the techniques and processes used.

Synoptic assessment

This unit would logically be taught after Unit 3 (or concurrently with Unit 5 and 6) and there are opportunities for learners to demonstrate synoptic knowledge and learning from those other units in their evidence for this unit.

The amplification below identifies where the centre should consider synoptic assessment and where learning from other units can be assessed within this unit.

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PO1 Understand concept art for video games

When learning about the hardware and software used in the creation of concept art, this could be taught concurrently with Unit 2 Digital asset management AO1 and AO2.

When learning about the role of concept artists within a team and types of employment, this could be taught concurrently with Unit 1 Business for video games AO1 and AO3.

When learning about communication of ideas, and visualisation of concepts, this could be taught concurrently with Unit 3 2D games art PO1.

PO2 Understand industry tools and techniques for creating concept art

When learning about toolsets and techniques, composition, perspective etc, this could be taught concurrently with Unit 3 2D games art PO1.

When learning about organisation of workspace and management of files, this could be taught concurrently with Unit 1 Business for video games AO1.

PO3 Create concept art for video games

When learning about the creation of concept art for games, this could be taught concurrently with Unit 6 3D character art PO2. The creation of concept art is also a requirement of Unit 12 Collaborative games development project PO1.

When creating concept art learners should have access to a range of media. This therefore could be taught concurrently with Unit 3 2D games art PO3. Having a strong understanding of colour, light and shade is essential to concept art, therefore this PO could be taught concurrently with Unit 3 2D games art PO4.

PO4 Prepare and present concept art for video games

When considering how to present concept art effectively, this could be taught concurrently with Unit 3 2D games art PO5. Elements of how to market and present work to the public or stakeholders could be taught concurrently with Unit 1 Business for video games AO4.

Delivery guidance

PO1 Understand concept art for video games

Learners are required to understand hardware and software requirements for the creation of digital concept art, including the specs for hardware such as; recommended RAM, GPU and CPU, alongside industry spec software packages, such as Photoshop, Pixlr, Illustrator, and Google Sketchup. Learners are required to develop an understanding of the job role and constraints placed on concept artists within studios through clients, target audience, legal and ethical issues. Following this, learners should breakdown two examples of concept art, analysing art style used to appeal to represent a specific audience.

PO2 Understanding industry tools and techniques for creating concept art

Learners should develop a comprehension of art based software packages, having the ability to identify ways of organising and arranging the digital workspace as well as summarising tools and palettes used for the creation of digital concept art. Learners will become familiar with visual communication techniques used for composition, perspective and proportion as well as clearly identifying the advantages of a digital toolset over traditional methods.

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PO3 Be able to create concept art for video games

Learners should develop skills in idea generation, thumbnailing, reference gathering of both primary and secondary sources and silhouette design, including the addition of 'value (*)' and colour to further develop a design. Learners are also required to understand and generate turnaround sheets and a polished final concept.

Value (*): adding detail to a silhouette by selecting a tone from the grey scale.

PO4 Producing and presenting concept art for video games

Learners should become familiar with techniques of presentation. An overall understanding of presentation techniques and concept layout will enable learners to complete an eight minute presentation of their work.

Employer engagement guidance

If learners are in the workplace then the centre could ask the employer about suitable projects that the learners could work on as part of the team. It would be helpful to the employer to be made aware of the sort of skills that the learners have to practice.

Useful links and resources

Textbooks

- Tonge G, *Bold Visions: A Digital Painting Bible,* Ohio, David & Charles, (2008).
- 3D Total, *Beginners Guide to Digital Painting in Photoshop,* United Kingdom, 3D Total Publishing, (2011).
- Morris D, *The Art of Game Worlds,* ILEX, (2004).
- Hartas L, *The Art of Game Characters,* ILEX, (2005).
- Berg R J, *The Art of Alice: Madness Returns*, Dark Horse, (2011).

Journals

- *3d World*
- *Imagine FX*

Weblinks

- 3D Total Games tutorials (online) Available from 3dtotal.com/ (accessed 01st March 2012).
- Feng Zhu School tutorials fzdschool.com/fzd-courses/free-online-tutorials
- ctrlpaint.com/library/
- youtube.com/user/ProkoTV/
- 2dgameartguru.com/
- simonschreibt.de/game-art-tricks/

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16.5 Unit 5: 3D environment art

Title	3D environment art
Unit number	J/507/6614
Unit assessment type	Externally set and marked assignment
Guided learning hours	90
Transferable skill(s) contextualised within this unit	n/a
Resources required for this unit	Learners should have access to 3D modelling software such as 3D Studio Max/Maya, 2D programs such as Photoshop/GIMP, Photoshop filters such as X-Normal/NVidia and internet texture libraries such as CG Textures etc. Reference material such as Luke Ahearn's book *3D Game Environments and 3D Game Textures* will help support learner technique. Learners should also have access to an online forum/blog such as Polycount, CG Society or a VLE such as Blackboard.
Synoptic assessment within this unit	It is a requirement that all learners undertake meaningful synoptic learning and assessment during their study. Depending upon the order in which the units are delivered, there are opportunities for learners to use elements of other units to support the development of knowledge and learning for this unit. This is an externally assessed unit and would logically be taught prior to Unit 12. However, it could also be taught concurrently with Units 4, 6 and 12. The assessment amplification within the unit identifies where the centre should consider synoptic links with other units.

Aim and purpose

This unit introduces learners to the field of environment art, focusing on modelling and texturing principles and resulting in the creation of efficient/modular game-ready assets.

Unit introduction

As a learner taking this unit, you will learn key construction methods for environment art. You will experience modelling and texturing pipelines required for the creation of your own city building.

To begin with, fundamental modelling techniques will be taught, resulting in the creation of everyday household objects. These practice pieces will help develop the underlying techniques required to move on to create an efficient modular building pack.

Next, you will study environment texturing, starting with exploring tiling textures and Photoshop/equivalent practice. This will build in complexity until the modular building pack is textured.

After the completion of the modular building pack, the unit will focus on presentation methodologies and rendering. In this area, you will get to look at skyboxes, FX textures, lighting and cameras.

Finally, the assets created will be presented in a 3D scene that will bring together the principal techniques. Throughout the unit, learners will be able to build on their programme knowledge and their visual skills such as composition, form, texture, and lighting.

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Unit content

Modelling techniques	

Fundamental modelling techniques	• General modelling practice:
	  • iterative saving
	  • dimensions and scale
	  • transforms
	  • mirroring, arrays and linking
	  • render sheets, wireframes, smoothing groups, lit renders
	  • game budgets, tricounts and optimisation.
	• Polygon modelling techniques:
	  • box modelling
	  • edge extrusion
	  • polygon optimisation, welding and collapse
	  • polygon detailing and chamfering.
	• Spline modelling techniques:
	  • creating control points
	  • tangents
	  • lathing
	  • lofting
	  • collapsing to polygons and surfaces
	  • modifiers.
	• Modular building packs:
	  • grid snapping techniques
	  • pivot points
	  • symmetry
	  • modularity theory
	  • modular assets
	  • completed buildings.

Texturing techniques	

Tileable texturing	• General texturing practice:
	  • document setup
	  • layers
	  • brushes
	  • filters
	  • organic surfaces
	  • manmade surfaces
	  • pixel density.

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Texturing techniques	

Unwrapping	• General unwrapping practice:
	  • UVW editor
	  • primitive and sophisticated unwrapping
	  • mirroring and welding
	  • laying out UVW islands
	  • rendering out UVW sheets.

Physically based rendering (PBR) textures	• PBR map pipeline:
	  • preparing photos
	  • surface textures
	  • blend modes and overlays
	  • grime and grunge
	  • non-destructive workflows
	  • image sourcing and blending
	  • PBR texture set: albedo, roughness and metalness.

Texture atlases	• Texture atlases pipeline:
	  • material ID's
	  • multiple tiling materials
	  • sub-object materials
	  • materials for rendering.

Normal maps	• Normal map pipeline:
	  • creating greyscale height maps
	  • using NVidia/XNormal Photoshop filter
	  • combining normal maps
	  • deepening normals.

FX textures	• Alpha and additive pipelines:
	  • emissive maps
	  • opacity maps
	  • materials
	  • decals
	  • foliage assets, trees, leaves, flowers, moss.

Presentation	

Lighting	• Lighting pipeline:
	  • lighting theory
	  • light creation
	  • controlling intensity and colour
	  • controlling shadow
	  • skyboxes.

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Presentation	

Cameras	• Camera pipeline:
	  • composition
	  • placing cameras
	  • animating cameras
	  • flythrough and turntables.

Video	• Video pipeline:
	  • resolution
	  • codecs and formats
	  • timelines and rendering
	  • video graphics, fading, blending and labels
	  • video hosting YouTube and Vimeo.

Review	

Paintovers	• Critique pipeline:
	  • making paintovers and evaluating models
	  • resolving poor construction methods for modelling and texturing
	  • presenting renders on forums/using online forums.

Performance outcomes

On successful completion of this unit learners will be able to:

Performance outcome 1:	Demonstrate an understanding of modelling techniques.
Performance outcome 2:	Demonstrate an understanding of texturing techniques.
Performance outcome 3:	Present a finished environment building.
Performance outcome 4:	Critically review created assets and apply optimisation techniques.

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Grading criteria

Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO1 **Demonstrate an understanding of modelling techniques**	**P1** Model **three** objects using **three** different polygon modelling techniques such as box modelling, edge extrusion and polygon detailing/chamfering.	**M1** Produce a render sheet for each polygon model. The sheet should include wireframes, smoothing groups and a lit render.	
	P2 Model **three** objects using **three** different spline modelling techniques such as lathing, tangents and lofting.	**M2** Optimise each of the **three** polygon modelled objects showing management of tri counts and game budgets.	
	P3 Create a modular building pack of **ten** modelled assets. Each model should demonstrate grid snapping, pivot points, symmetry and modularity theory.		

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Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO2 Demonstrate an understanding of texturing techniques	**P4** Create **three** different PBR tileable textures that show an understanding of organic and man-made surfaces.		
	P5 Unwrap and create at least **one** PBR texture set for the **three** polygon modelled objects created in P1.	**M3** Create a normal map for each of the **three** polygon-modelled objects created in P1.	
	P6 Unwrap and create a PBR texture atlas for the **ten** assets in the modular building pack. The atlas should demonstrate use of material ID's, sub-object materials and multiple tiling materials.	**M4** Create **three** different FX textures including an emissive, decal and opacity map. The FX textures are to be used with the **ten** assets in the modular building pack.	**D1** Create **three** different foliage assets for the modular building pack.

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Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO3 **Present a finished environment building**	**P7** Using grid and snap techniques, layout the modular building pack to create a completed building.		
	P8 Create a lighting solution to present the completed building. The solution should demonstrate light creation, lighting theory, control of intensity, and colour and control of shadow.		
	P9 Create a camera flythrough and turntable (30 second maximum). The flythrough should make use of composition, camera placement and camera animation.	**M5** Render the camera flythrough as a video. The final video should be uploaded to a video host such as YouTube. It should use codecs and formats, and feature video graphics.	**D2** Using the lighting and camera pipelines create a skybox for the completed building that shows an understanding of lighting and composition theory.

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Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO4 **Critically review and apply optimisation techniques to created assets**	**P10** Review tiling textures and atlases created in P4, P5 and P6, by making an online forum post. This review (300 words minimum) should comment on texturing construction methods.		
	P11 Present the **five** polygon-modelled objects and the **ten** modular building assets to your peers, demonstrating an understanding of modelling and texturing techniques.	**M6** Analyse the modular building assets and completed building, ensuring that the assets have working materials. Make a forum post that shows off finished renders of the modular building assets and completed building.	**D3** Evaluate your modular building assets and completed building by creating a paintover suggesting where improvements could be made.

Assessment amplification

This section provides amplification of what is specifically required or exemplification of the responses learners are expected to provide.

PO1 Demonstrate an understanding of modelling techniques

P1 Good examples would be simple hard surface objects such as computers, TV and phones.

P2 Simple examples would be a glass bowl which could lead onto more complex objects like a rope, boat, knife set etc.

P3 The building pack assets will mostly be contained of wall pieces but learners could also produce signs, fan extractors, railings etc. The modular building pack does not require high polygon details and should follow examples such as

Jacob Norris Modular Building Assets

- polycount.com/forum/showthread.php?t=144838

M1 Render sheets should be plain and not over complicated. The learners should try to keep the renders clean and well composed.

M2 The key here is to reduce the triangle count of models to within a game budget. Learners should show this information on the renders in M1, but staff can also examine model files should renders be unclear.

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P02 Demonstrate an understanding of texturing techniques

P4 Learners should create albedo, normal, roughness and metallic where necessary to ensure the PBR workflow is complete.

P5 Time should be taken to ensure the unwraps are well spaced and organised. When tackling the polygon objects learners should consider using more than one texture/material to ensure good pixel density on the object. An approach to solve this is to use multi sub object materials.

Autodesk Multi Sub Object Materials

- knowledge.autodesk.com/support/3ds-max/learn-explore/caas/CloudHelp/cloudhelp/2015/ENU/3DSMax/files/GUID-D968CDD9-4C5D-489D-A311-ED7486FCD4AA-htm.html

P6 The texture atlas should make use of grid snapping/points to help fit together all the elements. It might help learners to think of this as a jigsaw. The modular building pack should be textured using an atlas as per the example below.

Stefan Morrell

- google.co.uk/imgres?imgurl=http://wiki.polycount.com/w/images/1/15/Stefan-Morrell_modular-texture.jpg&imgrefurl=http://elliotbrown-dissertation.blogspot.com/2014/10/planning-and-modular-workflow.html&h=737&w=1200&tbnid=HE9O9a2AEWfvXM:&docid=U6-YKRBtEZjLcM&ei=pBfwVar6BKPG7Aaz6LOYBA&tbm=isch&ved=0CHsQMyhPME9qFQoTCKrc7aXs6ccCFSMj2wodM_QMQw

M3 The normal maps in this section should be generated through a baking process and not via a 2D generation means.

M4 The FX textures will need to show opacity channels if the learners are to use transparent materials.

D1 Learners should try to make simple foliage assets to begin with such as grass before attempting trees/complex bushes.

P03 Present a finished environment building

P7 When setting up the grid inform the learners about unit setups in the 3D application and take care in regards to scale.

P8 Learners may find it beneficial to pick a time of day and photograph reference before lighting their scene.

P9 The flythrough needs to be slow and steady, too often camera work is jittery and oddly focused.

M5 Learners should watch out for bad compression when uploading to YouTube and other web hosts. Larger video sizes are recommended.

D2 The images created for skyboxes need to have careful texture seam management as they can easily ruin a render.

P04 Critically review and apply optimisation techniques to created assets

P10 Images may help learners explore their work given the low word count.

P11 Again images and videos in the presentation of their work will help. Care should be used here to refer their work against relevant contemporary/industry work.

M6 All renders should be labelled with the learners details and presented at HD resolution.

D3 Paintovers should link to relevant industry examples and care should be taken with presentation.

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Synoptic assessment

This is an externally assessed unit. Depending upon the order in which the units are delivered, there are opportunities for learners to use elements of other units to support the development of knowledge and learning for this unit.

The amplification below identifies where the centre could consider synoptic learning and where learning from other units can be used to support the production of evidence for this unit.

PO1 Demonstrate an understanding of modelling techniques

When learning about 3D modelling principles and techniques used in video games, this could be taught concurrently with Unit 6 3D character art PO1. Demonstration of such principles and techniques could also be taught concurrently with Unit 6 3D character art PO3.

When learning about modular building packs in P3, this could be taught concurrently with Unit 9 Level design PO2 and Unit 12 Collaborative games development project PO4.

PO2 Demonstrate an understanding of texturing techniques

The creation and application of textures is a core skill that links with several units. When learning about creating tiling and unwrap textures this could be taught concurrently with Unit 4 Concept art PO2, Unit 3 2D games art PO2 and PO4, and Unit 6 3D character art PO3.

When learning about texturing techniques and texture atlases, this could be taught alongside Unit 12 Collaborative games development project PO4.

When learning about the variety of texture types and the range of file formats and compression methods that can be used, this could be taught concurrently with Unit 2 Digital asset management PO2.

PO3 Present a finished environment building

When considering lighting design, composition and presentation of final renders, this could be taught concurrently with Unit 3 2D games art PO1.

When learning about video codecs and formats, online hosting and bandwidth usage, this could be taught concurrently with Unit 2 Digital asset management AO2 and AO4.

The presentation of final outcomes through a portfolio could be taught concurrently with Unit 3 2D games art PO5.

When learning about presentation methods this could be taught concurrently with Unit 12 Collaborative games development project PO1.

PO4 Critically review created assets and apply optimisation techniques

When learning about paintover techniques in D3, this could be taught alongside Unit 3 2D games art PO3 and PO4 and also Unit 4 Concept art PO2 and PO3.

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Delivery guidance

It is suggested that delivery follows the order of performance outcomes, addressing the concepts and basic theory of modelling and texturing environments. Learners should then reflect on the modular building assets.

The building pack and assets generated in this unit should be realistic and focus on a PBR pipeline. Learners should avoid hand-painted assets and older lighting-based diffuse map pipelines.

All models produced should be presented in a 3D application or a game engine.

P01 Demonstrate an understanding of modelling techniques

This outcome needs to lay the foundation of modelling for learners. The focus here should be on getting learners to feel comfortable within a 3D application, building up to the modular building pack as they master the spline and polygon objects. At this stage it's important the learners are exposed to simple techniques and slowly exposed more complex modelling workflows over time.

P02 Demonstrate an understanding of texturing techniques

Learners should develop fundamental 2D package skills such as non-destructive workflows, image sourcing and blending as they create their first textures. The textures created should be manipulated using adjustment layers and masking to help create variety and visual interest. As they progress their unwrapping techniques should begin with basic unwrapping primitive modifiers such as Planar or Box unwraps and lead to sophisticated unwrapping such as Pelt Mapping or LSM techniques.

P03 Present a finished environment building

Learners by this point should begin to present their completed assets. Here the focus should be on managing larger scenes and producing images that are both technically and visually excellent. The use of reference images should be encouraged so that learners have ample inspiration for presentation. This is not to be confused with modelling reference. Learners should search for interesting city shots and lighting conditions to help present their own piece.

P04 Critically review and apply optimisation techniques to created assets

For the final outcome learners should focus on the critique of their work. Tutors should encourage learners to engage in relevant game industry and 3D art forums to help them gain experience in visual critique and industry interaction prior to completing their own forum posts. Where possible this should include lots of images and videos to help breakdown and explain the technical process that learners have gone through.

Employer engagement guidance

Guest speakers from local studios. Tutors and learners could contact local businesses who may wish to see their properties recreated in 3D. This may help learners gather good reference.

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Useful links and resources

Ahearn L, *3D Game Textures: Create Professional Game Art Using Photoshop,* 3rd Edition. Focal Press ISBN-10: 0240820770 ISBN-13: 978-0240820774, (2011).

- polycount.com/
- 3dmotive.com/
- 3dtotal.com/
- eat3d.com/
- thegnomonworkshop.com/
- gameartisans.org/forums/forum.php
- 3d-palace.com/
- forums.unrealengine.com/
- wiki.polycount.com/wiki/Category:EnvironmentModeling
- polycount.com/forum/showthread.php?t=144838
- xnormal.net/
- cpetry.github.io/NormalMap-Online/
- xnormal.net/
- cpetry.github.io/NormalMap-Online/

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16.6 Unit 6: 3D character art

Title	3D character art
Unit number	L/507/6615
Unit assessment type	Externally set and marked assignment
Guided learning hours	90
Transferable skill(s) contextualised within this unit	n/a
Resources required for this unit	Access to 3D modelling software such as 3D Studio Max, Maya, Cinema 4D, Lightwave, Blende and image manipulation software such as Photoshop, Pixlr, GIMP. It may also be advantageous to have access to reference material (textbooks and internet access) which provides information about the core principles of 3D modelling for character art, to assist learners in developing their understanding of the processes used.
Synoptic assessment within this unit	It is a requirement that all learners undertake meaningful synoptic learning and assessment during their study. Depending upon the order in which the units are delivered, there are opportunities for learners to use elements of other units to support the development of knowledge and learning for this unit. This is an externally assessed unit. This unit would logically be taught after to Unit 5. However, it could also be taught concurrently with Units 1, 2, 4 and 5. The assessment amplification within the unit identifies where the centre should consider synoptic links with other units.

Aim and purpose

In this unit, learners will take on the role of a character artist, researching the job role, developing pre-production materials and presenting a fully modelled and textured game-ready 3D character to industry specification. Learners will analyse the creative processes of character development whilst reflecting on the quality of their own character development and final outcomes.

Unit introduction

In this unit, learners will develop essential modelling skills required by a character artist. Through the use of 3D modelling and drawing software, learners will explore ways to construct a video game character for use in real-time game engines. Learners will also investigate methods for projecting high poly organic surface modelling detail to low polygon meshes.

