National Unit Specification: general information

UNIT   Computer Games: Design (SCQF level 6)

CODE   F915 12

SUMMARY

The aim of this Unit is for candidates to gain an understanding of underlying concepts and fundamental principles involved in computer game planning and design. Candidates will build on their knowledge of hardware in gaming technology and investigate graphics and sound technology used by various types of digital gaming platforms. Candidates will investigate emerging technologies in gaming and analyse how this technology will affect games and users' expectations of games. Candidates will investigate what organisations and activities are involved in the investment, creation, production and distribution of games and evaluate external factors to be considered when designing a computer game. Candidates will evaluate design methods used in the planning and design stages involved in the production of a computer game. Candidates will plan and design a computer game.

OUTCOMES

1 Evaluate gaming technologies.
2 Evaluate design elements.
3 Plan and design a computer game.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, it would be beneficial if candidates had the following IT skills:

D01D 11 *Information Technology* (Intermediate 2)

or equivalent qualifications or experience.

National Unit Specification: general information (cont)

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CREDIT VALUE

1 credit at SCQF level 6 (6 SCQF credit points at SCQF level 6*).

SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates

CORE SKILLS

Opportunities to develop aspects of Core Skills are highlighted in the Support Notes of this Unit Specification.

There is no automatic certification of Core Skills or Core Skill components in this Unit.

National Unit Specification: statement of standards

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Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit Specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

OUTCOME 1

Evaluate gaming technologies.

Performance Criteria

(a) Accurately evaluate graphics and sound technologies and their impact on computer games.
(b) Accurately evaluate emerging technologies in gaming.
(c) Accurately evaluate the process of the games industry value chain.

OUTCOME 2

Evaluate design elements.

Performance Criteria

(a) Accurately evaluate external factors to be considered when designing a computer game.
(b) Accurately evaluate design elements from observable design areas in existing games.
(c) Accurately evaluate game rules.

OUTCOME 3

Plan and design a computer game.

Performance Criteria

(a) Produce a clear, concise and feasible design brief for an advanced computer game.
(b) Produce a plan for the computer game that is consistent with the design brief.
(c) Produce a list of assets consistent with the plan for the computer game.

National Unit Specification: statement of standards (cont)

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EVIDENCE REQUIREMENTS FOR THIS UNIT

The Evidence Requirements for this Unit will be the production of a digital or paper portfolio containing the following:

1   A report evaluating graphics and sound technologies and their impact on computer games.
2   A report evaluating two emerging technologies in gaming.
3   A report accurately evaluating the six stages of the games industry value chain.
4   A report evaluating four external factors to be considered when designing a computer game.
5   A report accurately evaluating four design elements from observable design areas in two existing games.
6   A report accurately evaluating three game rules.
7   A clear, concise and feasible design brief for an advanced computer game containing at least six design elements, one of which must be user interface requirements.
8   A plan which includes at least four design elements for a computer game.
9   A list of assets required for a computer game.

Candidates are encouraged to use the internet in any research; however, the evidence produced must be in their own words. Tutors should assure themselves of the authenticity of candidates' evidence.

Written and/or oral recorded evidence is required which demonstrates that candidates have achieved all three Outcomes to the standard specified in the Performance Criteria. The evidence for all three Outcomes should be obtained under controlled, supervised conditions.

A checklist is required to confirm that each candidate has completed the above tasks, without undue assistance, to the standards defined in the performance criteria, and also to authenticate that the contents of the portfolio are the candidate's own work.

National Unit Specification: support notes

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This part of the Unit Specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

GUIDANCE ON THE CONTENT AND CONTEXT OF THIS UNIT

This Unit is a mandatory Unit of the NPA in Computer Games Development at SCQF level 6. It is included in the optional sections of Digital Media Computing frameworks and can be taken as a standalone Unit.

Outcome 1

Candidates will evaluate the impact graphics and sound technology has on computer games. Candidates will investigate various graphics and sound technology used by various types of digital gaming platforms. These may be located in manufacturers' web pages, catalogues, magazine reviews and within software help menus and documentation.