Learners will investigate the design process and the role of the 3D artist within a computer games development team, overcoming modelling issues and hardware/software limitations. Learners will be expected to develop skills in character modelling and texturing, and export a fully textured, game-engine-ready character to a deadline.

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Unit content

Understanding 3D modelling principles for video games	

Hardware/software	• Hardware:
	  • PC specs
	  • RAM
	  • GPU.
	• Software:
	  • Autodesk Maya
	  • Autodesk 3dsMax.
	• Advanced software*:
	  • Autodesk Mudbox
	  • Pixologic Z-Brush.

Artists/employment	• Artists:
	  • job roles:
	  • contract
	  • freelance
	  • duties
	  • salary
	  • art styles:
	  • realistic
	  • stylised
	  • abstract
	  • platforms:
	  • PC/mac/console – higher polycount
	  • handheld/mobile – lower polycount
	  • web.

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Understanding 3D modelling principles for video games	

Geometric theory/mesh construction/texturing	• Geometric theory/topology:
	  • vertex/edge/face/polygon/mesh
	  • wireframe/shaded/textured
	  • triangle
	  • quad
	  • N-gon (5 sided poly).
	• Mesh construction:
	  • box modelling
	  • edge modelling
	  • high poly sculpting.
	• Texture types:
	  • diffuse/albedo
	  • specular
	  • normal
	  • alpha
	  • ambient occlusion
	  • metalic
	  • roughness.

Preparing pre-production for 3D character modelling	

Client specification/idea generation	• Client specification:
	  • platform:
	  • PC
	  • console
	  • mobile
	  • legal/ethical considerations:
	  • copyright
	  • representation:
	  • race
	  • gender
	  • religion
	  • target audience
	  • technical constraints:
	  • poly/tri count
	  • texture resolution
	  • file type.
	• Idea generation:
	  • brainstorming
	  • sketches
	  • research/reference gathering
	  • thumbnailing
	  • silhouette design
	  • turnaround sheet
	  • colour palette.

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Produce 3D character model for a video game	

Modelling/texturing	• Setup viewports:
	  • reference planes.
	• Modelling:
	  • box modelling
	  • edge modelling
	  • edge loops
	  • anatomy – body
	  • anatomy – face
	  • symmetry/asymmetry.
	• Texture generation:
	  • UVW unwrapping
	  • diffuse/albedo
	  • specular
	  • normal
	  • alpha
	  • ambient occlusion
	  • metallic
	  • roughness.

Rendering final character model	

Rendering/compositing and evaluating	• Rendering:
	  • camera
	  • lighting.

Performance outcomes

On successful completion of this unit, learners will be able to:

Performance outcome 1:	Understand 3D modelling principles for video games.
Performance outcome 2:	Prepare pre-production for 3D character modelling.
Performance outcome 3:	Produce a 3D character model.
Performance outcome 4:	Render and present a 3D character model.

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Grading criteria

Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO1 **Understand 3D modelling principles for video games**	**P1** Identify **three** hardware and **three** software requirements for 3D modelling for games. For each requirement, describe how it assists the artist.		
	P2 Describe the geometric theory and processes used by 3D artists behind the creation of a mesh with correct topology. Ensure vertex, edge, face and mesh are described using correct subject-specific terminology.	**M1** Analyse the similarities and differences between modelling characters for AAA and mobile platforms.	**D1** Evaluate how the following can constrain a 3D artist's creative flow: client brief, target audience, poly/tri count, texture resolution limitations, legal issues and ethical issues.
	P3 Compare and contrast **four** texture types and their uses within video games today.		
	P4 Describe the role of a 3D character artist in video games, with respect to their job role, duties and average salary.		

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Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO2 **Prepare pre-production for 3D character modelling**	**P5** Using a client specification, prepare a technical document describing the technical constraints, target audience and legal/ ethical considerations for your character design.	**M2** Expand on initial ideas and silhouettes produced for P7 by introducing value and colour to **three** designs.	
	P6 Generate an **A4** page of annotated research and references for a game character related to **P5** and to client specification.	**M3** Using traditional or digital techniques, create an **A3** turnaround sheet (line drawing) for the final character design.	**D2** Enhance turnaround sheet from **M3** by adding value and colour to the character turnaround.
	P7 Brainstorm a minimum of **six** initial sketches/ silhouettes for a character design that meets the requirements of the client specification.		

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Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO3 **Produce a 3D character model for video games**	**P8** Set up reference planes for the modelling of a character within a 3D modelling package.		
	P9 Model a **low**-poly character, meeting the requirement of the client brief, keeping clean topology/edge loops in place for animation purposes.	**M4** Model a **high**-poly character meeting the requirements of the client brief, keeping clean topology/edge loops in place for animation purposes.	
	P10 UVW unwrap character for texturing and generate a diffuse/ albedo texture.	**M5** Expand on the texturing process by generating **two** additional texture maps, (specular, normal, alpha, metalness, ambient occlusion).	
PO4 **Render final character model and evaluate process**	**P11** Render an **A3** image of final character, making use of lighting.	**M6** Render a turntable animation of final character, making use of both cameras and lighting.	**D3** Evaluate character development process from concept through to final creation.

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Assessment amplification

This section provides amplification of what is specifically required or exemplification of the responses learners are expected to provide.

P01 Understand 3D modelling principles for video games

P1 A paragraph explaining which hardware and software tools are necessary for the creation of 3D character art, such as PC specs, graphics tablets, keyboard/mouse and of course Photoshop, 3dsMax, Maya, Cinema 4D etc.

P2 This criterion is asking the learner to write a paragraph with illustrations giving detailed descriptions of the theory of 3D mesh creation. Learners should accurately explain what a vertex, edge, face and element are. Correct subject terminology must be used.

P3 To complete this criterion learners must correctly describe four texture maps available to a 3D artist today. With each texture map learners must show illustrative examples of the map being used. For example, when explaining the use of an alpha map, learners should show the mesh with only a diffuse/albedo map of a chain link fence, followed by a second image with the alpha map displaying the transparency. Learners must then explain how the map is working, in the case of an alpha map, any section of the map which are white will render visible, whilst any sections of the map that are black will render transparent.

P4 This criterion is asking the learner to research and describe the job role of a 3D artist. Making reference to the salary, the duties and where the artist fits into the game production pipeline.

M1 Analysis of two character meshes used across AAA/mobile/web, eg one character from AAA (high poly) and one character from mobile (low poly). Here the learner will explain the key differences and the limitations that an artist working on either platform will face.

D1 Achieving this criteria requires the learner to evaluate how a 3D artist could be constrained when designing/modelling a character. Types of constraint on a 3D artist could include the client brief, target audience, poly count, texture resolution, animation, and legal and ethical issues.

P02 Prepare pre-production for 3D character modelling

P5 This criterion is asking the learner to prepare a written technical document which describes the constraints of the client brief supplied by the tutor (example client brief below). The learner must outline the specified target audience and legal/ethical considerations that will affect the design of their character.

P6 Here the learner must create a minimum of one A4 page of annotated reference material to assist in the design and development of their character. References should come from both primary and secondary sources.

P7 Following on from P6, learners are to use the references they gathered and begin sketching six ideas for a character design. These should be rough quick sketches/silhouettes which show a brainstorming of ideas that meet the client specification.

M2 To achieve this criterion learners are asked to work upon their initial designs/sketches/silhouettes by introducing value and colour to at least three designs.

D2 A turnaround sheet is an orthographic view of the character or object. Displaying front, side and rear views, as in the image on the next page.

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P03 Produce a 3D character model for video games

P8 This criterion is asking the learner to set up reference planes within the 3D package of choice. This means taking the turnaround sheet, slicing it into 'front' 'back' 'side' images and placing these images onto planes within the 3D package to enable more accurate modelling. Learners should print screen to show evidence of this.

P9 This criterion is asking the learner to put all the theory and practice to the test by modelling a low poly version of their character. It is important that the learner models the character to the texture and polygon limitations set in the client specification. Clean topology and edge loops, correctly placed for animation purposes, is also a requirement to pass this assessment criterion.

P10 Texturing and the creation of texture maps is an important skill to learn. This criterion is asking the learners to create a diffuse/albedo map and for the learner to correctly unwrap their character for texturing. Albedo/diffuse maps are essentially just the colour map.

M4 This criterion is asking the learner to push themselves further than in P9 by asking them to model a high poly version of their character. It is important that the learner models the character to the texture and polygon limitations set in the client specification. Clean topology and edge loops, correctly placed for animation purposes, is also a requirement to pass this assessment criteria.

M5 This criterion is asking the learner to make use of more than one texture map. In P10 the learner is asked to create a diffuse/albedo map only. This criterion is asking for two additional texture maps such as specular, normal, alpha, metalness or ambient occlusion.

P04 Render final character model and evaluate process

P11 This criterion is requesting that the learner renders a final shot of the character with use of lighting. The final render should be of A3 size.

M6 Here the learner is asked to render a turntable of the final character by placing a camera in the 3D scene and animating either the camera orbiting the character or the character rotating 360 degrees. This animation should last no longer than 30 seconds.

D3 For the final criterion learners are asked to write an evaluation of the character development process. This should include all thoughts and reflections on the concept stage right through to the final character model. Learners should state how they created the 3D asset and if there is anything they would do differently.

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Synoptic assessment

This is an externally assessed unit. Depending upon the order in which the units are delivered, there are opportunities for learners to use elements of other units to support the development of knowledge and learning for this unit.

The amplification below identifies where the centre could consider synoptic learning and where learning from other units can be used to support the production of evidence for this unit.

PO1 Understand 3D modelling principles for video games

When learning about 3D modelling principles and geometric theory, this could be taught concurrently with Unit 5 3D environment art PO1.

When learning about job roles, this could be taught concurrently with Unit 1 Business for video games PO3.

PO2 Prepare pre-production for 3D character modelling

When learning and creating pre-production, this could be taught alongside Unit 4 Concept art PO3.

When learning about target audience and legal/ethical considerations, this could be taught concurrently with Unit 4 Concept art PO1.

When learning about technical constraints, file types and texture resolutions, this could be taught alongside Unit 2 Digital asset management AO2.

PO3 Produce a 3D character model

When learning about modelling techniques using 3D modelling software, this could be taught concurrently with Unit 5 3D environment art PO1.

The creation and application of textures can be taught concurrently with Unit 5 3D environment art PO2 and Unit 3 2D games art PO4.

PO4 Render and present a 3D character model

When considering the rendering of created characters this could be taught concurrently with Unit 5 3D environment art PO3, and Unit 9 Level design PO2.

The presentation of end results can be taught concurrently with Unit 3 2D games art PO5.

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Delivery guidance

It is suggested that delivery follow the order of performance outcomes, addressing concepts and basic theory of 3D to begin. Followed by an industry/tutor designed 'client brief' which will begin the development and idea generation process for character design, followed by the production of a 3D character model, texturing this asset, and finally reflecting on the character development process from concept to creation.

***Example client brief:**

Summary of client brief

Here at AQA studios we are working on a stylized early nineteenth century third person game for mobile, PC and console. We need you to develop a character model for the many roaming NPC (non-player characters) in the game. Because we are launching the game on various platforms we will need a low poly and high poly version of the same character. Our game is an historic adventure game set in old London for children of both genders aged 10–16. Whilst the game has no specific relation to any religion, research and reference should be made around early nineteenth century (think *Oliver Twist*).

Pre-production – You must first produce the following:

Technical/legal restraints for client brief, brainstorm, annotated reference, silhouettes, A3 turnaround sheet.

Technical specs for 3D modelling:

Scale: One unit = one meter (Unity).

Polygon count:

Low poly: 2,500 polygons.

High poly: 20,000 polygons.

Be careful you are counting triangles and not quads. 'Polygon' is often used to describe both quads and triangles, which can be confusing.

Texture space:

Low poly: 1,024 pixels squared.

High poly: 2,048 pixels squared.

Efficient use of polygon budget: Polygons should be distributed intelligently throughout your model so there is greater polygon density in areas with more detail. This must not be done at the expense of making other areas of the model look too simple or 'choppy'.

Orientation and position: When viewed in the front viewport your model must face outwards towards you. The centre point at the area centre of its base must be placed at World (0,0,0).

P01 Understand 3D modelling principles for video games

Through formal lectures and independent study, learners will write one or more essays detailing 3D modelling principles for video games. Identifying hardware, software and the job role requirements of a 3D character artist, as well as describing the geometric theory behind 3D modelling and processes used in industry today.

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PO2 Prepare preproduction for 3D character modelling

Learners should develop skills in idea generation, thumbnailing, reference gathering of both primary and secondary sources and silhouette design, including the addition of 'value (*)' and colour to further develop a design. Learners are also required to understand and generate turnaround sheets for the chosen character.

Value (*): adding detail to a silhouette by selecting a tone from the grey scale.

PO3 Produce a 3D character model for video games

Learners should now become familiar with setting up the viewports and image planes for 3D modelling, developing their skills in box and edge modelling techniques, UVW unwrapping and texturing. Achieving a distinction for this performance outcome requires the learner to give an exposition on the modelling process for a 3D character.

PO4 Render final character model and evaluate process

Learners are required to use rendering techniques to present their 3D character model as a rendered still image, and for merit criteria, as a camera animated turnaround of the final character model. Learners are also required to evaluate character development process, from concept through to final creation.

Employer engagement guidance

Guest speakers from local studios and, if at all possible, any course tasks or assignments given to learners, should be set within real-world situations. Tutors may wish to contact appropriate local businesses to enquire whether they could provide industry-relevant scenarios for learners or samples of typical industry assets.

Useful links and resources

Textbooks

- Gahan A, *3ds Max Modelling for Games Volume 1,* Oxford: Focal Press, (2011).
- Gahan A, *3ds Max Modelling for Games Volume 2,* Oxford: Focal Press, (2011).
- Hartas L, *The Art of Game Characters,* ILEX, (2005).

Journals

- 3D World
- Develop Magazine
- Edge Magazine
- MCV Magazine

Websites

- Polycount.com
- 3dtotal.com
- digitaltutors.com
- eat3d.com
- 3dmotive.com
- docs.unrealengine.com/latest/INT/Engine/Rendering/Materials/PhysicallyBased/index.html

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16.7 Unit 7: User interface

Title	User interface (UI)
Unit number	R/507/6616
Unit assessment type	Centre assessed and externally quality assured
Recommended assessment method	Practical assignment This is the preferred assessment method for this unit. A centre may choose an alternative method of assessment, but will be asked to justify this as part of the quality assurance process.
Guided learning hours	90
Transferable skill(s) contextualised within this unit	Research Communication (oral)[4]
Resources required for this unit	Word processing software Data flow chart creation software Image creation/editing software Game engine
Synoptic assessment within this unit	It is a requirement that all learners undertake meaningful synoptic learning and assessment during their study. Depending upon the order in which the units are delivered, there are opportunities for learners to use elements of other units to support the development of knowledge and learning for this unit. This unit would logically be taught after Unit 3 and 4 (or concurrently with Unit 10 or 12). The assessment amplification within the unit identifies where the centre should consider synoptic links with other units.

Aim and purpose

This unit introduces learners to the theories of design and technical implementation of user interface for games. The unit focuses on best practices for designing a user interface specifically with games as the target medium, as well as how to utilise the design choices made to create a fully functioning user interface in a games engine.

Unit introduction

At the end of this unit, learners will be able to create a design for a user interface suitable for use in games as well as implement their designs on a technical level using a game engine to present their work. Learners will be able to de-construct existing user interfaces and gain a knowledge of design principles such as typography, user experience and information architecture.

[4]Please refer to Appendix A or visit the specification homepage to access the Transferable Skills standards and associated guidance and recording documentation

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Unit content

Understanding of user interface design and application

Design theory and principles	• The design process:
	  • planning:
	  • define the problem
	  • collect information/research
	  • brainstorm and analyse Ideas
	  • develop solutions
	  • documentation:
	  • understanding the problem
	  • presenting information/research
	  • outlining solutions.
	• Understanding technical and artistic design:
	  • maintaining artistic vision
	  • limitations of target platform
	  • maintaining a reliable workflow
	  • investigating new techniques.
	• Understanding user and information:
	  • usability:
	  • learnability
	  • efficiency
	  • memorability
	  • error checking
	  • satisfaction
	  • utility:
	  • information architecture
	  • flow charts
	  • wireframes
	  • user experience:
	  • user goals
	  • software goals
	  • relationship between information and experience.
	• Researching visual elements:
	  • style:
	  • diegetic
	  • non-diegetic
	  • spatial
	  • meta
	  • typography:
	  • size
	  • ratio
	  • spacing
	  • kerning

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Understanding of user interface design and application	

Design theory and principles – continued	• information types and their uses:
	  • buttons
	  • text boxes
	  • combo boxes
	  • sliders
	  • drop down menus.
	• Understanding user interface types:
	  • menu:
	  • interactivity
	  • available options
	  • transitions
	  • feedback to user
	  • heads-up display:
	  • presenting information
	  • screen space
	  • feedback to user.

Prototyping a user interface	

Prototype techniques	• Asset creation:
	  • setting up a digital workspace
	  • basic shapes
	  • effects
	  • text creation
	  • aligning.
	• Visual theory:
	  • colour theory:
	  • complimentary colours
	  • contrasting colours
	  • identification
	  • style tests:
	  • button styles
	  • feedback
	  • message dialogues
	  • information types and their presentation
	  • buttons
	  • text boxes
	  • combo boxes
	  • sliders
	  • drop down menus.

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Prototyping a user interface	

Prototype techniques – continued	• Asset placement:
	  • spacing
	  • user interaction
	  • scaling
	  • target platform.
	• Testing:
	  • usability testing
	  • functionality testing
	  • iterative design
	  • peer feedback.

Producing a user interface	

Implementation techniques	• Art assets:
	  • images:
	  • file types
	  • opacity
	  • lossless formats
	  • 9 point scaling.
	• Game engine:
	  • import:
	  • import settings
	  • file structures
	  • manipulating image data
	  • information interaction:
	  • buttons
	  • text boxes
	  • combo boxes
	  • sliders
	  • drop down menus
	  • functionality:
	  • opening levels
	  • selecting characters
	  • video settings:
	  • resolution
	  • display mode
	  • brightness
	  • audio settings:
	  • master volume
	  • FX volume
	  • music volume
	  • subtitles

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Producing a user interface	

Implementation techniques – continued	• input settings:
	  • keyboard input
	  • controller input
	• animation:
	  • transitions:
	  • fades
	  • screen wipes
	  • button effects:
	  • idle
	  • roll over
	  • roll out
	  • down
	  • release.
	• UI function:
	  • menu system
	  • in-game display.

Performance outcomes

On successful completion of this unit, learners will be able to:

Performance outcome 1:	Understand the principles of user interface design and their application.
Performance outcome 2:	Produce, critically review and iterate on a prototype design.
Performance outcome 3:	Produce a user interface for a games engine.

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Grading criteria

Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO1 **Understand the principles of user interface design and their application**	**P1** Identify the relationship between user experience, usability and utility.	**M1** Demonstrate an understanding of the larger relationship between technical and artistic design.	
	P2 Explain how style and typography can impact a design.		
	P3 **Research** and analyse a current game user interface and discuss its construction, focussing on the principles explored in P1 and P2.	**M2** Produce documentation defining the client brief, including research and a solution. The solution must show knowledge and application of the following: • usability • utility • user experience • limitations of target platform.	**D1** Critically evaluate the produced prototype documentation, focusing on principles explored in P1 and P2, and making comparisons to others' designs, as researched in P3.
	P4 **Present** to peers, your understanding of the principles of UI. Presentations must cover topics learnt in P1, P2 and P3.		

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Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO2 **Produce a prototype design for a user interface**	**P5** Create a user interface prototype with **three** different visual styles based on the design documentation produced in P4.	**M3** Analyse the produced user interface prototype focusing on principles explored in P1, P2 and M1.	**D2** Critically evaluate the produced user interface prototype, making sure to compare the design with previously researched UI design.
	P6 Collect peer feedback for prototype visual styles from both learners and tutors.		
	P7 Improve on the previously created prototype based on peer feedback from both tutor and learners.	**M4** Compare and contrast the prototype design with **three** current UI designs.	
PO3 **Produce a user interface for a games engine**	**P8** Produce final art assets for a user interface using the result of P3, P5 and P6 as a basis for quality. The assets must include the **five** types of information interaction covered in the unit content, as well as typographic choices.		
	P9 Import art assets into a games engine using the methods taught in the implementation techniques of the unit content.		

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Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
	P10 Set up the layout for the user interface using the imported art assets based on the prototype design produced in P5 and using assets made from P8.		
	P11 Set up functionality ensuring the user interface is able to be navigated. This includes button functionality, character select screens and level select.		
	P12 Set up main menu, which is visible upon starting the game. Menu must contain functionality through animation, button states and transitions. Game display must show required information to the player.	**M5** Set up complex functionality for the game options section of the main menu. This must include video, audio and input settings that can be altered and can perform their desired tasks.	**D3** Critically evaluate the in game menu and display produced.

Assessment amplification

This section provides amplification of what is specifically required or exemplification of the responses learners are expected to provide.

In completing this unit, learners will be presented with an opportunity to demonstrate achievement of the transferable skill of research when completing P3 and communication (oral) when completing P4.

P1, P2, P3 Presentation lasting eight minutes.

M1 Assess the clear links made by the learner between the technical limitations of the hardware/ engine versus the artistic elements. Do they understand how to minimize the file size they need but still maintain maximum output? Let them explore these areas freely.

M2 Written piece should be to the point, capped at 1,000 – 1,500 words.

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D1 Additional analysis should be capped at 500 – 750 words and should be amended to the prototype documentation. Learners should be able to explain their design by examining it in detail. Learners should also be able to assess the value and idea of their design comprehensively, highlighting both positive and negative points.

P5 Examples of what should be created by learners. The three different visual styles need to show considerations for many information types as well as different states of interactivity. No learner should be able to pass this section by creating a single button in three different styles; there must be multiple sheets which indicate many different interaction types, as seen below. These sheets should also include typographical choices that do not need to be made from scratch, but should adhere to the aesthetic of the surrounding sheet.

Learners must have these elements at a minimum per visual style:

- button:
  - idle
  - roll over
  - roll out
  - down
- sliders
- drop down menus
- combo boxes
- text boxes (information panel).

Each visual style must show use of colour theory as well as giving clear feedback to the user (as illustrated in the links to user interfaces provided below).

Bundlr

- bundlr.com/clips/5390ad62157f9734c5000042

Open Game Art

- opengameart.org/content/sci-fi-user-interface

James Briggs

- james-briggs.com/ui.php

M3, D2 This can be handled in a presentation or written manner. A presentation would be better as learners are now working in a visual medium. Learners should be able to explain their design by examining it in detail M3. Learners should also be able to assess the value and idea of their design comprehensively, highlighting both positive and negative points D2.

P6 One session.

P7 Noticeable developments need to have been made since the last iteration. If the learners work is of a quality that requires little improvement, accept the small improvements they have made as a good sign of progression/polishing.

M4 Learners must be able to note the similarity or dissimilarity between their work and **three** other pieces. Learners must also be able to point out any striking differences from the other works and explain how it affects the overall result.

P11 The menu must be able to be navigated. This means clicking buttons to progress to further screens as well as being able to get back where necessary. The menu should not break at any point and there should be no dead ends.

M5 The options menu should be working fully from the visual and the technical side. This will mean that if the resolution is changed in the menu, then it should change in the game.

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PO3 Examples of industry user interfaces:

Halo: Spartan Assault
Microsoft Studios
- halofanforlife.com/?p=8279

Destiny
Bungie, Activision
- guides.gamepressure.com/destiny/guide.asp?ID=25705

League of Legends
Riot Games
- guides.gamepressure.com/lol/guide.asp?ID=22197

Peggle 2
PopCap Games
- gamedev.stackexchange.com/questions/18243/interfaces-101-making-it-pretty

P9 This requires all art assets needed to create a working menu system, and in game display, to be imported. The images must all be of a lossless format and should use opacity where appropriate. The settings for the images must all be appropriate depending on the game engine and must use 9 point scaling where possible. The manipulation of images is a plus but not essential to pass.

P11, M5 These functions need to be working on a visual and game level.

P12 Straight cuts from one screen to another is not classed as an animation; if a straight cut is required, animation must be used elsewhere in the menu. Examples of this could be character panels that unfold like a deck of cards, or something equivalent.

P13 The UI should load when the game is played; there should be no need for console commands or any external help from the user. It should load up and work as intended.

M6, D3 Presentation of 15 – 20 minutes. 10 –15 minutes learner presentation, 5 minutes tutor questions. Learners should be able to explain their design by examining it in detail M6. Learners should also be able to assess the value and idea of their design comprehensively, highlighting both positive and negative points D3.

Synoptic assessment

This unit would logically be taught after Unit 3, 4 (or concurrently with Unit 10 or 12) and there are opportunities for learners to demonstrate synoptic knowledge and learning from those other units in their evidence for this unit.

The amplification below identifies where the centre should consider synoptic assessment and where learning from other units can be assessed within this unit.

PO1 Understand the principles of user interface design and their application

When considering elements of design theory and principles, this could be taught concurrently with Unit 3 2D games art PO1 and PO2.

When considering types of user interface and the ways feedback is delivered to the player, this could be taught concurrently with Unit 10 Games mechanics PO1 and PO3.

Analysing problems and responding to a client or project brief could be taught concurrently with Unit 1 Business for video games AO3.

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PO2 Produce, critically review and iterate on a prototype design

When learning about visual theory, this could be taught concurrently with Unit 3 2D games art PO4.

When producing a prototype user interface for a game engine, this could be taught alongside Unit 3 2D games art PO3, using a wide range of media.

PO3 Produce a user interface for a game engine

When producing art assets for a user interface, the understanding of file types, lossless formats etc could be taught alongside Unit 2 Digital asset management AO2.

The generation of digital art assets could be taught alongside Unit 4 Concept art PO3

When creating a user interface for a game engine, this could be taught concurrently with Unit 12 Collaborative game development project PO4.

Delivery guidance

The overall outcome for this unit is that the learner should be able to create the visual elements needed for a user interface and comprehend and appreciate the necessity of data management and iterative design. There should be a clear example of progression throughout the unit that will ultimately lead to a user interface that has been achieved through iteration and feedback.

Before starting the unit, the educator will need to create a short brief for the learners, outlining the exact requirements of the UI they are creating. This brief could be copied directly from an existing games brief, but it must be made available from day one to the learners. The brief should not be written out in such a way that the data flow is already handled for them. Try to use sentences and keep some descriptions deliberately open for interpretation. You should put yourselves in the position of being their employer; if they ask questions about the brief, be sure to answer them. Do not give them a data structure. Visual direction is fine if you so wish, but try not to back them into a corner where they are all making sci-fi menus.

To avoid any programming errors throughout this unit it is suggested that the tutor prepares a few blank scenes that have any variables learners may need to make the UI. This could be things like health amount, ammo, or creating a function that stores the chosen character and level. This is not a programming unit, it is art and design.

PO1 Understand the principles of user interface design and their application

Learners are required to research and analyse existing user interface design. This includes de-constructing visual elements as well as understanding data flow and its importance in creating a coherent user experience. This research and analysis builds an appreciation for how user interfaces are constructed which can then be utilised when creating prototype documentation and their first prototype PO2. Learners should then start to critically analyse their own prototype documentation based on the previous analysis of current user interface design, essentially being able to determine whether or not their data structure is comparable to their research.

Many of the learning outcomes in this section require the learner to explain or demonstrate an understanding of certain aspects of user interface design. Being a visual medium it would be better to have a milestone presentation to ascertain that the learner understands the principles fully and can apply them to an interface of their choosing.

P3 The current user interface should be capped to one genre chosen by the tutor. This in turn will help to apply their knowledge to the brief more effectively.

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PO2 Produce a prototype design for a user interface

Learners are required to create a prototype for their user interface based on the previously completed documentation. PO2 has a much heavier visual focus, as it will be the first time learners will have to start to consider the placement of assets and their relationship with the data to be presented. The method of creating this prototype is open for interpretation as long as it focuses on utilising the documentation and taking the first step into converting that data into a visual piece.

A suggestion would be to have a bare-bones prototype working in a games engine that does not focus on any art assets (grey buttons, focus on spacing and placement) coupled with asset sheets of potential directions and styles for buttons (idle, hover, click, pressed), bars and loading icons. This keeps the two elements separate, making sure learners do not fall into the trap of jumping too far ahead and having to rework a lot of assets later on. Peer feedback is critical, and it is suggested that the authors of the work should not try and justify their work, as it should be evident as to how to navigate their interface. A suggestion for feedback would be to have a printed list of tasks that testers have to perform and give feedback as to how easy or convoluted it was to perform them.

P6, P7 This feedback could be a single session set aside for people to either present work to a class or have a display board with a computer of all the work done so far. Let other learners make comments on a notebook that the author can refer to and use to better their design. The educator should also participate in the task helping to aid the iterative process and apply some direction.

M4 Should be handled in the same way as M3 and D2. If necessary, combine the presentations together, allowing the learner to critically evaluate their work and then discuss the feedback they received.

PO3 Produce a user interface for a games engine

Learners are required to complete a full working user interface based on the previously created prototype. PO3 has a much more technical focus; learners should be implementing animations, transitions between button states as well being able to perform engine level actions. The most important being the functionality of an options screen. It is also important that learners understand asset management and how to import their work properly into the destination engine. Learners need to be aware that, in the industry, their work could be handled by multiple people, so their files need to be organised in a clear manner.

P12 Understandably some visual styles require little in the way of animation. Ensure that learners know that animation is required in some form to pass this unit.

Employer engagement guidance

Guest speakers from local studios that specialise in user interface (games, web, app developers).

To fulfil the requirements of meaningful employer involvement – the visitor would also have to engage the learners in activities and/or tasks.

Useful links and resources

Novak Jeannie, Saunders Kevin, *Game Development Essentials: Game Interface Design, (*2012).

Wood Dave, *Basics Interactive Design: Interface Design: An introduction to visual communication in UI design, (*2013).

Preece Jenny, Sharp Helen, Rogers Yvonne, *Interaction Design, (*2015).

Norman Donald A, *The Design of Everyday Things, revised and expanded edition, (*2013).

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16.8 Unit 8: Games animation and VFX

Title	Games animation and VFX
Unit number	D/507/6618
Unit assessment type	Centre assessed and externally quality assured
Recommended assessment method	Practical assignment This is the preferred assessment method for this unit. A centre may choose an alternative method of assessment, but will be asked to justify this as part of the quality assurance process.
Guided learning hours	90
Transferable skill(s) contextualised within this unit	n/a
Resources required for this unit	Learners should have access to 3D modelling and animation software such as 3DS Max/Maya as well as Autodesk Motion Builder for working with motion capture data. Learners should also have access to a suitable 3D games engine such as Unreal Engine or Unity.
Synoptic assessment within this unit	It is a requirement that all learners undertake meaningful synoptic learning and assessment during their study. Depending upon the order in which the units are delivered, there are opportunities for learners to use elements of other units to support the development of knowledge and learning for this unit. This unit would logically be taught after Units 1, 2, 3, 4, 5 (or concurrently with Unit 6 and 10). The assessment amplification within the unit identifies where the centre should consider synoptic links with other units.

Aim and purpose

This unit introduces learners to the key principles of animation, focusing on the development of character and environment animations for games. The unit also provides an introduction to visual effects for games engines including particle systems and dynamics.

Unit introduction

Learners will learn the skills to create animations and VFX solutions suitable for use in a games engine and present them using appropriate pre-rendered and real-time solutions.

Learners will begin by learning the basic animation techniques, using industry standard software, in order to develop an understanding of the twelve principles of animation. Introductory animation exercises will allow learners to put these twelve principles into practice whilst learning how to render animations for inclusion in show reels ready to produce a longer, planned animation using cameras.

Next, learners will develop skills to produce environment animations using hierarchies, constraints and simulated physics. To enhance the environment animations, learners will learn how to produce environmental particle effects including smoke, fire, sparks, rubble, etc.

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Following on from this, learners will produce animations inside a games engine to set up a fully playable character in both third and first person camera views. To enhance the character, learners will learn how to create short, retriggerable weapon particle effects and animations.

The unit will also focus on developing technical understanding of character rigging and motion capture data handling along with visual skills in composition, cinematography and lighting.

Unit content

Understanding of animation techniques	

Animation techniques	• Identification of the twelve principles of animation:
	  • squash and stretch
	  • anticipation
	  • staging
	  • straight ahead action and pose to pose
	  • follow through and overlapping action
	  • slow in and slow out
	  • arcs
	  • secondary action
	  • timing
	  • exaggeration
	  • solid drawing
	  • appeal.
	• Professional examples of the twelve principles of animation from films, games and TV cartoon animation.
	• Introductory animation exercises:
	  • ball and tail animations
	  • flour sack emotions
	  • platform and pendulum.
	• Use of animation techniques:
	  • keyframe animation techniques
	  • understanding the use and benefits of motion capture technology
	  • working with motion capture data.
	• Use of storyboarding methods:
	  • storyboards
	  • animatics
	  • layout
	  • animation block in.
	• Use of rendering and presentation techniques:
	  • camera types
	  • shot types
	  • field of view
	  • lighting
	  • render methods:
	  • scanline renderer
	  • mental ray
	  • video composition.

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Technical animation tools	

Kinematics and hierarchies	• Kinematics and hierarchies:
	  • parent–child (linked) hierarchies
	  • forwards kinematics
	  • inverse kinematics.
	• Constraints:
	  • look at constraint
	  • path constraint
	  • link/parent constraint
	  • position constraint
	  • orientation constraint.

Rigging for animation	• Animation rigs:
	  • bones
	  • controls.
	• Skin modifier:
	  • Vertex weight assignment to a skeleton.

Visual effects for games	

Particle systems	• Particles systems:
	  • environmental particle systems
	  • retriggerable weapon particle systems
	  • creating textures for particle systems
	  • creating efficient particle systems.
	• Physics based animations:
	  • Pre-calculated physics animation
	  • Real-time physics animation using a games engine.

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Character animation for games engines	

Games animation	• Character animation:
	  • bipedal rigging solutions such as biped/CAT/HumanIK
	  • idle animations
	  • walk cycles
	  • run cycles
	  • jump animations:
	  • three part or cycle depending on animation system and games engine
	  • attack animation
	  • death animation.
	• Games animation:
	  • creating animation loops for games engines.
	• Engine implementation:
	  • importing animations
	  • blended animation system setup
	  • control system setup for playable characters.
	• Gameplay showreel generation:
	  • capturing gameplay
	  • compiling gameplay videos in a video editing package.

Performance outcomes

On successful completion of this unit, learners will be able to:

Performance outcome 1:	Understand animation techniques and their application.
Performance outcome 2:	Understand technical animation tools and techniques.
Performance outcome 3:	Produce environment animations and VFX in a games engine.
Performance outcome 4:	Produce character animations for a games engine.

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Grading criteria

Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO1 **Understand animation techniques and their application**	**P1** Produce **three** different introductory exercise animations showing an understanding of the twelve principles of animation.		
	P2 Plan an animation of a maximum 30 seconds, using an animatic or storyboard with consideration for cameras and shot types.		
	P3 Produce planned animation using at least two cameras, suitable lighting techniques and a chosen rendering method.	**M1** Analyse the differences between key frame animation and motion capture, and identify strengths and weaknesses of each (Max 250 words).	**D1** Critically evaluate produced animations, including discussion of the twelve principles of animation (Max 250 words).
PO2 **Understand technical animation tools and techniques**	**P4** Explain linked hierarchies and kinematics.	**M2** Explain the use of a skin modifier in terms of animation.	
	P5 Identify uses for three different constraints.	**M3** Apply and refine a skin modifier to a mesh using a bone system.	
	P6 Using appropriate solutions including constraints and/or kinematics, produce a 10–15 second animation of a simple linked hierarchy.		

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Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO3 **Produce environment animations and VFX in a games engine**	**P7** Create an environmental particle system in a games engine using your own textures.	**M4** Create a short, retriggerable weapon particle system in a games engine using your own textures.	**D2** Critically evaluate at least one of the produced visual effects with suggestions for improvements, using comparisons to industry examples.
	P8 Analyse at least two existing particle systems and discuss their construction.		
	P9 Create a physics-based animation for a games environment using either real-time physics or a pre-calculated physics simulation.		
PO4 **Produce character animations for a games engine**	**P10** Create a set of third person character animations including an idle animation, walk cycle, run cycle and an attack animation suitable for use in a games engine.	**M5** Produce a show reel video showing character animations during gameplay.	**D3** Critically evaluate animations produced from P10 with suggestions for improvements.
	P11 Import created animations from P10 into the chosen games engine.		
	P12 Implement produced animations into a character setup for chosen games engine including blending and playable character control systems.		

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Assessment amplification

This section provides amplification of what is specifically required or exemplification of the responses learners are expected to provide.

There is no mandatory division of grading criteria although, as can be seen from the Grading criteria grid, some are naturally linked either by learning outcome or a developmental theme. Connections between the various pass, merit and distinction criteria can therefore suggest logical assessment grouping but do not necessarily have to be followed.

P01 Understand animation techniques and their application

P1 These should be short animations showing the quality, avoiding excessively long animations where quality is lost. Examples for expected exercises could be:

- bouncing ball with overlapping tail
- jumping ball with overlapping tail
- flour sack excitedly waving hello
- flour sack changing emotion from happy to sad with a sigh
- flour sack sulk/crying
- platform side to side with overlapping pendulum
- platform figure of eight with pendulum.

Learners should be encouraged to push the boundaries of each of these exercises to explore the animation and feel. For example the side to side pendulum is more straightforward than the figure of eight but both have their merits and learners should focus on completing the task, focusing on quality of animation over difficulty level.

P2 For learners who are less confident in portraying their ideas in 2D, the animatic offers the ability to plan the animation using simple movement and rotation keys to show their intended animation and plan timing. It is beneficial for learners to do both however this is not required.

P3 This animation should be in keeping with the planning from P2. It is important than learners make use of cameras so they can focus on appeal and staging. Lighting doesn't need to be anything overly complex, a simple skylight is sufficient as long as the animation can be seen clearly.

M1 This short essay is designed to ensure learners know when motion capture is beneficial. The essay should not be an argument, instead focusing on the widely accepted uses for each method of animating a character.

D1 Self-reflection is key to a learner's development, this short analysis of their animations from P3 should focus on how improvements could be made, based on their understanding of the twelve rules of animation and potentially industry/professional examples of animation.

Performance outcome 2: Understand Technical Animation Tools and Techniques

P4 This should be covered by a sentence or two as part of a development discussion for the animation in P6.

P5 Learner's should choose any of the constraints taught and mention how they are used, they will find it beneficial to suggest a real world example where that particular constraint could be used, eg look at constraints for two part piston systems.

P6 A 'simple linked hierarchy' could be anything from as simple as an articulated table lamp such as Pixar's *Luxo Jr* or, something more complex like a bipedal mech. The key focus should be on pivot point placement and parent/child relationships, locks, inherits etc.

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M2 This should be covered, again by a few sentences as part of a development discussion for the skin modifier application in M3.

M3 The most difficult example of this would be a creature or character but learners can pick up the functionality with something as simple as a bending tube. The key is that learners show an understanding of how blended weights can help a mesh deform more realistically, this does not need to be done using a character mesh/skeleton.

P03 Produce environment animations and VFX in a games engine

P7 Learners should create a particle system such as smoke, sparks etc. Learners should be advised to avoid making the system too complex. The key is an understanding of how particles change size or speed over time as well as the requirements for making textures for particle systems.

P8 Both UE4 and Unity 5 have free example content available for download. Learners should use these as their examples of existing particle systems. The analysis should be accompanied by annotated images to help explain the systems and reduce the word count.

P9 This can be completed in one of two ways:

- real-time physics – this should make use of the physics system inside of a games engine. This requires technical setup using the chosen engines physics tools
- pre-calculated – this should make use of the physics system inside of a modelling/animation package such as Maya or 3DS Max, baking the animation and exporting using FBX.

M4 Suitable systems include muzzle flash, laser fire or cartridge eject. The cartridge system will also require a simple 3D mesh. The key is to ensure the learner shows understanding of efficiency as weapon particle systems can be used repeatedly at short intervals so the particle system must not cause performance issues such as frame rate drops.

D2 Learners can choose either the particle system created in P7 or M4. The discussion should focus on how improvements could be made, based on their analysis of existing particle systems in P8.

Performance outcome 4: Produce character animations for a games engine

P10, 11 and 12 For this system it is advisable to focus on a character which turns to face the direction of travel, avoiding the requirement for sidestep and backwards walking animations. The learners should be showing their understanding of animating short loops with no obvious pops or flicks that make the animation appear to loop badly.

M5 The showreel should be from real time, in game footage. Engine footage can be recorded using tools such as fraps or open broadcast software (OBS).

D3 As with previous critical evaluations, learners should focus on how improvements could be made based on existing examples or professional animation showreels.

Synoptic assessment

This unit would logically be taught after Units 1, 2, 3, 4, 5 (or concurrently with Unit 6 and 10) and there are opportunities for learners to demonstrate synoptic knowledge and learning from those other units in their evidence for this unit.

The amplification below identifies where the centre should consider synoptic assessment and where learning from other units can be assessed within this unit.

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PO1 Understand animation techniques and their application

When considering the principles of animation and examples of animation in films, games and TV, this could be taught concurrently with Unit 3 2D games art PO2.

PO2 Understand technical animation tools and techniques

When learning about character model rigging, kinematics and hierarchies, this could be taught concurrently with Unit 10 Games mechanics PO2 and Unit 6 3D character art PO3.