Candidates will extract and analyse information regarding hardware specifications such as graphic cards, processor speed, memory capacity, clock speed, interface and power and sound quality such as 3D sound and surround sound from gaming platforms which may include the following:

♦ portable gaming platform (psp, nds, pandora, gp2x wiz)
♦ games console (xbox360, ps3)
♦ PC (Windows, Mac OS X, Linux)
♦ software platforms (flash, java)
♦ mobile operating systems (Symbian, RIM Blackberry, Windows, Apple iPhone, Google Android, other (Palm/Linux))
♦ other devices: eg skybox, portable media players

Examples of questions and pointers to aid evaluation of graphics:

♦ How does the quality of graphics add to the enjoyment of the game?
♦ Why should I upgrade my graphics card?
♦ Discuss processor speed, memory capacity, clock speed, interface and power
♦ What is DirectX?
♦ What is Open GL?
♦ Compare OpenGL and Direct3D.

National Unit Specification: support notes (cont)

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Examples of questions and pointers to aid evaluation of sound:

♦ How does the quality of sound add to the enjoyment of the game?
♦ Demonstrate an understanding of current sound technology.
♦ Compare 3D sound with surround sound.

Candidates will evaluate emerging technologie**s** in gaming. Candidates may:

♦ analyse how this technology will affect games and users' expectations of games
♦ predict how this technology will affect the gaming industry in the future

Candidates will evaluate the process of the game value chain.

Candidates will investigate what organisations are involved in the investment, creation, production and distribution of games. Candidates will identify the different activities involved, from games conception through to distribution. Candidates may use internet websites, catalogues and magazine reviews.

Computer games can be designed, created, developed, published and marketed by different organisations that are all responsible for a particular element of the game value chain.

The game value chain is made up of six connected but distinctive layers:

1 The investment (capital) layer: paying for development of new titles and seeking returns through licensing of the titles.
2 The design and creative (product and talent) layer: includes designers, artists and developers.
3 The production and tools layer: game engines, game development middleware and project management tools.
4 The publisher/distribution layer: the publishing industry involved in generating and marketing games for retail and online distribution.
5 The hardware (or virtual machine or software platform) layer: the providers of the underlying platform which may be console-based, accessed via online media or through mobile devices such as the iPhone.
6 The end-user layer: the users/players of the games.

Examples of questions and pointers to aid evaluation of the game value chain

1 Who are the main investors in the games industry?
  ♦ Why invest?
    — What are the rewards?
    — Growing market
  ♦ What are the risks?
    — Pirating and distribution of illegal software therefore no return on investment.
    — Illegal downloading and sharing of software.
    — How do you protect your intellectual property?
    — Competition: who gets to the market first? Sony PS2 versus Nintendo Game — who got there first and did that influence their success?

National Unit Specification: support notes (cont)

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2   The design and creative layer includes designers, artists and developers who may be self-employed or part of an in-house development team.

   The role of a games designer may include the following aspects:
   ♦   translating the concept of game into a plan
   ♦   creating a game design document (blueprint)

3   The production and tools layer

   A game engine is a software system designed for the creation and development of video games. There are many game engines that are designed to work on video game consoles and desktop operating systems such as Microsoft Windows, Linux, and Mac OS X. Game engines usually include a rendering engine ('renderer') for 2D or 3D graphics, a physics engine or collision detection (and collision response), sound, scripting, animation, artificial intelligence, networking, streaming, memory management, threading, localisation support, and a scene graph. Game developers frequently reuse the same game engine to create different games.
   For more information see source: http://en.wikipedia.org/wiki/Game_engine

   Game development middleware: Some companies now specialise in developing software suites known as 'middleware'. Middleware developers attempt to develop robust software suites which include many elements a game developer may need to build a game. Most middleware programs provide facilities that ease development, such as graphics, sound, physics and AI functions. Gamebryo and RenderWare are widely used middleware programs.

   Project Management Software is a term covering many types of software, including budget management, cost control, resource allocation, collaboration and communication. Creating a game is in essence running a large project. Investors, publishers and hardware vendors are looking for a return on their investment. A game has to be created, produced and distributed in the most efficient way. Timelines are set and tracked (eg using Gannt charts), tasks and resources are allocated, tracked and monitored.

4   Who are the main publishers?
   ♦   Microsoft Games Studios
   ♦   Electronic Arts (ERTS)
   ♦   Activision (ATVI)
   ♦   Take-Two Interactive Software (TTWO)

5   Who are the main hardware vendors?
   ♦   Microsoft
   ♦   Sony
   ♦   Nintendo
   ♦   Apple

National Unit Specification: support notes (cont)

UNIT Computer Games: Design (SCQF level 6)

6   The end-user layer

In the UK in 2005 the BBC's Audience Research department undertook a research study on behalf of the New Media and Technology division amongst people between the ages of 6–65 (grouped into six sections: 6–10, 11–15, 16–24, 25–35, 36–50 and 51–65 years old).

As well as surveying just under three and a half thousand people across the UK, they also commissioned qualitative research from 14 mini-groups of gamers from the first four age groups (in Leeds and London). The results give a light-touch window into the gaming life of UK residents today.

For more information see source:
http://open.bbc.co.uk/newmediaresearch/files/BBC_UK_Games_Research_2005.pdf

Gaming is now a mainstream leisure activity in the UK. The average age of gamers is in the mid-twenties and it is estimated that over half of all males and one in four of all females play games regularly. As with other entertainment forms, there are games aimed at consumers of all ages from the very young to the over-18 market.

For more information see source: http://www.skillset.org/games/overview/article_4809_1.asp

Will some layers disappear in future?

Will technology and/or the internet have an affect on the value chain? Will some of the layers disappear? For instance there are videos on 'YouTube' ®™ that take individuals through the process of creating their own iPhone application.

Outcome 2

Candidates will evaluate factors external to the design brief that need to be considered when designing a digital game.

Factors to be considered may include:

♦ target audience
   — what age group is the game intended for?
   — can they read?
   — what will their IT skills level be?
   — does the user have any disability?
♦ social, cultural and legal
   — too much violence, crime, promotion of drug use, racism will have an effect on censorship
   — each country has its own censorship laws

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♦ history, nationality, religion and politics
  — The games industry operates in a global market. Games designers may wish to ensure that their game could not be construed as insulting or racist. If the game is a fictional story but is based in a real country the content could alienate potential customers and enflame opinion. For this reason Sony removed Bangladesh from one of their games. Spending time in courts defending a game is time consuming and costly. The games designer has to be prepared to make changes to the game to diffuse negative public opinion or even better avoid incorporating these negative factors into the game in the first place.
♦ gender
  — do all games avoid stereotyping?
  — do females and males favour different genres?
  — are some games designed to be a gender-inclusive game?
  — do some games genres favour male or female characteristics?

Characteristics	Male	Female
Consequences of failure	harsh — die, restart, lose	cannot continue till pass challenge
Competition	direct competition — versus each other or versus the game	indirect competition — against previous best
Colour scheme	dark brown, green, grey and blue	pink, purple and yellow
Objective	war/battle with violence/gore	real-life activity or puzzles, negotiation, mental challenge
Graphics	realistic graphics all male avatars	cute graphics

Candidates will play and evaluate observable design elements from two existing games. The games should be from different genres. Candidates will evaluate design elements in at least four of the following observable design areas:

Design Area: Questions and pointers to help with the evaluation of design elements

Narrative design

Identify narrative markers which help to guide players through the narrative of a game, eg: pop-ups, voice-over, properties of pickups, dialogue with characters and video.

Discuss the merits and drawbacks of having these narrative markers in computer games.

Examine different types of narrative structure (ie tree and web).

What is storyboarding?
♦ How to storyboard?
♦ Advantages of storyboarding?
♦ Methods — paper illustrations versus digital software?
♦ Digital — better for non-linear creations such as games.

National Unit Specification: support notes (cont)

UNIT   Computer Games: Design (SCQF level 6)

Character design

Accurately evaluate how games use different types of character to build interesting narratives. (Propp's Character Types — investigate Propp's theory on character types. Identify Propp's character types from an existing game.)