PO3 Produce environment animations and VFX in a games engine

When creating environment animations and VFX for a game engine such as particle systems or physics based animations, this could be taught concurrently with Unit 12 Collaborative games development project PO4.

The implementation of visual effects for player feedback could also be taught concurrently with Unit 7 User interface PO2 and PO3.

PO4 Produce character animations for a game engine

The development of character animations (walk, run, jump cycles etc) could be taught concurrently with Unit 10 Games mechanics PO1 and PO2.

These animations would also require a suitable character mesh and could therefore be taught alongside Unit 6 3D character art PO3.

Delivery guidance

This unit contains two strings of study; animation and VFX. It is advisable for learners to be introduced to the key principles of animation and understand the technical tools which make complex animations possible, before attempting to work within the constraints of game technology. For that reason, it is suggested that delivery follow the order of the performance outcomes.

For the technical or reflective essays, a forum thread or blog system will work well for learners to post their work and discussion together allowing for a flowing assessment submission.

PO1 Understand animation techniques and their application

The focus of this performance outcome is to get to grips with the core concepts of animation, from the key principles through to presentation and critique.

This should be accompanied by a short technical and reflective essay/post (max 500 words) split between M1 and D1. The discussion in D1 should include comparison to professional animations (films, games, TV etc) which show the twelve principles of animation.

PO2 Understand technical animation tools and techniques

Through formal lectures and independent study, learners will write a short technical essay/post (max 500 words) showing understanding of elements assessed in P4, P5 and M2. The practical elements of P6 and M3 provide opportunity to apply this understanding to a practical application.

PO3 Produce environment animations and VFX in a games engine

Using the same approach as PO2, learners will write a short technical and reflective essay/post (max 500 words) showing understanding of elements assessed in P8 and apply their understanding practically in P7, P9 and M4. The essay should also include the critical evaluation for D2.

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P04 Produce character animations for a games engine

Learners are required to create animations for use in a games engine. It is advisable that learners are provided with a good quality character model and rig suitable for use in a chosen games engine, this will prevent learners from getting bogged down with character modelling and rigging when their focus should be on animation.

For the practical elements of this module, it is advised that either Unreal Engine 4 (UE4) or Unity 5 is utilised as both have well documented animation systems which have the required technical capabilities to complete the required tasks.

Employer engagement guidance

Guest speakers from local studios, and if at all possible, any course tasks or assignments given to learners, should be set within real-world situations. Tutors may wish to contact appropriate local businesses to enquire whether they could provide industry-relevant scenarios for learners such as player character types etc.

Useful links and resources

Books

Williams Richard, *The Animators Survival Kit,* Faber & Faber, ISBN: 0571202284, (2002).

White Tony, *The Animator's Workbook,* White Watson-Guptill, ISBN: 0823002292, (1988).

Websites

- animatorisland.com/
- 11secondclub.com/
- polycount.com/forum/

YouTube video tutorial playlists

- Autodesk's Learning Channels:
- 3DS Max: youtube.com/user/3dsMaxHowTos/featured
- Maya: youtube.com/user/MayaHowTos/featured
- Creation and Design Suite: youtube.com/user/autodesksuitehowtos

Autodesk's Working with CAT:

- youtube.com/playlist?list=PLnKw1txyYzRll285axBmjwEcdTALQqIPC

Autodesk's Character Rigging (Mainly for Skinning Videos (12 onwards):

- youtube.com/playlist?list=PLnKw1txyYzRlxh1-BT4CifPXC5TBg2vUd

Autodesk's Creating a Character Rig (Maya):

- youtube.com/playlist?list=PL8hZ6hQCGHMXKqaX9Og4Ow52jsU_Y5veH

Unity Character to Player tutorial:

- youtube.com/watch?t=1443&v=Ch4oNqaXw1w

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16.9 Unit 9: Level design

Title	Level design
Unit number	Y/507/6620
Unit assessment type	Centre assessed and externally quality assured
Recommended assessment method	Practical assignment This is the preferred assessment method for this unit. A centre may choose an alternative method of assessment, but will be asked to justify this as part of the quality assurance process.
Guided learning hours	90
Transferable skill(s) contextualised within this unit	n/a
Resources required for this unit	Learners should have access to a modern 3D games engine such as Unreal Engine 4 or Unity. Learners will also require access to video editing software such as Adobe Premier and/or After Effects.
Synoptic assessment within this unit	It is a requirement that all learners undertake meaningful synoptic learning and assessment during their study. Depending upon the order in which the units are delivered, there are opportunities for learners to use elements of other units to support the development of knowledge and learning for this unit. This unit would logically be taught after Units 2, 4, 5, 10 (or concurrently with Unit 5 and 10). The assessment amplification within the unit identifies where the centre should consider synoptic links with other units.

Aim and purpose

This unit introduces learners to level design, focussing on the iterative design process required to take a level from idea through to playable concept, with the use of engine tools and scripting, building in playable level mechanics in line with a set series of player mechanics. The unit also focuses on the key aspects of testing and analysis of level designs during development.

Unit introduction

Learners will start this unit by learning the key concepts of level design to influence play. These ideas will be developed into an initial 2D level design, which, over the duration of the unit, will be developed into an in-game playable whitebox level prototype.

Learners will be introduced to a series of games engine level designs/development tools in order to produce their prototypes. Learners will be required to test and analyse their levels during development to be able to iterate upon the design, based upon feedback and analytical results.

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Unit content

2D level designs	

Life cycle	• Level plans:
	  • top down planning
	  • orthographic view for elevation planning.
	• Level gameplay planning:
	  • pickup placement
	  • enemy placement
	  • level event placement.
	• Enemy/combat design:
	  • combat zones
	  • cover design
	  • choke points
	  • action areas
	  • rest areas
	  • AI pathing.
	• Level plan analysis:
	  • level flow
	  • line-of-sight analysis
	  • pacing analysis
	  • interest level planning and analysis.
	• Designing for different types of games:
	  • 1st person games
	  • 3rd person games
	  • side scrolling games
	  • top down games
	  • other games.

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3D level production	

3D level development	• 3D block outs:
	  • in-engine geometry editors
	  • use of development textures (scale textures)
	  • block out geometry from 3D package (Max/Maya).
	• Pickup placement:
	  • pick up generation
	  • pick up re-spawn time.
	• Enemy placement and spawn systems:
	  • enemy spawn
	  • enemy types
	  • enemy weapon versus placement in level.
	• AI pathing:
	  • AI navigation systems:
	  • pathfinding
	  • patrol and detect
	  • pursuit
	  • path nodes
	  • navigation meshes
	  • in-editor tools.
	• Level lighting:
	  • lighting for atmosphere
	  • lighting to guide the player
	  • static lighting
	  • dynamic lighting.
	• Critical path analysis/development.

Video playthrough development	• Video production:
	  • video capture
	  • voice-over recording
	  • video editing.

Iterative design and development	

Level analytics	• Level data acquisition:
	  • heat map generation
	  • player path tracking
	  • player choices
	  • player death points
	  • pacing analysis
	  • action analysis.

User feedback	• Gathering user feedback:
	  • observations
	  • questionnaires
	  • playthrough recording.

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Iterative design and development	

Responding to collected data	• Analysing data:
	  • heat maps
	  • player paths
	  • player choices
	  • death locations
	  • pacing
	  • actions.
	• Iterative development cycles:
	  • iteration timescales
	  • iterative development approaches.

Level mechanics	

Level mechanics	• Level mechanics design:
	  • doors
	  • moving environment elements:
	  • lifts
	  • moving platforms
	  • pushers
	  • traps
	  • cover mechanics
	  • damageable environment elements.
	• Level mechanics implementation:
	  • doors
	  • lifts
	  • movers
	  • traps
	  • cover mechanics:
	  • environment setup
	  • player setup
	  • damageable environment elements:
	  • visible damage
	  • physical damage
	  • level scripting
	  • environmental events:
	  • falling objects
	  • playable area changes
	  • trap reveals.

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Performance outcomes

On successful completion of this unit, learners will be able to:

Performance outcome 1:	Produce 2D level designs.
Performance outcome 2:	Produce a 3D level in a games engine.
Performance outcome 3:	Demonstrate understanding of iterative design and development.
Performance outcome 4:	Design and implement level mechanics.

Grading criteria

Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO1 **Produce 2D level design**	**P1** Design, in 2D, a level plan from a top down perspective.		
	P2 Develop orthographic side view level plans to implement level elevation features based on set character movement mechanics.		
	P3 Make a copy of the level plans and add placement of doors, pickups, enemies and level events to the 2D designs, focusing on level flow and gameplay pacing.	**M1** Make a copy of the 2D level plans, develop enemy AI pathing routes and identify combat zones, cover positions and likely choke points.	**D1** Analyse level plans with consideration for line of sight and explore appropriate modifications to provide a positive improvement on the gameplay experience.

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Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO2 **Produce 3D level in a games engine**	**P4** Develop 2D level plans from P1 and P2 into a 3D block out in a games engine.	**M2** Develop level lighting to generate atmosphere and guide the player.	**D2** Produce two playthrough videos: one showing each of the features off, including a voice over discussing them and one showing a critical path run through to complete the level in the shortest time.
	P5 Implement pickup and event placement based upon 2D designs.	**M3** Implement AI pathing based upon level plans produced in M1.	
	P6 Implement enemy placement based upon 2D designs.		
PO3 **Demonstrate understanding of iterative design and development**	**P7** Analyse 3D block out to identify areas of the design which need improvement and make amendments.	**M4** Use level analytics to test the 3D level against the original plans for combat, such as AI paths, making adjustments as required.	
	P8 Facilitate **two** different methods of gathering user-generated feedback.		
	P9 Utilise user feedback to test the level; iterate upon the level development accordingly.		

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Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO4 **Design and implement level mechanics**	**P10** Implement at least **two** functional doors based upon 2D designs and testing.	**M5** Implement **one** damageable environment element based upon 2D designs and testing.	**D3** Implement **one** usable cover mechanic which provides an advantage to the player. Placement of cover should be based upon 2D designs and testing.
	P11 Implement a moving environment element into the level, based upon 2D designs and testing.		
	P12 Implement an environmental event to the level, either to begin the level, end the level or develop the gameplay experience through the level.		

Assessment amplification

This section provides amplification of what is specifically required or exemplification of the responses learners are expected to provide.

2D designs should be assessed separately from the 3D level. They should be completed before development of the level and not updated/modified or changed to replicate decisions or changes made when developing the level in engine.

PO1 Produce two dimensional level designs

P1 The designs should be clear and simple line drawings. These can be done digitally using Photoshop/ Illustrator or using analogue medium such as pen and squared paper. Learners should pay close attention to scale when producing level plans.

P2 Side views should only be produced once the top down designs have been completed. Their purpose is to show elevation. Scale should be adhered to; taking care to ensure heights of elevated areas can be reached using the mechanics of the provided character.

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P3 Planning of these elements should be done on copies, not the base plans. The base plans should be kept for use with other elements of the process including AI pathing M1 and analytics M4. There is no set requirement for number of pickups or enemies, the number of each should be based on the planned level to generate good gameplay pacing and level flow. The plans must include at least two doors in order for learners to be able to complete P10.

M1 AI pathing should identify in which areas a single AI will be likely to roam/patrol etc, combat zones should be generated based on cover positions and AI paths and expected choke points due to environmental features. The identification of combat zone will be entirely theoretical. Gameplay testing will give a better idea of actual points of combat.

D1 Learners should be encouraged to analyse their initial plans and calculate expected lines of sight. They should identify any areas where they may have line of sight issues (too little or too much) and consider modifications prior to developing the level in a games engine.

P02 Produce a 3D level in a games engine

P4 Learners should recreate their plans using simple geometry of BSP to produce a blockout. A blockout is not a meshed environment and serves to show the intended space, not beautify it.

P5 Pickups and event placements should be based upon plans from P3. Some changes can be made if it becomes clear that the original plan was flawed however major changes should be avoided until the first iteration of the level has been tested.

P6 As with P5, placement of AI should be based upon P3 and changes should be avoided until tested. For this criterion, it is not required for the AI to path or patrol, simply be placed.

M2 Lighting is key to player guidance. Learners should avoid attracting players to dead ends unless a risk/reward situation is implemented. The lighting doesn't need to be of cinematic quality but should ensure the environment is suitably lit that players can play through the level.

M3 AI pathing can be implemented using any of the taught methods. Pathing should be free of errors (AI characters getting stuck).

D2 Playthrough videos can be either live captured with voice over or captured first and a voice over added afterwards. Videos should be a good resolution to allow for elements to be clearly visible and free from error or warning messages on screen such as 'lighting needs to be rebuilt'.

P03 Demonstrate understanding of iterative design and development

P7 Analysis should focus on the key gameplay elements that have been implemented as well as pacing and level flow. Images and diagrams should be used to enhance the discussion and reduce the word count.

P8 User generated feedback should be recorded from the earliest iteration of the level. It should contain at least three different testers.

P9 Based on the feedback/testing results, learners should modify their levels to make improvements.

M4 Level analytics can be generated from testing and come in any output which allows the learner to analyse how players have interacted with their level. Systems such as heat maps (youtube.com/watch?v=91Q4Iw5TEu4) would be great however are not possible/easy to implement with all games engines. A simple screen recording of players and translating that into identification of choke points, preferred paths, player death locations etc would suffice.

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PO4 Design and implement level mechanics

P10 Doors can be any type of door, automatically activated or player input activated. Learners should make the decision depending upon how the implementation affects the game play.

P11 The implementation of the moving elements should include consideration for player feedback if interaction is required ie if a lift requires the player to press a button to activate it, this should be clear, on-screen prompts or lit environment elements (buttons) are the most common solutions.

P12 Learners should ensure that the player can clearly see what is happening in the event, cut scene or scripted sequences should be used, ensuring the player cannot focus on something else and miss the key event.

M5 This damageable environment element should ideally have an effect on how the level plays, effecting pathing, line of sight etc however any implementation of a damageable environment element should be accepted.

D3 The cover mechanic implementation should assist the player in the level, not be placed to simply tick the box. Learners will most likely want to include more than one piece of cover, this is fine but again, the cover should enhance gameplay not restrict it.

Synoptic assessment

This unit would logically be taught after Units 2, 4, 5, 10 (or concurrently with Unit 5 and 10) and there are opportunities for learners to demonstrate synoptic knowledge and learning from those other units in their evidence for this unit.

The amplification below identifies where the centre should consider synoptic assessment and where learning from other units can be assessed within this unit.

PO1 Produce two dimensional level designs

When creating level plans and designing the level, this will make use of techniques and skills taught in Unit 3 2D games art PO3 and also in the form of research in PO2.

PO2 Produce a 3D level in a games engine

When producing block-out geometry for a 3D level, this could be taught concurrently with Unit 5 3D environment art PO1.

When planning and implementing lighting for levels, this could be taught concurrently with Unit 5 3D environment art PO3.

The construction of a 3D level could be taught simultaneously with Unit 10 Games mechanics PO3 and PO4. It also links with Unit 12 Collaborative games development project PO4.

PO3 Demonstrate understanding of iterative design and development

When considering using an iterative development process, this could be taught concurrently with Unit 1 Business for video games AO3. It also includes elements of revision control that could be taught concurrently with Unit 2 Digital asset management AO3.

When reviewing the success of a created level through gathering user feedback and analysing collected data, this could be taught concurrently with Unit 1 Business for video games AO4.

PO4 Design and implement level mechanics

The design and implementation of level mechanics could be taught concurrently with Unit 10 Games mechanics PO3. It is also applicable to Unit 12 Collaborative games development project PO4.

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Delivery guidance

For this unit, the focus should be on functionality and gameplay experience, not visual aesthetic although learners should still aim to make their level visually tidy and appealing to use. Learners should be provided with a setup of assets to avoid the production of 3D models, animations etc. Existing ones available in games engines are fine.

Performance outcomes do not explicitly need to be covered in order however to allow for a correct development of understanding of iterative design processes, PO1 must come first. PO's 2, 3 and 4 can be delivered synchronously as the development and analysis of levels should occur simultaneously. Learners should not be producing 3D levels without first considering the design outside of the games engine.

PO1 Produce 2D level design

It is important that learners understand the need for concise detail in designs as well as segmentation to avoid design becoming cluttered and difficult to interpret. Analysing ideas at an early 2D stage should allow learners to get to grips with the key considerations for level design without becoming lost or guided by the 3D tools available to them.

PO2 Produce 3D level in a games engine

This outcome is focussed on the practical development of the level, implementing the ideas generated in PO1. It is important that learners aim to keep their level close to their original plans but also understand that, if during development, something clearly doesn't work, then it should be changed.

PO3 Demonstrate understanding of iterative design and development

For this outcome, learners should produce a development journal discussing their developments PO2, analysis P7, user testing and generated feedback P8, and adjustments P9.

PO4 Design and implement level mechanics

This outcome focuses on inclusion of scripted elements within the level.

For the practical elements of this module, it is advised that either Unreal Engine 4 (UE4) or Unity 5 is utilised as both have free resources available and have the technical capabilities to complete the required tasks.

For this unit to be completed, learners will need to be provided with a game which has a character that is able to utilise core movement elements (walk, run, jump, climb etc) and has a cover animation to allow learners to complete D3.

Employer engagement guidance

Guest speakers from local studios and, if at all possible, any course tasks or assignments given to learners, should be set within real-world situations. Tutors may wish to contact appropriate local businesses to enquire whether they could provide industry-relevant scenarios for learners such as game types, level themes etc.

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Useful links and resources

Books

- Totten C, *An Architectural Approach to Level Design,* CRC Press. ISBN: 1466585412, (2014).
- Rogers S, *Level Up!: The Guide to Gread Video Game Design,* John Wiley & Sons. ISBN: 1118877160, (2014).
- Rollings A, Adams E, *Andrews Rollings and Ernest Adams on Game Design,* London: New Riders Publishing, (2003).
- Rollings A and Morris D, *Game Architecture and Design,* Arizona: Coriolis, (2000).

Websites

- gamasutra.com
- tomlooman.com
- worldofleveldesign.com

YouTube video tutorial playlists

Learning Channels:

- Unreal Engine: youtube.com/user/UnrealDevelopmentKit/featured
- Unity: youtube.com/user/Unity3D/playlists

Jim Brown of Epic Games: Intro to Level Design:

- youtube.com/watch?v=XDsJOFyxMnw

Jim Brown of Epic Games: Design Workflow in Unreal Engine 4:

- youtube.com/watch?v=Bnqfzymxnrk

Massive UE4 Tutorial Playlist:

- youtube.com/playlist?list=PLZIv_N0_O1gaCL2XjKluO7N2Pmmw9pvhE

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16.10 Unit 10: Games mechanics

Title	Games mechanics
Unit number	H/507/6622
Unit assessment type	Centre assessed and externally quality assured
Recommended assessment method	Practical assignment This is the preferred assessment method for this unit. A centre may choose an alternative method of assessment, but will be asked to justify this as part of the quality assurance process.
Guided learning hours	90
Transferable skill(s) contextualised within this unit	n/a
Resources required for this unit	Learners should have access to an industry recognized games engine such as Unreal Engine or Unity as well as a 2D texturing package such as Adobe Photoshop or GIMP. Learners will also require access to video editing software such as Adobe Premier and/or After Effects.
Synoptic assessment within this unit	It is a requirement that all learners undertake meaningful synoptic learning and assessment during their study. Depending upon the order in which the units are delivered, there are opportunities for learners to use elements of other units to support the development of knowledge and learning for this unit. This unit would logically be taught with Unit 1. The assessment amplification within the unit identifies where the centre should consider synoptic links with other units.

Aim and purpose

This unit introduces learners to game mechanics and game theory. The unit guides learners through the process of developing a set of playable game mechanics to begin designing their own gameplay concepts and ideas.

Unit introduction

Learners will start this unit by learning the fundamental ideas behind games design, why we play games and how games are designed. This knowledge will be used to drive the technical development of a playable character within a games engine. This character will be built up to participate in a complete playable experience.

Learners will start with basic movement setup, moving through pickups, health systems, score systems, and the design and development of unique selling point mechanics to make their games stand out.

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Unit content

Game and player mechanics	

Game mechanics	• Games:
	  • introduction to games theory
	  • definitions of a 'game'
	  • theories of play and why we play.
	• Game mechanics:
	  • definition of a games mechanic.
	• Types of mechanics:
	  • movement mechanics:
	  • on foot
	  • driven vehicle
	  • flying vehicle
	  • buoyant vehicle
	  • combat mechanics:
	  • melee and weapon combat
	  • projectile combat
	  • reward mechanics
	  • input/output mechanics
	  • aesthetical customisation mechanics.
	• Maths and mechanics:
	  • time management
	  • in game currency management.
	• Emergent game mechanics.

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Game and player mechanics

Player mechanics	• Movement characteristics:
	  • walk/run speed
	  • crouch height
	  • jump height
	  • jump distance
	  • flight speed
	  • effects of character types:
	  • small characters
	  • heavy characters
	  • thin characters
	  • athletic characters
	  • strong characters.
	• Movement mechanics:
	  • compass movement mechanics
	  • walk/run mechanics
	  • jumping mechanics
	  • crouching
	  • flying.
	• Health systems:
	  • design
	  • implementation
	  • take damage
	  • restore health
	  • feedback to player.
	• Character attributes:
	  • movement speed
	  • health
	  • jump height
	  • custom/game specific attributes
	  • design
	  • modification.
	• Pickups:
	  • linking to the player
	  • modifying player attributes.
	• Scoring systems:
	  • design
	  • implementation
	  • scoring models:
	  • time
	  • kills
	  • pickup
	  • health (survival)
	  • goal achievement.

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Player controls	

Player control setup	• Basic movement controls:
	  • compass movement
	  • jump
	  • crouch
	  • run/walk modifier.
	• Control binding/assignment:
	  • keyboard
	  • gamepad.
	• Control input-based events/functions:
	  • action controls
	  • Interaction controls.
	• Player camera:
	  • design
	  • setup and implementation
	  • controlling
	  • scripting
	  • automation
	  • camera mapping
	  • camera adjustment using controls
	  • camera position effect on design and gameplay.
	• Context sensitivity:
	  • principles of design
	  • considerations for use
	  • benefits and limitations
	  • setup and implementation
	  • testing and feedback.

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Key gameplay mechanics	

Key gameplay mechanics	• Unique selling points:
	  • identification of USP mechanics:
	  • what is a USP?
	  • USP mechanic design.
	• Designing key gameplay mechanics:
	  • idea generation/conceptual design
	  • theoretical design/mechanics planning
	  • timing and interaction with the player.
	• Implementing player mechanics:
	  • communicating between player and world/level objects
	  • communicating between player and non-player characters.
	• Mechanic analysis and reflection:
	  • user based testing
	  • collecting test data
	  • analysing test data
	  • generating conclusions based upon feedback
	  • polishing mechanics using an iterative design process.
	• User interface prototypes:
	  • temporary UI development
	  • simple text based UI elements
	  • simple image based UI elements
	  • debug text.

Proof of concept development	

Proof of concept/tech demo production	• 3D testing environment:
	  • purpose
	  • requirements
	  • visual styles
	  • showcasing mechanics
	  • pickup placement
	  • visualisation of gameplay-based attribute changes.
	• Proof of concept development:
	  • purpose
	  • design.
	• Gameplay tutorials:
	  • design
	  • timing
	  • implementation of on-screen prompts.
	• Tech demo video
	  • production
	  • video editing
	  • voice-overs.

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Performance outcomes

On successful completion of this unit, learners will be able to:

Performance outcome 1:	Design and implement game and player mechanics.
Performance outcome 2:	Design and implement player controls.
Performance outcome 3:	Design and implement key gameplay mechanics.
Performance outcome 4:	Produce a proof of concept technical demonstration.

Grading criteria

Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO1 **Design and implement player mechanics**	**P1** Design key player movement characteristics based on character type.	**M1** Justify which character attributes would be usable for modification during gameplay.	**D1** Design and implement a suitable player score system based on the type of gameplay.
	P2 Implement designed characteristics onto a provided character.	**M2** Implement **two** gameplay-based character mechanic changes based on pickups.	
	P3 Implement a character health system.		
PO2 **Design and implement player controls**	**P4** Implement basic movement controls for the playable character based on a recognized control binding layout.	**M3** Implement **two** context sensitive control elements for the playable character using the same control input.	
	P5 Implement action controls for a playable character.		
	P6 Implement camera swapping and camera adjustment controls for a playable character.		

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Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO3 **Design and implement key gameplay mechanics**	**P7** Design **two** different key gameplay mechanics.	**M4** Refine the mechanics following an iterative process, with consideration for timing and interaction with the player.	**D2** Choose **one** of the refined mechanics and implement prototype user interface elements.
	P8 Implement **two** designed mechanics.		
	P9 Evaluate and reflect upon the implemented mechanics.	**M5** Analyse and evaluate **two** refined mechanics from M4.	
PO4 **Produce proof of concept technical demonstration**	**P10** Create a 3D testing environment in the games engine to showcase the character movement mechanics.	**M6** Implement an area within the testing environment to showcase the pickup-based character mechanic changes.	**D3** Implement an area within the testing environment to showcase the polished USP as a mechanic, complete with supporting on-screen prompts.
	P11 Implement on-screen prompts to guide the player through the testing environment.		
	P12 Produce a tech demo video showing the player mechanics implemented within the testing environment.		

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Assessment amplification

This section provides amplification of what is specifically required or exemplification of the responses learners are expected to provide.

P01 Design and implement game and player mechanics

P1 Learners should plan each of the character attributes listed in the unit content with consideration for their character type, eg a heavy character would not be expected to jump very high.

P2 For this criterion it is not required for learner's implementation to make anything happen, instead creating appropriate variables and setting default values to those designed in P1.

P3 This should include the creation of variables, default values and functions to increase and decrease the health.

M1 Justification should be a simple sentence for each planned modifiable attribute, eg maximum walk speed should be modifiable during gameplay to facilitate a reduction in speed when the player loses health.

M2 Learners should create functions based on pickups that modify the character, eg a pickup which modifies how high the character can jump. For this criterion to be met, the learner must have functions which successfully modify the values when the pickup is collected (not activated by any other means).

D1 Scoring system can use any solution but should fit with the designed character/setting. For example, a kill based score system would not be suitable for a game where the aim is to collect items.

P02 Design and implement player controls

P4 This is the actual implementation of a control system onto a player character, this should be designed based on a familiar, recognized control binding layout such as WASD (Keyboard) and Mouse or Twin Analogue Sticks (Controller).

P5 This is the continuation of the control implementation started in P4, this time assigning a control and functions to cause the character to perform actions.

P6 Camera swapping can be as simple as a fixed camera (third person) to a user controlled adjustable camera (third person with right analogue stick or mouse look). Learners could alternatively implement a camera swap for an aiming system, similar to *Gears of War*.

M3 Context sensitivity doesn't need to be overly complex, something as straight forward as only being able to press a button when the character is stood by it will be suitable.

P03 Design and implement key gameplay mechanics

P7 Possible ideas could include mechanics such as dodging, rolling or passing through walls or modifications of existing mechanics to add a unique element, similar to the sprinting feature in *Gears of War* which includes camera position changes and adjusts the responsiveness of the player character.

P8 This criterion is the implementation of the two mechanics designed in P7. Some allowances should be made for learners to adjust the design as they implement if original design is too difficult or doesn't feel as good as originally anticipated.

P9 This should be a short discussion within a development diary/blog evaluating the mechanic's quality, implementation and feel.

M4 Based on the analysis in P9, learners should refine the mechanics to improve the feel for the player. Close attention should be paid to timing and interaction with the player.

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M5 Similar to P9, learners should re-evaluate their refined mechanics from M4, again discussing quality, implementation and feel. This should feature as part of the diary/blog.

D2 User interface elements are key to explain to a player how to use a mechanics or when a mechanics is available. Learners should consider on-screen prompts for use, clear UI changes (if mechanics changes functionality). The key focus as always should be on the feedback to the player.

PO4 Produce a proof of concept technical demonstration

P10 This environment should be made using primitive meshes or BSP, it should not be beautified. The environment should allow the player to try each of the movement mechanics without being obstructed.

P11 On-screen prompts just showing keyboard inputs are sufficient, inclusion of iconography to indicate resulting action would be ideal however not required.

P12 This video can be produced using free screen capture software such as Open Broadcast Software (OBS) – obsproject.com/ and does not necessarily require additional video editing.

M6 Part of the environment developed in P10 should include pickups and environmental element where the modifications can be tested, eg if a pickup increases the jump height of a character, the pickup should be placed near a high ledge that cannot be jumped onto without the pickup.

D3 This area should again extend the environment created for P10 and M6, focusing on allowing the player to test the key gameplay mechanics refined in D2. This should include some element of on-screen tutorial prompts to explain to the player how to use the mechanic. The environment should also feature elements which allow the mechanics to be used as intended during gameplay similar to that described in M6.

Synoptic assessment

This unit would logically be taught concurrently with Unit 1 and there are opportunities for learners to demonstrate synoptic knowledge and learning from other units in their evidence for this unit.

The amplification below identifies where the centre should consider synoptic assessment and where learning from other units can be assessed within this unit.

PO1 Design and implement player mechanics

When considering game mechanics and the definitions of what makes a game, this could be taught concurrently with Unit 1 Business for video games AO3.

When learning about the design and implementation of health and scoring systems, and feedback to the player, this could be taught concurrently with Unit 7 User interface PO1, PO2 and PO3.

PO2 Design and implement player controls

When learning about player controls with regards to the player character, this could be taught concurrently with Unit 8 Games animation and VFX PO4.

PO3 Design and implement key gameplay mechanics

When learning about unique selling points this could be taught concurrently with Unit 1 Business for video games AO3.

When learning about user interface prototypes, this could be taught concurrently with Unit 7 User interface PO1.

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PO4 Produce proof of concept technical demonstration

When creating a 3D testing environment, this could be taught concurrently with Unit 5 3D environment art PO1 and PO2.

When considering visualisation of gameplay attribute changes and on-screen prompts, this could be taught concurrently with Unit 7 User interface PO3.

When producing a proof of concept technical demo, particularly as a group based activity, this could be taught concurrently with Unit 1 Business for video games AO3.

When creating audio voice-overs for a tech demo video, this could be taught concurrently with Unit 11 Games audio PO2 and also Unit 2 Digital asset management AO1 and AO2.

Delivery guidance

For this unit, the focus should be on functionality and gameplay experience, not visual aesthetic although learners should still aim to make their proof of concept visually tidy and appealing to use. Learners should be provided with a setup of assets to avoid the production of 3D models, animations etc. Existing ones available in games engines are fine.

Performance outcomes 1 and 2 can be developed and taught simultaneously as they are co-dependent.

PO1 Design and implement player mechanics

The focus here is to setup the basics of a playable character and identify what parts of a character should be possible for pickups to modify. Elements such as health, walk speed, armour amount etc are simple to setup in games engines and offer a wide array of gameplay variation through use of pickups and events. Learners should produce a character planning sheet which includes elements such as how fast the character can walk and run, how high the character can jump and other key characteristics before implementing elements inside a games engine.

PO2 Design and implement player controls

For this outcome, learners should integrate user input controls into the playable character system. The control system should be designed and planned based on available input devices (mouse and keyboard vs controller). Learners should not be looking to break convention, instead implement an accepted layout for controls based on the chosen controller.

PO3 Design and implement key gameplay mechanics

Learners are required to develop unique selling point (USP) player mechanics. These could mimic existing games but should be something more complex than basic movement and interaction. Learners should consider how to indicate availability to players as well as core functionality.

PO4 Produce proof of concept technical demonstration

This outcome is vital for learners to be able to show their ideas for pitches, critique, user testing or marketing purposes. The testing environment should be a simple whitebox prototype space that enables each of the mechanics to be used and tested, on-screen prompts should help explain when, where and how to use the controls/mechanics.

For the practical elements of this module, it is advised that either Unreal Engine or Unity is utilised as both have free resources available and have the technical capabilities to complete the required tasks.

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Employer engagement guidance

Guest speakers from local studios and, if at all possible, any course tasks or assignments given to learners should be set within real-world situations. Tutors may wish to contact appropriate local businesses to enquire whether they could provide industry-relevant scenarios for learners such as game types etc.

Useful links and resources

Books

- Fullerton T, *Game Design Workshop: Designing, Prototyping and Playtesting Games,* (Gama Network Series). San Francisco: CMP, (2004).
- Levy L, *Game Development Essentials: Game QA & Testing,* London: Delmar Cengage Learning, (2009).
- Rollings A and Adams E, *Andrews Rollings and Ernest Adams on Game Design,* London: New Riders Publishing, (2003).
- Rollings A and Morris D, *Game Architecture and Design,* Arizona: Coriolis, (2000).
- Salen K and Zimmerman E, *Rules of Play: Game Design Fundamentals,* London: MIT Press, (2004).
- Schell J, *The Art of Game Design,* CRC Press, (2008).

Websites

- gamasutra.com
- tomlooman.com
- worldofleveldesign.com

YouTube video tutorial playlists

Learning channels:

- Unreal Engine: youtube.com/user/UnrealDevelopmentKit/featured
- Unity: youtube.com/user/Unity3D/playlists

UE4 3rd Person Game with Blueprints (pre v4.7):

- youtube.com/playlist?list=PLZlv_N0_O1gZS5HylO_368myr-Kg2ZLwb

UE4 Endless Runner (Contains pickup tutorials):

- youtube.com/playlist?list=PLZlv_N0_O1gbY4FN8pZuEPVC9PzQThNn1

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16.11 Unit 11: Games audio

Title	Games audio
Unit number	M/507/6624
Unit assessment type	Centre assessed and externally quality assured
Recommended assessment method	Practical assignment This is the preferred assessment method for this unit. A centre may choose an alternative method of assessment, but will be asked to justify this as part of the quality assurance process.
Guided learning hours	90
Transferable skill(s) contextualised within this unit	Communication (written)[5]
Resources required for this unit	Computer system running a suitable digital audio workstation (DAW), such as Logic, Cubase or ProTools and audio editing software, such as Sound Forge. Access to microphones and a portable field recorder such as Tascam DR-40 or similar.
Synoptic assessment within this unit	It is a requirement that all learners undertake meaningful synoptic learning and assessment during their study. Depending upon the order in which the units are delivered, there are opportunities for learners to use elements of other units to support the development of knowledge and learning for this unit. This unit would logically be taught concurrently with Unit 12. The assessment amplification within the unit identifies where the centre should consider synoptic links with other units.

Aim and purpose

The aim of this unit is to familiarise learners with the principles and practice of creating, processing and synchronising sound to image for use within the computer game industry.

Unit introduction

Learners will be introduced to the physics of sound and how this relates to the creation of audio content for computer games. They will also learn the principles and practicalities of sound recording, digital audio processing, Foley and sound spatialisation. The unit will cover important aspects of the structure and working constraints of audio teams within the computer games industry. Learners will then apply these ideas to create the sound track for two one minute long clips of in-game footage of different genres and one minute of full motion video/cinematic.

Upon completion of the unit, learners will have learned a wide variety of skills in the creation and deployment of audio for a variety of applications and genres within computer games. Learners will have an understanding of how audio teams work within the industry and will have developed three pieces of work for their portfolio.

[5]Please refer to Appendix A or visit the specification homepage to access the Transferable Skills standards and associated guidance and recording documentation

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Unit content

Recording and editing original Foley using relevant microphones and techniques	

Sound recording	• Sound principles:
	  • sound properties
	  • sound propagation
	  • human hearing.
	• Recording:
	  • dynamic microphones
	  • condenser microphones
	  • polar pattern
	  • frequency response
	  • recording dialogue.
	• Field recording:
	  • microphone selection
	  • portable recorders
	  • wind shields.

Digital audio	• Sampling:
	  • the Nyquist theorem
	  • bit depth
	  • sample rate
	  • file types (.wav, .aiff, .mp3, .ogg)
	  • file size.

Spatialisation	• Reverb:
	  • what is reverb?
	  • synthesised reverb
	  • convolution reverb.
	• Panning:
	  • binaural recording and panning
	  • directionality.
	• Filtering:
	  • high pass
	  • low pass.
	• Objects:
	  • the influence of barriers
	  • sound absorption/reflection.

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Producing full audio soundtrack for one computer game full motion video and two in-game videos	

Overview	• Approaches to sound design:
	  • what to include/exclude
	  • emulating reality
	  • hyper-real
	  • creating ambience
	  • interactive considerations
	  • procedural audio
	  • use of audio effects.
	• Introduction to synthesis:
	  • synthesis types
	  • filters (high pass, low pass, band pass and notch)
	  • oscillators
	  • waveforms (sine, saw, square, triangle)
	  • contemporary synthesis (granular, wavetable, physical modelling).

Audio editing	• Dynamic processing:
	  • noise reduction
	  • compression
	  • expanders
	  • gates.
	• Equalisation (EQ):
	  • parametric EQ
	  • graphic EQ
	  • single band (high pass and low pass)
	  • audio frequency analysers.
	• Advanced editing:
	  • click repair
	  • strip silence
	  • spectral processing.

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Producing full audio soundtrack for one computer game full motion video and two in-game videos	

Workflow, mixing and mastering	• Workflow and file management:
	  • session organisation
	  • file delivery
	  • data compression
	  • file formats (WAV, AIFF, OGG, FLAC).
	• Synchronisation:
	  • automatic dialogue replacement (ADR)
	  • Foley artist (performing in sync)
	  • punch-in and punch-out
	  • comping
	  • time-code
	  • synchronising audio regions and video
	  • time stretching, nudging
	  • fades and cross fades
	  • Colin-Broad, EdiCue, Voice Q.
	• Mixing:
	  • dynamic processing
	  • 3D mixing
	  • balancing amplitudes.
	• Mastering:
	  • audio compression
	  • balancing perceived levels
	  • consideration of gamers home set-up (TV, mono, stereo formats)
	  • phase
	  • RMS/peak.
	• Gain structure:
	  • importance of signal to noise ratio
	  • normalisation.

Producing a written technical report which analyses and evaluates the game audio production process	

Roles	• The role of the sound designer:
	  • implementer
	  • Foley artist
	  • field recordist
	  • mixer
	  • recording engineer
	  • asset provider
	  • audio lead.

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Producing a written technical report which analyses and evaluates the game audio production process	

Roles – continued	• The role of audio in the development process:
	  • proposal
	  • production
	  • alpha
	  • beta
	  • release
	  • testing.
	• Games audio teams:
	  • comparison between smaller developers and larger producers.

Industry tools	• Overview of tools:
	  • audio editors:
	  • Sound Forge
	  • Audacity
	  • Audition
	  • digital audio workstations:
	  • Logic
	  • ProTools
	  • Cubase
	  • Nuendo
	  • Ableton Live
	  • Reaper
	  • game engines:
	  • Fmod
	  • Unreal
	  • Unity
	  • working methods
	  • sound implementation
	  • video editing:
	  • Quicktime (for separating audio and video)
	  • Adobe Premiere
	  • FinaCut Pro.
	• Graphical programming (interactive tools):
	  • Max/MSP
	  • Pure Date.

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Producing a written technical report which analyses and evaluates the game audio production process	

Industry tools – continued	• Sound libraries versus custom/field recording:
	  • Sounddogs.com
	  • Hollywood edge
	  • Sound Ideas 6000 series.
	• Consoles and gaming platforms:
	  • limitations of consoles
	  • handing audio files (DVD, BluRay)
	  • RAM considerations
	  • internal effects processing.

Performance outcomes

On successful completion of this unit, learners will be able to:

Performance outcome 1:	Record and edit original Foley using relevant microphones and techniques.
Performance outcome 2:	Produce full audio soundtrack for two in-game videos.
Performance outcome 3:	Produce full audio soundtrack for one computer game full motion video.
Performance outcome 4:	Produce a written technical report which analyses and evaluates the game audio production process.

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Grading criteria

Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO1 **Record and edit original Foley using relevant microphones and techniques**	**P1** Identify appropriate microphones for the recording application based on microphone frequency response and sensitivity.	**M1** Produce at least 10 high quality audio recordings suitable for the game footage. These should be recorded and edited to a high standard.	
	P2 Demonstrate a practical understanding of the relationship between microphone polar pattern and microphone placement.		
	P3 Edit captured sound appropriately to fit with the video content.		
PO2 **Produce full audio soundtrack for two in-game videos**	**P4** Identify suitable Foley sounds for use in two in-game videos of differing genres.	**M2** Mix and balance the audio content in the game engine to ensure that their levels accurately depict the game environment.	**D1** Apply **at least three** spatialisation effects to the audio content to accurately and effectively replicate the spatial aspects of the two in-game videos.
	P5 Save the final files with consideration for file size.		
	P6 Implement all recorded and/or sourced sounds into a suitable game engine.		

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Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO3 **Produce full audio soundtrack for one computer game full motion video**	**P7** Identify suitable Foley sounds for use in one computer game full-motion video.	**M3** Apply **at least two** spatialisation techniques to the audio content to accurately replicate the spatial aspects of the video.	**D2** Apply **three or more** spatialisation techniques to the audio content to accurately and effectively replicate the spatial aspects of the two in-game videos.
	P8 Synchronise selected audio to one computer game full-motion video.		
	P9 Mix and balance all audio levels to ensure they do not peak or clutter the mix.	**M4** Produce high quality audio using equalisation and audio compression to ensure the final product has impact.	
PO4 **Produce a written technical report which analyses and evaluates the game audio production process**	**P10** As part of a **technical report,** analyse and evaluate the software tools that were used to record, process and arrange audio.	**M5** Reflect on how the game engine was used to implement the audio in P6.	**D3** Critically evaluate the audio produced for the three video projects, with clear recommendations for future working practices.
	P11 As part of a **technical report,** compare and contrast recording practices and techniques used in P1 and P2.		
	P12 As part of a **technical report,** demonstrate an awareness of the constraints and limitations on the sound designer within the computer games industry.	**M6** Identify and discuss appropriate and effective techniques for undertaking sound spatialisation, with consideration for the properties of sound and its propagation in air.	