Level/environment design

Level design

Linear v non-linear level design: linear level design requires that the user must tackle problem A, then problem B, and so on. The way to solve each problem might still be interesting, but the linear structure prevents the possibility of strategic thinking. In non-linear level design the order in which you tackle the problems is an interesting gameplay element in its own right.

Environmental design

Is the game set in a 3D world modelled on real places?
Is there a range of features (trees, buildings, blocks, maze)?
Is there a sense of atmosphere? Environments are realistically gritty and include weather and are set at different times of the day with suitable lighting.
Is each environment design suitable to the setting of the story?
Are the size and dimensions sensible?
Number of locations?
Do the sound effects add to the game (audio and narration—- frightening, peaceful, fun)?
Do the visual effects add to the game (lighting, shadows, warps)?

Gameplay

What are rules of the game?
What are the challenges/choices?
Does the player receive appropriate rewards?
Is there an element of chance?
Is there a limited number of outcomes?
Is there progression from one activity to the next, from one level to the next?
Is there an element of skill/dexterity required?
Is this game for individual players or multiple players?

How do you depict the logic of gameplay?

A flow chart (and/or with refinement).
A top down design (and/or with refinement).
A bottom up design (and/or with refinement).

National Unit Specification: support notes (cont)

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Game Mechanics

Why is it important to specify values of variables that affect game play or game mechanics, ie object.attribute = value or playercar.speed = veryfast. (to pass information onto programmers)

Is it possible to modify game variables, eg lives, scoring, speed, number of enemies. What is the effect?

Is it possible to modify functions/algorithms, eg calculation of scores, keyboard input, positioning of characters, repetition, timed events. What is the effect?

User Interface Design

What is the user interface?
What are the UI design principles?
How can the interface affect the game?
How does the user receive information?
What screens are required — legal, level, score, win, lose?
How can the player control the game — via menus, control devices, buttons, icons, objects?
Can the interface elements be incorporated into gameplay?
How do you design quality navigation?

Candidates will accurately identify game rules: constitutive, operational and implicit. Candidates will define the operational rules of a simple popular game and change one or two of those rules to evaluate the impact on gameplay.

Every game has a set of rules. Conversely, every set of rules defines a game. Rules are the formal structure of a game. To play a game is to follow its rules.

General characteristics of game rules:
♦   fixed
♦   shared by all players
♦   binding
♦   repeatable
♦   explicit and unambiguous

Candidates will define the rules of a simple popular game as a focus of their evaluation. Games such as *Snakes and Ladders*, *Pong*, *Pacman*, etc would be suitable. Candidates should then change the rules to see what effect the rule change has on gameplay.

For instance, in *Snakes and Ladders* they could add a rule that if you landed on a square half way up a ladder then the ladder would move in a random direction and the player would move to the square at the top (or bottom) of the ladder. Snakes could have different colours and the player could collect points each time they went down a snake. If they had 50 points they would be exempt from being swallowed by any subsequent snake.
♦   What would be the effect on gameplay?
♦   Has the game improved?
♦   Has the logic of the game changed?
♦   What would be the effect on constitutive rules?

National Unit Specification: support notes (cont)

UNIT   Computer Games: Design (SCQF level 6)

Candidates will produce a clear, concise and feasible design brief for an advanced computer game.

The design brief should contain at least six of the following, one of which must be user interface requirements:

Design element	Items required
Game title/theme/genre	One accurate description
Target audience	One accurate description
Game platform	One accurate description of one named platform with details of hardware specifications, control and output devices.
Game purpose/objective/plot	One detailed description
Basic gameplay	One description
Main characters	Two descriptions
User interface requirements	Three screens (ie start screen, score screen, character selection screen)

Candidates will provide evidence of planning at least four design elements of one computer game. Four or more of the following types of evidence would be acceptable:

- ♦ narrative design — storyboard, mind map, story, script:
  - — a narrative that is engaging for the intended audience and appropriate for the target platform(s) or technologies being used
  - — a storyboard (digital or a detailed paper illustration)
- ♦ character design — character/object description, character sketch
- ♦ level/environment design — written description, illustrations, environmental pictures:
  - — linear design
  - — non-linear level design
- ♦ gameplay and game mechanics design:
  - — a document that specifies values of variables that affect game play or game mechanics ie Object.Attribute = Value or PlayerCar.Speed = VeryFast
  - — an accurate flow chart of one logical sequence of game play — with one sub routine (refining one aspect of gameflow)
  - — a written top down design of one level of a digital game with refinement of one aspect of gameflow
  - — accurate details of modification of game variables, eg lives, scoring, speed, number of enemies
  - — accurate details of modification of functions/algorithms, eg calculation of scores, keyboard input, positioning of characters, repetition, timed events
- ♦ user interface design — navigation, feedback, instructions, menus, buttons:
  - — navigation should be designed that is clear and intuitive to use
  - — the User Interface Design should adhere to the UID principles

Candidates will provide a list of assets required for the game they are designing. This will vary and may include graphics, sound files, animation, 3D objects, video clips and text files.

National Unit Specification: support notes (cont)

UNIT   Computer Games: Design (SCQF level 6)

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

If this Unit is undertaken in the context of the NPA in Computer Games Development at SCQF level 6, the following sequence of delivery is recommended:

1   *Computer Games: Design.*
2   *Computer Games: Media Assets.*
3   *Computer Games: Development.*

A variety of different types of information sources should be used for Outcome 1. Suitable sources include current magazines and a range of websites available on the internet.

Candidates should be allowed to actively explore various gaming platforms.

Candidates could record the findings of their research on a pro forma with suitable headings to aid gathering of appropriate information.

This Unit could be delivered in the context of a larger game with each candidate designing a level of a computer game. In these circumstances it essential that each candidate identifies their own contribution to the design task and provides evidence for their own individual portfolio.

The actual distribution of time between Outcomes is at the discretion of the centre, however, the following distribution and order is suggested.

Outcome 1   12 hours
Outcome 2   12 hours
Outcome 3   16 hours

OPPORTUNITIES FOR CORE SKILL DEVELOPMENT

In this Unit candidates are required to investigate technologies and to create a design which can provide opportunities to gather evidence towards aspects of *Information and Communication Technology* and *Problem Solving* at SCQF level 6.

Candidates should produce a clear, concise and feasible design brief for a computer game and may also choose to plan a narrative design including writing a story, play or plot which could provide opportunities to gather evidence towards aspects of *Communication* at SCQF level 6..

This Unit may be delivered in the context of a larger game with each candidate designing a level of a computer game. This would provide opportunities to gather evidence towards aspects of *Working with Others* at SCQF level 6.

National Unit Specification: support notes (cont)

UNIT Computer Games: Design (SCQF level 6)

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

A portfolio approach to assessment should be taken. The portfolio may be paper or electronic (digital). The portfolio should be constructed over the period of the Unit, with candidates contributing material to the portfolio on an on-going basis. The contents of the portfolio should be clearly labelled and related to specific Evidence Requirements. The inclusion of specific items in the portfolio should be negotiated between candidate and tutor; with only the 'best' examples of work being stored.

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or e-checklists. Centres which wish to use e-assessment must ensure that the national standard is applied to all candidate evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. Further advice is available in *SQA Guidelines on Online Assessment for Further Education (AA1641, March 2003), SQA Guidelines on e-assessment for Schools (BD2625, June 2005)*.

If an e-portfolio is used to capture candidates' work, it may take one of a variety of forms, ranging from general purpose digital repositories to specialised e-portfolio products. For example, a web log could be used to record candidate activity over the duration of the Unit. Specific entries to the blog could provide sufficient evidence in their own right (for example, a required identification) or could link to a file stored in another web service (such as a file hosting site). The use of a blog would aid authentication since any record of a candidate's day-to-day activities would provide implicit evidence of participation and ownership.

If a candidate is undertaking this Unit as part of the NPA in Computer Games Development at SCQF level 6 then the evidence should be retained as part of a portfolio of work required for the Units *Computer Games: Media Assets* and *Computer Games: Development* (SCQF level 6).

DISABLED CANDIDATES AND/OR THOSE WITH ADDITIONAL SUPPORT NEEDS

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**