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Assessment amplification

This section provides amplification of what is specifically required or exemplification of the responses learners are expected to provide.

In completing this unit, learners will be presented with an opportunity to demonstrate achievement of the transferable skill of communication (written) when completing P10, P11 and P12.

P01 Record and edit original Foley using relevant microphones and techniques

P1 For example, if recording dialogue, a large diaphragm condenser microphone should be used. A high SPL mic should be used for miking very loud sources.

P2 As an example, an omni mic could be used to record the whole environment, and a highly directional mic should be used when sound isolation is important.

P3 This might entail fade-ins, fade-outs, trimming audio to length, reversing sounds etc.

M1 A high standard here means a high signal to noise ratio and recorded with a professional quality microphone placed appropriately. The audio should then be edited appropriately for the application free from clicks, pops or any other audio anomalies that are not in keeping with the game footage.

P02 Produce full audio soundtrack for two in-game videos

P4 Foley sounds could be recorded by the learner or sourced from a sound library.

P5 Total file size for all used samples should not exceed 1MB. These should be submitted as .ogg files.

P6 Sound should be effectively placed in the game world with appropriate min and max values and trigger points etc.

M2 The key here is making sure the audio is balanced and no audio files are either lost or stand out.

D1 The spatialisation effects should be reverb, filtering, panning, amplitude changes etc.

To achieve P4, M2 and D1 learners should produce and implement audio assets for two existing games.

Additional descriptions

Create and implement the soundtrack for two short game levels. Example levels will need to be provided in Unreal Engine or similar.

Each game level should enable learners to demonstrate a range of sound design skills, including the creation of Foley, ambience, effects and dialogue as well as the use of spatialisation techniques and other aesthetic considerations.

In order to demonstrate a range of current techniques, learners should be able to choose between two varying styles of computer game (eg a platform game and a racing game).

Do not include music unless it is absolutely essential to the gameplay. Ensure that it does not distract from, or mask, other elements of the soundtrack. No marks are awarded for music composition.

In addition to the video files, learners must also submit two directories containing all the sounds used in each of the video clips in .ogg format. The maximum directory size is 1MB.

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PO3 Produce full audio soundtrack for one computer game full motion video

P7 Foley sounds could be recorded by the learner or sourced from a sound library.

P8 Sounds should be used effectively to match with the scene. In the case of distant sounds, these should be effective, ie thunder and lightning might not happen simultaneously.

P9 Again, the key here is making sure the audio is balanced and that no audio files are either lost or stand out.

M2 The spatialisation effects should be reverb, filtering, panning, amplitude changes, phasing, flanging etc.

M3 The overall audio should be loud and have impact; this will require the use of audio compression and other dynamic range processing.

D2 The spatialisation effects should be reverb, filtering, panning, amplitude changes, phasing, flanging etc.

Additional descriptions

Create the soundtrack to one sixty second full-motion video (FMV) sequence/cut-scene or cinematic in-game footage.

The footage should enable learners to demonstrate a range of sound design skills, including:

- the creation of Foley, ambience, effects and dialogue
- spatialisation techniques and aesthetic considerations.

You may only include music if absolutely necessary – and it should not distract from, or mask, other elements of the soundtrack. No marks are awarded for music composition.

To fully explore the creation of audio for various game applications, learners should be actively recording and editing their own sounds for the project. This will involve deploying technical knowledge gained during the module to select and place microphones correctly for a variety of applications. For example, if a very noisy subject is being recorded, learners would be expected to select a microphone with a high sound pressure level (SPL) rating; when recording dialogue, learners should choose a sensitive condenser microphone and so on. The placement of these microphones should also be carefully considered based on their polar pattern. Strong links between the recording situation and the microphone choice should be clear.

Editing should be undertaken using a suitable audio editor or using the digital audio workstation itself. Edits should include cutting audio files to length, normalisation and looping compression as well as fade-ins and fade-outs as appropriate.

Recordings should also take signal-to-noise ratio into consideration and the final results should be of high enough quality to feature in a commercial release to gain high marks.

PO4 Produce a written technical report which analyses and evaluates the game audio production process

P10 Some description is necessary but higher marks will be awarded for deeper critical engagement.

P11 Again, critical reflection is required regarding microphone selection and placement.

P12 This criterion should cover both timing and financial impacts, and how these can affect the production process. The production of the audio for this assessment should be used as a case study.

M5 It is important to discuss the relationship between the sound design, the editing process and what was learned during the implementation phase, with demonstrable learning being made clear. For

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example, it is not always clear if the edited sounds are going to work in the context of the game when undertaking the sound design phase. What lessons were learned during this process?

M6 Discussions of synthesised reverb, convolution reverb, amplitude automation and frequency filtering should be covered. Other more elaborate techniques, such as phasing, will be awarded higher grades.

D3 This criterion is looking for combination of ideas based on experiential factors that affected the production and implementation of the audio. This synthesis will result in the recommendations for future ways of working.

Learners are required to produce a technical report that documents the creation of the sound effects for their chosen full-motion video and in-game footage. They should consider the following points:

- Discuss the sources of the sounds used, and why these were chosen. This could include information on certain sound libraries, or certain 'found sound' objects. Learners should include a section that discusses the conflict between aesthetics and budgetary constraints when using sample libraries over original recordings. Some research into game company finances would be beneficial here. Ensure that the information is focused on the games industry as a whole, and mention the specific project undertaken for this assignment.
- A section on recording technique should be included. Part of this assignment will require learners to record vocals for the full-motion video, but they are also required to include Foley recordings for the in-game assignment. It is especially important in this section that learners focus on the reasoning behind their practices and discuss a range of solutions to recording audio, such as their particular microphone choice, their placement and associated practices.
- Learners should include a critical appraisal of their work, and discuss where the work excelled and where its weaknesses lie. This is an important section that should aim to demonstrate that learners understand the limitations of their skills and working practices as a sound designer.
- The report should aim to cover some of the more important elements of the software tools used for the project. This should include specific mention of the reverb plugins, EQs and other effects that were used. Learners should undertake a critical evaluation of the audio produced, with a specific discussion of the appropriate techniques for undertaking sound spatialisation using the tools of their choice.

Synoptic assessment

This unit would logically be taught concurrently with Unit 12 and there are opportunities for learners to demonstrate synoptic knowledge and learning from other units in their evidence for this unit.

The amplification below identifies where the centre should consider synoptic assessment and where learning from other units can be assessed within this unit.

PO1 Record and edit original Foley using relevant microphones and techniques

When learning about recording and editing original Foley, microphones and audio techniques, this could be taught concurrently with Unit 12 Collaborative game development project PO4.

When learning about digital audio and file types, this could be taught alongside Unit 2 Digital asset management AO2.

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P02 Produce full audio soundtrack for two in-game videos

When considering the role of a sound designer, and the part audio plays in the development process, this could be taught concurrently with Unit 1 Business for video games AO3.

When learning about the technical limitations of gaming platforms, this could be taught concurrently with Unit 2 Digital asset management AO1.

When considering using sound libraries versus custom recording, and issues of copyright, this could be taught concurrently with Unit 2 Digital asset management AO5.

P03 Produce full audio soundtrack for one computer game full motion video

When considering the role of a sound designer, and the part audio plays in the development process, this could be taught concurrently with Unit 1 Business for video games AO3.

When learning about the technical limitations of gaming platforms, this could be taught concurrently with Unit 2 Digital asset management AO1.

When considering using sound libraries versus custom recording, and issues of copyright, this could be taught concurrently with Unit 2 Digital asset management AO5.

P04 Produce a written technical report which analyses and evaluates the game audio production process

When considering the role of a sound designer, and the part audio plays in the development process, this could be taught concurrently with Unit 1 Business for video games AO3.

When learning about the technical limitations of gaming platforms, this could be taught concurrently with Unit 2 Digital asset management AO1.

When learning about digital audio and file types, this could be taught alongside Unit 2 Digital asset management AO2.

Delivery guidance

The overall outcome of this unit will be the production of three artefacts that will equip learners for a range of tasks they are likely to face in the computer games industry as a sound designer. These three artefacts will act as the beginning of a portfolio of work for employment within the industry.

P01 Record and edit original Foley using relevant microphones and techniques

This assessment outcome places emphasis on the technology used for capturing and editing sound. Background in the propagation of sound in air is crucial to this learning, as is a practical understanding of the polar pattern and frequency response of microphones and how these can affect the recording. Learners should have access to a range of microphones including dynamic, condenser and more specialist microphones, such as directional shotgun microphones, but the theoretical delivery could potentially be broader. Learners will also need background on audio editing techniques and audio restoration skills to enable them to carry out the tasks required.

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P02 Produce full audio soundtrack for two in-game videos

Learners are required to select the most appropriate sounds from a range of options, either recorded themselves or sourced from a library, and integrate these files into a game engine. They will require background on how to edit audio as well as a working knowledge of a suitable industry standard game engine. A key constraint on game audio development for consoles is that of file size. For this reason, learners are required to produce high quality audio within a limited file size. Learners will need to learn file compression techniques and a range of software tools that allow for this processing. To gain higher marks learners will need to mix and balance the audio as well as applying spatialisation effects inside the game engine. To this end, learners will require background on the properties of sound as well as specific application of effects such as filtering, reverb and equalisation.

P03 Produce full audio soundtrack for one computer game full motion video

Again, learners are expected to source sounds or record their own for this assessment outcome. The constraint on file size is removed, as full-motion video and cut scenes do not have any such limitations. Learners should be free to choose a scene themselves in negotiation with the unit tutors. Specific examples should also be provided if learners have difficulties sourcing their own scenes. This assessment outcome has more emphasis placed on audio quality and impact, so learners will need background in dynamic range processing, normalisation and creative use of EQ and other audio effects tools. A central part of the assessment is implementation, so learners will need to be taught methods of audio synchronisation as mentioned in the unit contents.

P04 Produce a written technical report which analyses and evaluates the game audio production process

The written technical report gives learners the opportunity to explore the role of the sound designer and their place within the games development team. The report also gives learners the opportunity to demonstrate their theoretical knowledge around the subject area. Whilst this unit will give learners a valuable insight into producing audio content for several applications, there will be many other demands on them as they work on other projects outside the unit in industry. This written element should be able to demonstrate this knowledge and should be seen as a tool to show that learners have a flexible and deep understanding of the subject area, rather than simply the knowledge required to undertake this specific assessment.

Employer engagement guidance

If learners are in the workplace then the centre could ask the employer about any suitable projects that the learners could work on as part of the team. It would be helpful for the employer to be made aware of the sort of skills that the learners have to practise.

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Useful links and resources

Essential reading

- Collins K, *Game sound: an introduction to the history, theory, and practice of video game music and sound design,* MIT Press, (2008).
- Marks A, *The complete guide to game audio: for composers, musicians, sound designers and game developers,* 2nd ed. Focal press, (2009).
- Rumsey F, *Spatial audio,* Music technology series. Focal Press, (2001).

Recommended reading

- Ament V, *The Foley grail: the art of performing sound for film, games, and animation,* Focal Press, (2009).
- Childs G W, *Creating music and sounds for games.* Thomson Course Technology, (2007).
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16.12 Unit 12: Collaborative games development project

Title	Collaborative games development project
Unit number	T/507/6625
Unit assessment type	Centre assessed and externally quality assured
Recommended assessment method	Practical assignment This is the preferred assessment method for this unit. A centre may choose an alternative method of assessment, but will be asked to justify this as part of the quality assurance process.
Guided learning hours	90
Transferable skill(s) contextualised within this unit	Teamwork Communication (oral)[6]
Resources required for this unit	Learners should have access to a modern 3D games engine such as Unreal Engine 4 or Unity, 3D modelling package such as Autodesk 3DS Max/ Maya, 2D programs such as Photoshop or GIMP, video editing software such as Adobe Premier and/or After Effects and slideshow and presentation software such as Microsoft PowerPoint.
Synoptic assessment within this unit	It is a requirement that all learners undertake meaningful synoptic learning and assessment during their study. Depending upon the order in which the units are delivered, there are opportunities for learners to use elements of other units to support the development of knowledge and learning for this unit. This unit would logically be one of the last units taught and assessed, and there are opportunities for learners to use synoptic knowledge and learning from the other units on the qualification in their evidence for this unit. The assessment amplification within the unit identifies where the centre should consider synoptic links with other units.

Aim and purpose

This unit introduces learners to the complete game development process and teamworking environment, replicating the concepts of working within a team in the games industry.

Unit introduction

Learners on this unit will work as a team to develop a game together. Learners will take on a particular development role within the team and work to develop content in line with that role.

To begin with, learners will all pitch their ideas for a pick-up-and-play game. The games should be easy to play, relatively short and provide instant gratification to the player. Learners will deliver their pitch in the form of a presentation to their team. The team will then decide which of the pitched games they will develop. The chosen game will be the focus of the development for the remainder of the unit.

Learners will produce a finished, working game that could be released to the public. It will be accompanied by a development journal detailing each team member's contributions throughout the project. Learners will be expected to contribute a page per week for their journals.

[6]Please refer to Appendix A or visit the specification homepage to access the Transferable Skills standards and associated guidance and recording documentation

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Unit content

Game idea pitch	

Research	• Competitor analysis.
	• Audience research:
	  • demographic
	  • potential sales market
	  • price point
	  • release types (disc/download etc).
	• Platform:
	  • hardware types
	  • software types.

Presentation	• Producing slideshows.
	• Enhancing pitches:
	  • data
	  • moodboards
	  • videos
	  • examples.

Quick prototypes	• Definition of a quick prototype:
	  • what is too much?
	  • fail fast prototyping
	  • how far should a pitch prototype be developed
	  • how to produce a quick prototype.

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Key aspects of chosen role with the games development team	

Game development teams	• Roles:
	  • management
	  • development:
	  • artist
	  • designer
	  • audio engineer
	  • animator
	  • level designer
	  • engine specialist/technical designer
	  • programmer
	  • testing
	  • role differences in small teams:
	  • shared responsibilities.
	• Responsibilities:
	  • management
	  • developers.
	• Working in a team:
	  • communication
	  • estimation of task complexity and length as a group
	  • fast iteration of ideas
	  • planning
	  • asset management
	  • development planning.

Personal development planning	• Personal development planning:
	  • self-analysis
	  • self-reflection
	  • development plan production
	  • personal goal setting
	  • deadline setting
	  • professional critical skills based on chosen roles.

Asset production/task lists	

Asset/task planning	• Identifying requirements of game.
	• Identifying personal tasks:
	  • setting out realistic timescale estimates
	  • setting out realistic quality expectations.
	• Project planning:
	  • Trello
	  • Dropbox
	  • task prioritisation
	  • critical path analysis for project planning
	  • contingency planning.

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Work as part of a team to develop a shippable game	

Working on games	• Working habits:
	  • time management
	  • measuring quality of work
	  • weekly reviews of work against goals and quality requirements.
	• Working with a team:
	  • communication
	  • problem solving
	  • dispute handling.

Technical documentation	• Presenting work effectively for printed documents:
	  • presentation styles
	  • annotations
	  • images
	  • presentation of:
	  • art
	  • animation
	  • design
	  • level development
	  • mechanics development.
	• Setting out an art style for printed documents.

QA and testing	• Game testing approaches:
	  • different types of bugs:
	  • visual
	  • gameplay
	  • fatal.
	• Bug tracking:
	  • tracking methods
	  • database systems
	  • bug prioritisation
	  • fixing bugs.
	• Use of external feedback.

Performance outcomes

On successful completion of this unit, learners will be able to:

Performance outcome 1:	Develop and present a game idea pitch.
Performance outcome 2:	Demonstrate an understanding of the key aspects of a chosen role within the games development team.
Performance outcome 3:	Develop an asset production/task list for chosen role.
Performance outcome 4:	Work as part of a team to develop a shippable game.

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Grading criteria

Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO1 **Develop and present a game idea pitch**	**P1** Produce a presentation of a game idea to pitch to a team.	**M1** Enhance the game idea pitch with the use of competitor analysis, providing examples of previous similar games.	**D1** Enhance the game idea pitch with a quick, rough prototype of the game idea.
	P2 **Present** game idea to team; this should not exceed 10 minutes in duration.	**M2** Enhance the game idea pitch with the use of audience research, identifying a core demographic and potential market.	
PO2 **Demonstrate an understanding of the key aspects of a chosen role within the games development team**	**P3** **As part of a team,** outline understanding of preferred role, including a breakdown of general responsibilities and expectations.	**M3** Produce a personal development plan which will allow for skills development during the project to improve quality of work developed for the game.	**D2** Act upon personal development plan, showing skill development throughout the course of the games project development cycle.
	P4 Produce a CV with covering letter to identify own strengths and weakness, highlighting where improvements can be made to fit better into preferred role.		
	P5 Discuss how the role fits into the makeup of their games development team for the project.		

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Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO3 **Develop an asset production/task list for chosen role**	**P6** **As part of a team,** identify and list the development tasks required for job role.	**M4** Produce contingency plans based on possible problems or issues that could arise, based on listed development tasks.	
	P7 Prioritise job development task list to ensure final game is of the highest possible standard.		
	P8 **As part of a team,** use planning tools to keep track of development and completion of tasks.		

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Performance outcomes	Pass	Merit	Distinction
	To achieve a pass the learner must evidence that they can:	**In addition to the pass criteria, to achieve a merit the evidence must show the learner can:**	**In addition to fulfilling the pass and merit criteria, to achieve a distinction the evidence must show that the learner can:**
PO4 **Work as part of a team to develop a shippable game**	**P9** Complete asset production/ development tasks, working towards the end goal of a complete, shippable game.	**M5** Reflect upon overall contribution to the development of the game as a member of the team.	**D3** Critically analyse assets produced/tasks completed during the games development, producing a personal development plan following on from the completion of the game.
	P10 Implement developed assets into the game.	**M6** Critically analyse final game, comparing it to the initial pitch, including suitability for target demographic and comparing it to competitors games.	
	P11 Provide weekly contributions to the game development **as part of the team** development journal.		
	P12 Partake in QA and testing of the game, completing a report and fixing bugs found.		
	P13 Evaluate the success of the development **team,** agreeing ways of improving collaborative work in the future.		

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Assessment amplification

This section provides amplification of what is specifically required or exemplification of the responses learners are expected to provide.

In completing this unit, the process of team working will be continually developed and reflected upon. Learners will also be provided with an opportunity to demonstrate the transferable skill of communication (oral) when completing P2.

This unit is intended to be group work based but assessed individually, each learner must be encouraged to take responsibility for their own work and not rely on the group to carry them through the unit. This is why it is important that, as stated in the delivery guidance, each learner takes on a practical development role where a practical output can be used for assessments.

The unit should be assessed in two sections, the initial pitch presentation, assessing PO1, and then the development journal to assess PO2, PO3 and PO4.

All of the evidence, analysis, reflection and personal development planning should be included in the development journal.

PO1 Develop and present a game idea pitch

P1 This criterion should assess the production of the presentation, not the delivery. The presentation should contain images, videos and bullet points, avoiding large screens of text.

P2 This criterion assesses the actual presentation of the game idea pitch. Learners should not exceed 10 minutes.

M1 As part of the pitch created in P1 and presented in P2, learners should discuss similar games that hold a place in the market similar to their idea discussing their successes/failings.

M2 As part of the pitch created in P1 and presented in P2, learners should include elements of research identifying the core demographic and potential market. This should be based on the audiences that play games identified in M1.

D1 A rough prototype should be quick, simple and use existing assets to show the core ideas of the game. It is not expected that this prototype be polished or fully playable. It should not contain narrative or progression, instead focusing on the core ideas and mechanics which make the game interesting.

PO2 Demonstrate an understanding of the key aspects of a chosen role within the games development team

P3 This should be based upon a skills audit, learners should be clear on what they can/can't do for a preferred role. They should ideally be applying for roles where there is a greater percentage of things they can do.

P4 The CV should take the form of a standard CV with an accompanying letter discussing both strength and weaknesses. Learners should be encouraged to be open about their skills in order to better understand how to develop a personal development plan.

P5 This should be included as a brief statement/section of the covering letter.

M3 It is advisable that learners are given a template to use. Their PDP should include an outline of the skill, a timescale for improvement and a measure of success. Learners should include no more than three areas for improvement eg:

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Skill area	Current level 1 to 5 (1 lowest, 5 highest)	Timeline for improvement (number of weeks or end of specific development phase)	Measure of success
Model optimisation	3	5 weeks	Increased amount of detail in 3D models avoiding significant increases in tri-count.
Texturing	2	End of texturing phase	Increased quality of textures compared to professional examples.
Unreal Engine 4 materials	2	End of project	Creation of complex materials using more advanced techniques than simple plugged in textures.

PDP could be enhanced with inclusion of tutorials which a learner intends to follow in order to improve skills.

D2 This is something that can only be assessed at the end of the project. The learner should be able to show on their development log/thread, that they have improved their skills throughout the project. Learners may find it easier to include a comparison of before and after work showing a particular skill area.

P03: Develop an asset production/task list for chosen role

P6 At the start of the project, learners should outline a list of tasks they need to complete for the development of the game. This should be posted to the development blog.

P7 Once the learner has a list, they should assign a priority to each task based on what effect it has on the final game. A player character model for instance would carry a priority of one, this, if not completed would have a sizable, negative effect on the game. Something like a random generated litter system for around bins in a first person shooter game would carry a lower priority as, if this is not included it would likely not have a major effect on the overall gameplay or feel of the game.

P8 Learners should be encouraged to also use project management solutions such as Trello (trello.com), file management using version control or at the very least Dropbox (dropbox.com)

M4 Along with each task, learners should consider contingency plans in case a task cannot be completed or an intended feature doesn't work. This could be as simple as exclusion from the game as it has minimal effect or a more complex solution such as using a different, backup idea. In the case of additional ideas, learners should consider timescales and challenges that the alternative would require/present to ensure that, if a contingency is required, they are prepared and the team know what the effects will be.

P04: Work as part of a team to develop a shippable game

P9 This assessment point is designed to be flexible for learners to complete the tasks they have outlined, it is therefore important that each learner's task list from P6 contains a suitable number of tasks to complete this criteria.

P10 As part of a game development team it is vital that learners can take their assets and put them in the game. It is not suitable for one team member to be solely responsible for implementation. All learners should be implementing their assets into the game.

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P11 As part of the development journal, each learner should submit a contribution each week. This contribution should include images, videos, comments etc. It would also be advisable for learners to comment upon what they have completed and what they plan to do next. This will ensure that everyone in the team is aware of what each other's doing.

P12 With small development teams it is important that everyone tests the game. A template bug tracking report should be provided and learners should ensure they are filling it out correctly. Once a bug has been found, the learner responsible for the bug should take the report and fix the bug.

M5 This should be completed as part of the learner's final contribution to the development journal or blog. They should discuss successes and failings of their work and how they contributed to the final product.

M6 As with M5 this should be completed as part of the final post. Each member of the team should critically analyse the game, presenting reasoned opinions.

D3 As with M5 and M6, this again should be completed as part of the final post. Learners should reflect upon their tasks and completed assets, referring back to the PDP produced in PO2. Learners should also produce a new PDP based on their skills, again identifying timescales and measures of success.

Synoptic assessment

This unit could be taught concurrently with Unit 7, 8 and 11 and there are opportunities for learners to demonstrate synoptic knowledge and learning from other units in their evidence for this unit.

The amplification below identifies where the centre should consider synoptic assessment and where learning from other units can be assessed within this unit. Centres could also consider Unit 12 as the final taught unit, whereby all skills and techniques learnt in previous units are showcased.

PO1 Develop and present a game idea pitch

When learning about how to pitch an idea, analyse an audience and produce a presentation, this could be taught concurrently with Unit 1 Business for video games AO3.

When considering games platforms and hardware/software types, this could be taught concurrently with Unit 2 Digital asset management AO1.

When learning about building prototypes and iterating on concepts, this could be taught concurrently with Unit 10 Games mechanics PO3 and PO4.

PO2 Demonstrate an understanding of the key aspects of a chosen role within the games development team

When considering the key aspects of chosen roles, and the part it plays in the development process, this could be taught concurrently with Unit 1 Business for video games AO3.

When learning about personal development planning, the setting of deadlines and personal goals, this could also be taught concurrently with Unit 1 Business for video games AO3.

PO3 Develop an asset production/task list for chosen role

When identifying the requirements of a game production, and planning a personal task list, this could be taught concurrently with Unit 1 Business for video games AO3.

When planning a project, and learning about project management techniques, this could also be taught alongside Unit 1 Business for video games AO3.

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PO4 Work as part of a team to develop a shippable game

When working as part of a team, learning about working habits and working with a team could be taught concurrently with Unit 1 Business for video games AO3.

When learning about presentation of technical documents this could be taught concurrently with Unit 4 Concept art PO2 for composition rules and PO4 for effective presentation to peers and use of office tools.

Delivery guidance

For this unit, learners should use skills developed in previous units to produce their final product.

PO1 Develop and present a game idea pitch

This outcome should be completed very early in the delivery process. It is important that each learner has the opportunity to show their ideas. Following the deliveries of these pitches, the team, along with teaching staff should decide upon which idea is to be developed into a game for the remainder of the unit. Following that decision, learners should collaboratively build a concise games design document to help ensure each member of the team knows what the game should become.

PO2 Demonstrate an understanding of the key aspects of a chosen role within the games development team

The preferred role a learner applies for should be based upon a skills audit. Learners should produce a CV and covering letter to accompany a portfolio of work produced during the previous units of their study. The role applications should be reviewed by centres and roles assigned according to skills and understanding of role requirements. Learners should all be applying for a practical role as with small teams, management is a collective effort from the whole team. Without a practical role, learners will find it difficult to meet the marking criteria for PO3 and PO4.

PO3 Develop an asset production/task list for chosen role

The tasks a learner completes for the project will most likely change as the project develops. Learners should, based on prior experience from previous units, be able to outline their expected tasks at the offset, and then modify the list as required through the development. The development journal should be used to track the changes to this list, including reasoning etc. The prioritised list should be based on the ideology of completing tasks in order to get the best possible product in the available time.

Contingency planning is important but not always possible at the start of a project. Learners should develop and discuss possible contingencies in their development journals.

PO4 Work as part of a team to develop a shippable game

This performance outcome addresses the final product itself. Learners are required to show, in their development journals what they have contributed. Learners should be encouraged to maintain good written discussion and produce well presented evidence of practical work in the form of screenshots, renders, videos etc.

For the practical elements of this module, it is advised that either Unreal Engine 4 (UE4) or Unity 5 is utilised as both have free resources available and have the technical capabilities to complete the required tasks.

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Employer engagement guidance

Guest speakers from local studios and, if at all possible, any course tasks or assignments given to learners, should be set within real-world situations. Tutors may wish to contact appropriate local businesses to enquire whether they could provide industry-relevant scenarios for learners such as game types, game themes etc.

Useful links and resources

Books

- Koster Raph, *A theory of fun for game design,* Scottsdale, Ariz.: Paraglyph, c2005.
- Moore Michael E, *Basics of game design,* Boca Raton : A K Peters/CRC Press, c2011.
- Trefry Gregory, *Casual game design: designing play for the gamer in all of us,* Amsterdam; London: Morgan Kaufmann, c2010.
- Adams Ernest, *Fundamentals of game design,* Upper Saddle River, N.J.: Pearson Prentice Hall, c2007.
- Schuytema Paul, *Game design: a practical approach,* Boston, Mass.: Charles River Media, c2006.
- Todd Deborah, *Game design: from blue sky to green light,* Wellesley, Mass.: A K Peters, c2007.
- Burgun Keith, *Game design theory: a new philosophy for understanding games,* Boca Raton, Fla.; London: CRC, c2013.
- Fullerton Tracy, *Game design workshop: a playcentric approach to creating innovative games,* Amsterdam; London: Morgan Kaufmann.
- Swink Steve, *Game feel: a game designer's guide to virtual sensation,* Amsterdam; London: Morgan Kaufmann, c2009.
- Rogers Scott, *Level up!: the guide to great video game design,* Chichester: Wiley, 2010.

Websites

- gamasutra.com
- tomlooman.com
- worldofleveldesign.com

YouTube video tutorial playlists

- Learning Channels:
- Unreal Engine: youtube.com/user/UnrealDevelopmentKit/featured
- Unity: youtube.com/user/Unity3D/playlists

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17 Externally set and marked examinations

17.1 Introduction

Unit M/507/6610, Business for video games and unit T/507/6611, Digital asset management of these qualifications are assessed via an externally set and marked AQA examination.

External examinations are set by AQA (sometimes in collaboration with an employer or a professional body) and are sat by learners in a controlled examination environment, at a pre-set time and date and marked by AQA.

Examinations are available for externally assessed units in January and June and entries must be made in accordance with AQA's procedures.

Further information on how to make entries for examinations can be found in the AQA *Centre Administration Guide for Technical and Vocational Qualifications*.

17.2 Examination format and structure

Unit title	M/507/6610 – Business for video games
Exam sessions	January and June
Duration	2 hours
Type of exam	Written exam A mixture of multiple choice, short answer and case study type questions
Number of marks	80
Weighting of unit	25% of the Level 3 Foundation Technical Level Entertainment Technology: Video Games Art and Mechanics 16.66% of the Level 3 Technical Level Entertainment Technology: Video Games Art and Animation 12.5% of the Level 3 Technical Level Entertainment Technology: Video Games Art and Design 8.33% of the Level 3 Technical Level Entertainment Technology: Video Games Art and Design Production

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Unit title	T/507/6611 – Digital asset management
Exam sessions	January and June
Duration	2 hours
Type of exam	Written exam A mixture of multiple choice, short answer and case study type questions
Number of marks	80
Weighting of unit	12.5% of the Level 3 Technical Level Entertainment Technology: Video Games Art and Design 8.33% of the Level 3 Technical Level Entertainment Technology: Video Games Art and Design Production

17.3 Reasonable adjustments and special considerations

Information on the reasonable adjustments allowed for the external examinations within this qualification can be found in the AQA *Centre Administration Guide for Technical and Vocational Qualifications*.

17.4 Availability of past examination papers

Sample and past examination papers for this qualification are available from AQA.

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18 Externally set and marked assignments

Unit J/507/6614, 3D environment art and unit L/507/6615, 3D Character art of these qualifications are assessed via an externally set and marked AQA assignment.

External assignments are set by AQA (sometimes in collaboration with an employer or a professional body), and are sat by learners in a supervised environment, and marked by AQA.

Further information on how to make entries for external assignments can be found in the AQA *Centre Administration Guide for Technical and Vocational Qualifications* at aqa.org.uk

18.1 Assignment format and structure

There are two assignments for unit J/507/6614, 3D environment art and unit L/507/6615, 3D Character art, in each academic year. Learners can choose which of the assignments they wish to complete.

Materials for both assignments are released to centres on a specified date each year. This date can be obtained from the AQA website aqa.org.uk

There are two windows for assessment each year when centres must submit their learners' completed external assignments to AQA for marking. The dates of these windows can be obtained from the AQA website.

Learners must undertake their external assignment tasks individually and under supervised conditions. The *Guidance notes for tutors* and the *Assignment brief* provide specific instructions on the way in which the assignment tasks should be delivered.

18.2 Preparation

The assignment should only be undertaken after learners have acquired the necessary skills and after teaching for the appropriate sections of the specification has taken place. Learners should also be familiar with any apparatus, equipment or materials they will need to use.

Centres should organise an appropriate approach to the delivery of the assignment that takes into account when the assignment becomes available and when completed learner work is required by AQA for submission.

Before starting the assignment, centres should introduce learners to the *Information for candidates* document that identifies the rules surrounding learner research and independent working. Learners should be introduced to the idea that, prior to submission of their external assignment, they will be required to sign a declaration to say that they have complied fully with the rules of the administration of the external assignment.

18.3 Risk assessment and risk management

Risk assessment and risk management are the responsibility of the centre.

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18.4 Carrying out the assessment

Learners are expected to work individually.

Unless specific guidance to the contrary is made in the *Assignment brief*, centres should not give any advice to learners regarding completion of the assignment.

Details of any supporting documents, materials or electronic devices that can be used by learners during the assessment will be provided within the *Guidance notes for tutors* and the *Assignment brief*. The circumstances in which learners are permitted to undertake research will also be specified within the *Guidance notes for tutors* and the *Assignment brief*.

18.5 Learner absence

If a learner is absent for a part of the assignment then they should be given the opportunity to undertake the part of the assignment missed before they move on to the next stage. This may be with another group or at a different time.

18.6 Storage of materials

Materials for each assignment must be kept unopened and in secure storage until the date upon which the centre wishes to commence work on the assignment with learners.

Secure storage is defined as a securely locked cabinet or cupboard.

Whilst undertaking assignment tasks, at the end of each session, the centre must collect learners' work and keep it securely until the next session. Learners must not take any assessment materials away at the end of a session. Specific rules relating to the security of assessment can be found in the *Guidance notes for tutors*.

Further guidance on secure storage can be found in the *JCQ Instructions for Conducting Examinations* document at jcq.org.uk/exams-office/ice---instructions-for-conducting-examinations

Where learners' work is in an electronic format, centres must take steps to ensure that they meet the requirements for secure storage described above. This may involve collecting USB memory sticks for secure storage between sessions or restricting learners' access to specific areas of the centre's IT network.

As a general rule, learners should use the IT facilities provided by their centre. Where learners wish to/are required to use their own equipment, then the centre is responsible for establishing and implementing a procedure to ensure compliance with the requirements for secure storage described above.

18.7 Submission of learner work

Deadlines for submission of assignments will be provided in the *Assignment brief*.

Details of submission arrangements can be found in the AQA *Centre Administration Guide for Technical and Vocational Qualifications* at aqa.org.uk

To ensure that the external assignment has been completed appropriately, learners and tutors are required to confirm, before all learner work is sent to AQA for marking, that each of the learners has undertaken the assessment appropriately and in accordance with the rules.

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18.8 Redrafting or resubmission of learner work

Learners may only make one attempt at each assignment and redrafting is not allowed at any stage. Learners who wish to re-sit a unit assessment must attempt a different assignment.

18.9 Suspected malpractice or maladministration

Where centres suspect that the work produced by the learner is not their own, then this could potentially be malpractice. Further guidance on dealing with malpractice can be found in the JCQ document *Suspected Malpractice in Examinations and Assessments: Policies and Procedures* – jcq.org.uk/exams-office/malpractice and in the AQA *Centre Administration Guide for Technical and Vocational Qualifications* at aqa.org.uk

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19 External quality assurance

19.1 Overview

AQA's approach to quality assurance for this qualification is described within each unit specification.

External quality assurance for Tech-levels takes the form of verification and is concerned with maintaining the quality of assessment and checking that the assessment process has been undertaken appropriately by centre staff. It focuses on auditing the whole process and enables the head of centre, and all individuals involved in the assessment process, to understand what is required of them.

19.2 Quality assurance visits

When a learner is registered or a centre wants to submit work, this triggers a verification visit from an AQA external quality assurer (EQA).

Once a centre has registered learners, these visits will occur, as a minimum, every six months and will be face-to-face at a centre.

Our EQAs offer advice and guidance on any aspect of quality assurance in between formal visits, via telephone or email, and additional visits can be arranged.

These meetings will involve the following verifying that:

- all of the staff, resources, processes and procedures are still in place
- the centre is continuing to meet the approved centre criteria (those signed off during the initial centre approval visit)
- there is evidence of meaningful employer involvement in delivery.

A major part of the verification process is to check that the centre's policies and procedures (including internal standardisation minutes, record keeping, IQA/assessor records and materials) meet AQA's requirements and ensure valid and reliable assessment.

The EQA will look at a representative sample of learner work to verify that the results awarded by the centre are valid, as well as reviewing evidence of the activities that have been undertaken to standardise assessments.

These samples will be taken from different sites if the centre operates at more than one location, from different centre assessors or IQAs and at different stages of delivery – all samples will be selected by the EQA.

As part of the sample, the EQA will request examples of learner work at Pass, Merit and Distinction. This will also support the centre in their internal standardisation.

If centre assessment decisions are found to be inconsistent, adjustments can be made at a learner and cohort level, or in more severe cases, where a fundamental inconsistency or non-compliance is identified, sanctions (from a Level 1 Action plan through to Level 4 Suspension of delivery) can be put in place.

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19.3 Sanctions

Sanctions are used to help process improvement and are a way of protecting the validity of assessments or assessment decisions. We will only ever impose sanctions on a centre that are proportionate to the extent of the risk identified during the quality assurance process.

Sanctions can be applied at a learner, centre or centre staff level – and they can be at qualification or centre level and take the following form:

Level 1: Action point in EQA report.

Level 2: Suspension of direct claims status (where applicable).

Level 3: Suspension of learner registration and/or certification.

Level 4: Withdrawal of centre approval for a specific qualification.

Further information on levels and application of sanctions can be found in the AQA *Centre Administration Guide for Technical and Vocational Qualifications*.

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20 Internal assessment and quality assurance

20.1 Overview

Unit A/507/6612, 2D games art, unit F/507/6613, Concept art, unit R/507/6616, User interface, unit D/507/6618, Games animation and VFX, unit Y/507/6620, Level design, unit H/507/6622, Games Mechanics, unit M/507/6624, Games audio and unit T/507/6625, Collaborative games development project, of this qualification are internally assessed by the centre.

All assessment decisions that are made internally within a centre are externally quality assured by AQA.

AQA has worked with employers and professional bodies to produce guidance on what is the most appropriate form of assessment or evidence gathering for all internal centre assessment.

The most appropriate method of assessment (or evidence gathering) is detailed against each unit. Should a centre wish to use an alternative method of assessment to that detailed, then justification must be provided during AQA quality assurance visits to the centre.

This justification needs to explain why the centre feels their approach to assessment is more appropriate, efficient or relevant to the learner and/or subject and should be provided in writing to the AQA external quality assurer.

Centres should tailor the assessment to suit the needs of the learner, and internal assessments can take place at a time to suit the centre or learner.

Centres should take a best practice approach with learners being assessed through real life or work based activity to generate the required evidence (see Section 12.1 on Meaningful employer involvement).

20.2 Role of the assessor

The role of the assessor is to:

- carry out initial assessments of learners to identify their current level of skills, knowledge and understanding, and any training or development needs
- review the evidence presented against the requirements of the qualification, to make a judgement on the overall competence of learners
- provide feedback to learners on their performance and progress. This feedback needs to give learners a clear idea of the quality of the work produced, where further evidence is required and how best to obtain this.

20.3 Assessor qualifications and experience

In order to assess learners working towards this qualification, assessors must:

- have appropriate knowledge, understanding and skills relevant to the units within this qualification
- have experience as a practitioner and/or teaching and training, with significant experience of creating programmes of study in relevant subject areas
- undertake activities which contribute to their continuing professional development (CPD).

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20.4 Applying portfolio assessment criteria

When assessing learners' work, the centre should consider the level of attainment in four broad areas:

- the level of independence and originality
- the depth and breadth of understanding
- the level of evaluation and analysis
- the level of knowledge, skills or competency demonstrated.

20.5 Authentication of learner work

The centre must be confident that a learner's work is their own. You must inform your learners that to present material copied directly from books or other sources such as the internet, without acknowledgement, will be regarded as deliberate deception. This also includes original ideas, as well as the actual words or artefacts produced by someone else.

Learners' work for assessment must be undertaken under conditions that allow the centre to authenticate the work. If some work is done unsupervised, then the centre must be confident that the learners' work can be authenticated with confidence – eg being sufficiently aware of an individual learner's standard and level of work to appreciate if the evidence submitted is beyond the level of the learner.

The learner is required to sign a declaration that the work submitted for assessment is their own. The centre will also countersign this declaration that the work was carried out under any specified conditions – recording details of any additional assistance. This must be provided with the learner's work for external quality assurance purposes.

Any assistance given to an individual learner beyond that given to the group as a whole, even if within the parameters of the specification, must also be recorded.

If some work is done as a part of a team, the centre must be confident that the learner's contribution to that team activity can be clearly identified and authenticated.

20.6 Tutor assistance and feedback

Whilst learners are undertaking assignment tasks, tutors must ensure that any assistance given, or offered as a result of a learner's question and/or request for help, does not compromise the learner's ability to independently perform the task in hand.

During assessment, tutors can give general feedback and support to learners, most notably, on the following:

- development of the required knowledge and skills underpinning the assignment at hand
- confirmation of the assessment criteria being assessed
- clarification of the requirements of the *Assignment brief*
- identification of assignment deadlines

Tutors, however, must not assist learners directly and specifically with assignment tasks.

Tutors are not permitted to provide 'formative' feedback on learner's work, ie feedback, prior to submission for marking, on an assignment/task that will enable the learner to amend the assignment/task to improve it.

Once learner work has been submitted for marking, then tutors must give clear and constructive feedback on the criteria successfully achieved by the learner. Tutors should also provide justification

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and explanation of their assessment decisions. Where a learner has not achieved the performance criteria targeted by an assignment, then feedback should not provide explicit instructions on how the learner can improve their work to achieve the outstanding criteria. This is to ensure that the learner is not assisted in the event that their work is considered for resubmission.

20.7 Research and references

Where learners are required to undertake research towards the completion of a task, they should reference their research results in a way that is informative, clear and consistent throughout their work. We do not prescribe a specific way to organise references, but we expect tutors to discuss this with learners and identify a 'house style' that learners are then expected to use. Learners may include a bibliography of relevant sources on larger assignments where there has been significant research and there is value in recording all sources fully.

20.8 Role of the internal quality assurer

An internal quality assurer (IQA) must be appointed to ensure the quality and consistency of assessments within the centre. Each assessor's work must be checked and confirmed by an internal quality assurer.

The IQA must observe assessors carrying out assessments, review assessment decisions from the evidence provided and hold standardisation meetings with the assessment team to ensure consistency in the use of documentation and interpretation of the qualification requirements.

All assessment decisions made within a centre must be standardised to ensure that all learners' work has been assessed to the same standard and is fair, valid and reliable.

Evidence of all standardisation activity should be retained by the centre and could take the form of, for example, records of training or feedback provided to assessors, minutes of meetings or notes of discussions.

Our external quality assurers (EQAs) will always be happy to provide guidance and assistance on best practice.

Internal standardisation activity may involve:

- all assessors marking trial pieces of work and identifying differences in marking standards
- discussing any differences in marking at a training meeting for all assessors
- cross-moderation of work between assessors.

20.9 Internal quality assurer qualifications and experience

In order to internally quality assure the assessment of learners working towards this qualification, IQAs must:

- have appropriate knowledge, understanding and skills relevant to the units within this qualification
- have experience as a practitioner and/or teaching and training with significant experience of creating programmes of study in relevant subject areas
- undertake activities which contribute to their continuing professional development (CPD).

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20.10 Record keeping

The centre must be able to produce records that show:

- the assessor and IQA allocated to each learner
- the evidence assessed
- the dates of assessment and IQA
- details of internal standardisation activities of the assessor – what, when and by whom
- the grade awarded and rationale for this.

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21 Resits, resubmissions and retakes

21.1 Note on terminology

Resits refer to learners taking further attempts at an examined/externally assessed unit.

Resubmissions refer to learners undertaking a second attempt at an internally assessed unit task/assignment prior to external quality assurance.

Retakes refer to learners undertaking a second attempt at an internally assessed unit after external quality assurance.

21.2 Rules on resits, resubmissions and retakes

Resits and retakes are permitted where a learner has either failed the requirements of the unit, or where they wish to improve on a grade awarded.

For certification purposes, AQA will recognise the best achievement by the learner and not the most recent.

Resitting an exam or external assessment
The learner is permitted **three** attempts (one initial and two resits) in relation to each examined/externally assessed unit of the specification.

Learners who have been awarded the Foundation qualification and have progressed to the full Technical Level are allowed to use the resit opportunities to go back and improve the grade achieved in the external assessment. Any improvement cannot be used to upgrade and reclaim the previously awarded Foundation qualification.

Resubmitting internal assessments
The learner is permitted **one** resubmission in relation to each internally assessed unit of the qualification, but only when the tutor believes the learner can achieve the outstanding criteria without further guidance. Any resubmission of work must be undertaken prior to external moderation.

Retaking internal assessments
The learner is permitted **one** retake in relation to each internally assessed unit of the qualification. This could mean the learner doing the entire unit work again, or simply correcting a task/assignment before the unit is again submitted for external moderation by AQA. With a retake, learners are not allowed a resubmission opportunity.

Any retake and/or resubmission of work must be completed within a defined and reasonable period of time following learner feedback of the initial assessment. Any work provided as evidence must be authenticated by the learner as their own.

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22 Grading

22.1 Overview

Performance in all units is graded at Pass, Merit or Distinction. These unit grades are then converted into points and added together to determine the overall grade for the qualification.

The overall qualifications are graded as follows:

Level 3 Foundation Technical Level Entertainment Technology: Video Games Art and Mechanics P, M, D, D*.

Level 3 Technical Level Entertainment Technology: Video Games Art and Animation PP, MP, MM, DM, DD, D*D, D*D*.

Level 3 Technical Level Entertainment Technology: Video Games Art and Design PP, MP, MM, DM, DD, D*D, D*D*.

Level 3 Technical Level Entertainment Technology: Video Games Art and Design Production PPP, PPM, MMP, MMM, MMD, DDM, DDD, D*DD, D*D*D, D*D*D*.

22.2 Internally assessed units

Centres must ensure that all assessment criteria in the unit are covered during the teaching and learning process so that learners can meet the requirements. Work should be assessed against the grading criteria provided within each unit.

- To achieve a Pass, a learner must have satisfied all Pass criteria.
- To achieve a Merit, a learner must achieve all of the Pass and all of the Merit criteria.
- To achieve a Distinction, a learner must achieve all of the Pass, Merit and Distinction criteria.

22.3 Externally assessed (examined) units

These units are assessed by AQA using a marks-based scheme. After the assessment has taken place and been marked, the grade boundaries are set by AQA. These grade boundaries are based on the level of demand of the assessment and learners' performance – all learners that took the assessment, not just those in your centre.

When the assessment results are shared with the centre, AQA will report on the grade boundaries.

Note: These grade boundaries may change for each assessment window according to the demand of the assessment – this is important to maintain standards across each window.

Learners' grades are converted into points.

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22.4 Points per grade – unit level

Table 1 shows the points for each grade at a unit level.

Table 1: Points per grade

Grade	Internally/centre assessed unit
Pass	36
Merit	54
Distinction	72

22.5 Final grade for overall qualification

The final grade for the overall qualification will be calculated by adding together the points achieved for each unit. The total possible number of points that can be achieved is 618.

Tables 2 to 5 set out how the overall qualification grade is calculated.

Points for overall qualification grades

Table 2: Level 3 Foundation Technical Entertainment Technology: Video Games Art and Mechanics

Grade	Points boundary
P	144
M	198
D	252
D*	270

Table 3: Level 3 Technical Entertainment Technology: Video Games Art and Animation

Grade	Points boundary
PP	216
MP	270
MM	297
DM	360
DD	378
D*D	396
D*D*	405

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Table 4: Level 3 Technical Entertainment Technology: Video Games Art and Design

Grade	Points boundary
PP	288
MP	360
MM	396
DM	468
DD	504
D*D	522
D*D*	540

Table 5: Level 3 Technical Entertainment Technology: Video Games Art and Design Production

Grade	Points boundary
PPP	432
PPM	486
MMP	540
MMM	594
MMD	648
DDM	702
DDD	756
D*DD	774
D*D*D	792
D*D*D*	810

22.6 The 'Near Pass' rule

A near pass will be applied to an **externally assessed unit or external assignment** for those learners who may fall just short of a pass grade. The unit grade will still be reported as a grade U, since the learner will not have performed to the minimum standard required for a Pass grade, but will qualify as a near pass for the purposes of determining the overall qualification grade.

The actual mark required to achieve the 'near pass' grade on an examined unit will change from year to year, depending on the grade boundaries that have been set. For an external assignment a learner will achieve a 'near pass' if they satisfy all bar one of the Pass criteria for the unit. A learner will receive 27 points if they achieve a Near Pass.

A learner is allowed one Near Pass in an externally assessed unit or external assignment in a Foundation Technical Level or up to two Near Pass results (six or eight unit Technical Level) or up to three Near Pass results (12 unit Technical Level).

All other eligibility requirements for achieving the qualification will remain the same:

- the total points score is above the Pass threshold; **and**
- all other units are passed

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23 Administration arrangements

Full details of all of the administration arrangements relating to AQA Tech-levels can be found in the AQA *Centre Administration Guide for Technical and Vocational Qualifications*, including:

- how to apply for centre approval
- registration of learners
- dealing with recognition of prior learning (RPL)
- how to make examination entries
- dealing with missed examination dates
- examination invigilation arrangements
- how to make claims for certificates
- how to appeal against an assessment, IQA or EQA decision
- retention of learner work and assessment/IQA records
- dealing with potential malpractice or maladministration.

Details of all AQA fees can be found on the AQA website at aqa.org.uk

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24 Appendix A: Transferable skills standards and guidance

24.1 Transferable skills – communication standards (oral)

Evidence must clearly show that the learner can:

CO1	Prepare a suitable presentation.	1.1 Research suitable topics for the presentation. 1.2 Research the most appropriate format for the presentation. 1.3 Plan the structure of the presentation. 1.4 Make use of any appropriate supporting materials and prepare any other resources needed for the presentation.
CO2	Use language, vocabulary, tone and style suited to the complexity of the topic and the context.	2.1 Use appropriate language and vocabulary. 2.2 Structure what is presented to help the audience follow the sequence of the main points and ideas. 2.3 Use tone and style of presentation appropriate to the audience and environment.
CO3	Use a variety of methods to engage the audience.	3.1 Provide examples to illustrate complex points. 3.2 Use relevant images from appropriate sources to illustrate key points. 3.3 Use at least one additional method to engage the audience.

Required evidence[7]

- Learner preparation evidence (planning notes, research).
- Learner presentation including all support materials.
- Assessor observation record*.

Learner guidance

The learner should consider the purpose, topic and audience as follows:

- the presentation should be eight minutes long to allow the learner to demonstrate the appropriate skills
- the presentation must always be contextualised within the technical subject content, and should not be simulated
- an audience of at least two or three people which may or may not include peers.

[7]For evidence marked with an asterix (*) recording documents are available for centres to use – please see aqa.org.uk/tech-levels/transferable-skills

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CO1

There should be evidence showing that the learner has:

- researched the technical subject content of a complex matter
- selected information relevant to the purpose of the presentation
- planned how to structure the presentation
- planned to use a relevant image or images to illustrate key points of the presentation – that adds value to the overall presentation
- included one additional method to engage audience for example questioning, completion of hand-out, discussion etc.

CO2

Learners should:

- give a well-structured delivery and must clearly highlight the main points of their presentation using tone, gesture or expression
- use appropriate vocabulary suited to the audience and environment.

CO3

Learners must:

- give examples to explain ideas
- make effective use of an image or images and other support materials to engage the audience and to illustrate key points, for example through use of video clips, explanatory notes or other technically related activities.

Tutor guidance

- Tutors should use an observation record to support their assessment.
- Tutors should ensure that those observing are familiar with the observation record content and purpose.
- The presentation may be delivered through spoken communication or using sign language.
- Tutors should look for fitness of purpose and styles of presentation. Brief notes may be used as a prompt, but learners should not rely on them entirely.

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24.2 Transferable skills – communication standards (written)

Evidence must clearly show that the learner can:

CW1	Select appropriate formats for presenting information as a report.	1.1 Decide on the most appropriate format for the technical report. 1.2 Plan the structure of the technical report. 1.3 Make use of any appropriate supporting materials and prepare any other resources needed for the technical report.
CW2	Select and use an appropriate style and tone to suit their audience.	2.1 Use appropriate language and vocabulary. 2.2 Structure the technical report to help the audience follow the sequence of the main points and ideas. 2.3 Use tone and style appropriate to the intended recipient(s).
CW3	Organise material coherently, to suit the length, complexity and purpose of their technical report, proofread and where necessary, re-draft documents.	3.1 Spell, punctuate and use grammar accurately. 3.2 Make their meaning clear. 3.3 Use relevant images from appropriate sources to illustrate key points. 3.4 Proofread their technical report. 3.5 Obtain feedback and amend technical report accordingly.

Evidence required[8]

- A learner technical report of at least 1,000 words excluding support materials.
- An assessor recording form*.

Learner guidance

The learner should:

- produce a technical report about a complex subject which must be at least 1,000 words long
- include subject matter, which may well have a number of strands that is challenging to the individual learner in terms of the ideas it presents.

[8]For evidence marked with an asterix (*) recording documents are available for centres to use – please see aqa.org.uk/tech-levels/transferable-skills

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CW1

It is essential that learners know how to:

- organise their technical report
- link paragraphs in various ways
- use features, such as indentation and highlighting, to suit different types of documents.

CW2

Learners should know how to:

- produce a technical report that takes account of the vocabulary, tone and techniques normally used when producing documents for particular purposes and different recipients
- write with confidence and with the appropriate degree of formality.

CW3

In supporting key points:

- images that could be used include: graph, sketch, picture or material taken from a presentation
- learners should know how to check their work to ensure that spelling, punctuation and grammar are accurate
- learners should know how to write grammatically correct sentences, including correct use of a variety of verb tense, form and person (for example passive voice); spell accurately, complex, irregular and technical words and use punctuation effectively for example bullet points, semicolon, colon, apostrophes) to ensure their meaning is clear.

Tutor guidance

For the technical report produced, assessors should look for evidence that the learner has:

- selected an appropriate format for report
- organised relevant information using a clear and coherent structure
- used technical vocabulary when appropriate
- ensured that text is legible with accurate use of spelling, grammar and punctuation.

The learner should not be penalised for one or two errors providing meaning is still clear.

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24.3 Transferable skills – problem-solving standards

Evidence must clearly show that the learner can:

PS1	Identify a problem and the tools and techniques that could be used to explore the problem.	1.1 Identify, analyse and describe the problem. 1.2 Identify a variety of tools and techniques which could be used to explore the problem. 1.3 Plan how you will investigate the problem highlighting which tools and techniques will be used.
PS2	Implement both the plan to investigate the problem and the plan to solve the problem.	2.1 Implement the plan for investigating the problem and seek support and feedback from others as necessary. 2.2 Record and analyse the results of the investigation. 2.3 Identify the solution(s) to solve the problem. 2.4 Plan the steps to be taken in order to solve the problem, identifying any risks, and implement the solution.
PS3	Check if the problem has been resolved and review the approach to tackling problems.	3.1 Check whether the problem has been resolved/ solved. 3.2 Analyse the results and draw conclusions on the success of the problem-solving process. 3.3 Review the approach to tackling/solving the problem, including whether other approaches might have proved more effective.

Evidence required[9]

- Explore/plan* – to be completed by the learner.
- Do* – to be completed by the assessor.
- Review* – to be completed by the assessor.

Learner guidance

The learner must demonstrate:

- a systematic approach to tackling problems, including identifying which is the most appropriate method, then developing a plan and implementing it
- how they went about the problem-solving process.

Evidence should be on individual performance. A group approach to problem-solving does not allow learners to achieve specific elements of the standards.

Activities must always be in relation to the core subject content and should not be simulated.

Effective definition of the problem will help the learner tackle it systematically and produce valid evidence. Tutors may discuss with learners the most appropriate definition of the problem and what sort of results might be expected so the learner is clear on what would show that the problem had been solved.

[9]For evidence marked with an asterix (*) recording documents are available for centres to use – please see aqa.org.uk/tech-levels/transferable-skills

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PS1

Learners should:

- recognise, identify and describe the main features of the problem
- identify how they will explore the problem and the tools and techniques they will use
- use a variety of methods for exploring the problem.

PS2

Learners should:

- obtain approval to implement their plan from an appropriate person, which could be the tutor or supervisor
- make effective judgements, based on feedback and support available, when putting their plan into action
- check their plan regularly for progress and revise it accordingly.

PS3

Learners should:

- use an appropriate method for checking if the problem has been solved. For example if a learner designed a procedure or process for improving a system that records information, they would need to test this out and report back on their findings
- know how to describe the results in detail and draw conclusions on the success of their problem-solving skills
- reflect back on the process considering areas such as:
  - did they spend enough time considering the features of the problem?
  - were they effective in planning action points to tackle the problem?
  - did they take a logical approach to checking if the problem had been solved/resolved?

In some circumstances, achievement of the standard may be possible even if the problem has not been solved or resolved, especially if factors were outside of their control, and the learner was able to demonstrate the process of tackling the problem.

Tutor guidance

- Tutors should check problem-solving implementation planning.
- Tutors may be required to provide a witness statement in support of evidencing the processes.

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24.4 Transferable skills – research standards

Evidence must clearly show that the learner can:

R1	Design a research study.	1.1 Identify possible topics for research. 1.2 Choose one topic, identifying appropriate objectives for detailed research, and plan how to carry out the research. 1.3 Select a variety of resources to gather relevant information and identify appropriate methods and techniques to carry out the research.
R2	Conduct data collection and analysis.	2.1 Collect data using the appropriate methods to test the hypotheses/theories. 2.2 Carry out an appropriate analysis of the data. 2.3 Draw appropriate conclusions that are supported by the evidence from the data analysis.
R3	Present findings of the research and evaluate the research activities.	3.1 Prepare and present results of research. 3.2 Present the information in a clear and appropriate format adapted to the needs of the audience. 3.3 Seek feedback and use it to support own evaluation of research skills.

Required evidence[10]

- Plan* – to be completed by the learner.
- Do* – to be completed by the assessor.
- Review* – to be completed by the assessor.
- Results of research.

Learner guidance

The learner should demonstrate they can:

- identify clear and appropriate objectives for the research study
- plan and carry out research activities with the particular objectives in mind
- design their research study in a systematic way
- present their findings as well as evaluating their research skills and activities
- be clear about the objectives of the research study, for example to assess the positive and negative impact of digital photography on sports journalism to predict future trends
- identify sources, methods and strategies they plan to use to investigate the topic
- carry out the research within a clearly defined structure, with a measure of complexity that should be reflected in the breadth and nature of the research objectives
- undertake the analysis required to make the best use of information/data and the requirement to give a clear justification for their conclusions
- make different research methodologies.

Activities must always be contextualised within the core subject content, and should not be simulated.

[9]For evidence marked with an asterix (*) recording documents are available for centres to use – please see aqa.org.uk/tech-levels/transferable-skills

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RS1

The learner should explore:

- a variety of possible topics to research and should spend time deciding on clear and measurable objectives when designing their research study
- objectives and discuss and agree them with a tutor or supervisor
- a wide variety of sources when gathering their information
- the use of at least three different types of resource
- one source that is primary (gathered by the learner), for example, interview, questionnaire, survey, rather than from secondary for example encyclopaedia, interpretations of original material.

The learner should produce a plan detailing how they will carry out the research.

RS2

The learner should:

- keep a record of the sources used
- independently collect information including data
- analyse information collected and identify information and data most relevant to their research objectives.

RS3

When presenting their findings, learners should:

- use a format that is most appropriate to the content in terms of audiences, subject matter and research objectives
- communicate research findings clearly
- seek feedback from appropriate people
- show how they have used this feedback to help evaluate their research skills
- evaluate their research activities addressing all aspects including identifying the research objectives, collecting and analysing data and/or information, and recording, presenting and explaining findings.

Tutor guidance

- Tutors should agree research objectives with learner.
- Tutors should check that different types of resource have been used.

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24.5 Transferable skills – teamwork standards

Evidence must demonstrate the learner can:

TW1	Plan the work with others.	1.1 Agree realistic objectives for working together and what needs to be done in order to achieve them. 1.2 Share relevant information to help agree team roles and responsibilities. 1.3 Agree suitable working arrangements with other team members.
TW2	Develop and maintain cooperative ways of working towards agreed objectives checking progress on the way.	2.1 Organise and complete own tasks efficiently to meet responsibilities. 2.2 Seek effective ways to develop cooperation such as ways to resolve conflict and maintain open communication. 2.3 Share accurate information on progress and agree changes where necessary to achieve objectives.
TW3	Review working with others and agree ways of improving collaborative work in the future.	3.1 Agree the extent to which working with others has been successful and objectives have been met. 3.2 Identify factors, including their own role, in influencing the outcome. 3.3 Provide details of how they could improve working with others in the future, including interpersonal skills.

A group/team is defined as **three or more** people (eg peer, co-worker) who are working towards shared objectives. It is not acceptable for tutors/assessors to be part of the team. The nature of the teamworking should reflect the sector in which the qualification sits, eg engineering, business or IT.

Required evidence[11]

- Plan*.
- Do*.
- Review*.
- Minutes of meetings.
- Witness statement.
- Peer statements.

Learner guidance

Meeting the standard will confirm that the learner has:

- demonstrated the ability to work cooperatively with others
- be clear about the objectives the team or group is working towards and their own responsibilities
- planned and carried out the work supporting others, reviewing outcomes and suggesting ways of improving work with others.

Activities must always be contextualised within the core subject content, and should not be simulated.

[11]For evidence marked with an asterix (*) recording documents are available for centres to use – please see aqa.org.uk/tech-levels/transferable-skills

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TW1

As part of the initial team planning meeting the learner should:

- offer suggestions and listen to others to agree realistic objectives, prioritise tasks and identify resources and timescales
- be clear about their own responsibilities and the areas of work for which they are answerable to others
- produce a plan showing what needs to be done by the team clarifying own responsibilities and arrangements for working with others in the team.

TW2

Learners should take responsibility for:

- organising their own work to meet the agreed deadlines
- the use of correct and appropriate techniques and approaches when carrying out tasks
- actively looking for ways to develop and support cooperative working, including helping to deal with conflict and taking a lead role in anticipating the needs of others
- considering the rights and feeling of others
- ensuring at least one team progress meeting should be held before the final review meeting.

TW3

During the team review meeting learners should:

- provide information about their own contribution to the work of the team ie what did they do and how did they interact with other members of the group
- explain how improved inter-personal skills could contribute to more effective collaboration in the future (for example 'I should listen more carefully when negotiating activities/tasks')
- identify improvements they could make in managing tasks (for example 'I could have been better organised with notes at team meetings').

Tutor guidance

Tutors are encouraged to support the evidence process by completing a witness statement.

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