

Higher National Unit Specification

General information for centres

Unit title: Desk Top Publishing

Unit code: DF5Y 34

Unit purpose: This Unit is designed to enable candidates to work effectively in a desktop publishing (DTP) environment. The Unit should prepare candidates for this role by ensuring they possess the knowledge and/or skills required to be able to produce a high quality publication using a DTP system.

On completion of the Unit the candidate should be able to:

- ◆ Design and produce a publication for a given specification and target audience, ready for submission to printers.

Credit value: 1 HN Credits at SCQF level 7: (8 SCQF credit points at SCQF level 8*)

**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.*

Recommended prior knowledge and skills: Access to this unit will be at the discretion of the Centre. However, it is recommended that candidates should have some prior knowledge and skills in Computing/Information Technology. This may be evidenced by the possession of relevant National Units, HN units or experience.

Core skills: There may be opportunities to gather evidence towards core skills in this Unit, although there is no automatic certification of core skills or core skills components.

Context for delivery: If this Unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes.

Assessment: This Unit will be assessed by one assessment covering the knowledge and/or skills required for the whole Unit.

Higher National Unit specification: statement of standards

Unit title: Desk Top Publishing

Unit code: DF5Y 34

The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Please refer to Knowledge and/or skills for the Unit and Evidence requirements for the Unit after the Unit Outcome.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Unit Outcome

Design and produce a publication for a given specification and target audience, ready for submission to printers.

Knowledge and/or skills

- terminology used in desk top publishing
- functions of a typical desk top publishing package
- prepare draft(s) document(s) for a given brief
- produce a document, ready for submission to the printers, for a given specification

Evidence requirements

Candidates will produce a portfolio showing the stages of development up to and including the finished publication, as well as a disk copy, ready for submission to the printers.

The publication will contain all the evidence required for the unit outlining the terminology and functions of a typical desk top publishing package. This publication will consist of at least 12 (A4) pages but not more than 20 (A4) pages, including a front and back cover. The publication will also cater for back to back printing.

The content of the publication must include information on and show usage, as appropriate, of:

- front cover (containing graphics and text)
- master pages (right and left)
 - headers and footers
 - page numbers
 - background colour
 - watermark
 - margins

Higher National Unit specification: statement of standards (cont)

Unit title: Desk Top Publishing

- table of contents (at least 2 levels)
- a style sheet / template
- columns (at least 2 pages to have at least 2 columns)
 - use of guides
 - gutters
- layers (at least 3)
- text layout and placement
 - fonts
 - types
 - serif
 - sans serif
 - size
 - leading
 - spacing
 - proportional
 - kerning
 - tracking
 - tabs
 - autoflow
 - alignment
 - vertical text
- use of colour
 - CMYK (4 colour process)
 - RGB (Red, Green, Blue)
 - Spot colour
 - Pantone colour
 - Grayscale
 - Halftones
- images and graphics (at least 6 different images or graphics)
 - inline graphics
 - masking
 - sizing
 - resolution
 - pixilation
 - vectors
 - bitmaps
 - pixels
 - dithering
 - aliasing and anti-aliasing
 - text wrapping (2 styles)
- preparation for outside printers

All graphics must be appropriate to the text, with at least one area showing a before and after graphic where a technique has been applied.

Higher National Unit specification: statement of standards (cont)

Unit title: Desk Top Publishing

The portfolio must include:

- the specification
- at least 2 draft documents showing progress
- the final publication
- an electronic copy of the finished article

The content of the document created must contain details describing the nature of DTP and the features of appropriate DTP applications software as outlined above. Candidates will, therefore, be assessed on both the quality of document produced and on the content of the document.

Assessment guidelines

Please see the Support Notes.

Administrative Information

Unit code:	DF5Y 34
Unit title:	Desk Top Publishing
Superclass category:	KH
Date of publication:	December 2003
Version:	01
Source:	SQA

© Scottish Qualifications Authority 2003

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. The cost for each Unit specification is £2.50. (A handling charge of £1.95 will apply to all orders for priced items.)

Higher National Unit specification: support notes

Unit title: Desk Top Publishing

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 for this Unit

This Unit is designed to enable candidates to work effectively in a desktop publishing (DTP) environment. The Unit should prepare candidates for this role by ensuring that they possess the knowledge and/or skills required to be able to produce high quality publications using a DTP system for a given specification and target audience, ready for submission to printers.

Candidates should be enabled to gain the appropriate knowledge and/or skills in:

- The terminology used in desk top publishing.
- The functions of a typical desk top publishing package.
- How to prepare draft(s) document(s) for a given brief.
- How to produce a document, ready for submission to the printers, for a given specification.

Candidates should learn how to control and manipulate DTP applications software to produce high quality documents to a given specification. Candidates should also learn about and be able to describe the features of the DTP applications software being used, for example, how to create and manipulate:

- master pages
- a table of contents
- style sheets / templates
- layers
- text layout and placement
- colour
- images and graphics
- documents for outside printers

The Unit Evidence Requirements provide sufficient detail as to the level (depth) of DTP applications software knowledge and/or skills required.

Higher National Unit specification: support notes (cont)

Unit title: Desk Top Publishing

GUIDANCE ON THE DELIVERY AND ASSESSMENT OF THIS UNIT

As the content of the document created for the Unit will contain details describing the nature of DTP and the features of appropriate DTP applications software, it is recommended that candidates be given sufficient time and be provided with sufficient access to resources (e.g. books, Internet, magazines, etc) to investigate some areas of Desk Top Publishing as appropriate, e.g. history of printing, printing terminology, relationship of DTP to printing and features of DTP applications software. It is recommended that candidates are encouraged to carry out their investigations into the nature of DTP and the features of appropriate DTP applications software from the beginning of Unit delivery. It is also recommended that candidates start to use the relevant DTP applications software from the beginning of Unit delivery.

There is one assessment for this Unit in which candidates will be asked to create a high quality document to a given specification, using appropriate DTP applications software which is ready for submission to printers. The content of the document created should contain details describing the nature of DTP and the features of appropriate DTP applications software. Candidates will, therefore, be assessed on both the quality of document produced and on the content of the document.

Open learning

If this Unit is delivered by open or distance learning methods, additional planning and resources may be required for candidate support, assessment and quality assurance. A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes. For further information and advice, please see *Assessment and Quality Assurance for Open and Distance Learning* (SQA, February 2001 – publication code A1030).

Special needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

General information for candidates

Unit title: Desk Top Publishing

This Unit is designed to enable you to work effectively in a desktop publishing (DTP) environment. The Unit should prepare you for this role by ensuring that you possess the knowledge and/or skills required to be able to produce high quality publications using a DTP system. On completion of the Unit you should be able to:

Design and produce a publication for a given specification and target audience, ready for submission to printers.

In the course of the Unit you should learn about:

- The terminology used in desk top publishing.
- The functions of a typical desk top publishing package.
- How to prepare draft(s) document(s) for a given brief.
- How to produce a document, ready for submission to the printers, for a given specification.

You should learn how to control and manipulate DTP applications software to produce high quality documents to a given specification. You should also learn about and be able to describe the features of the DTP applications software you are using and for example, how to create and manipulate:

- master pages
- a table of contents
- style sheets / templates
- layers
- text layout and placement
- colour
- images and graphics
- documents for outside printers

There is one assessment for this Unit in which you will be asked to create a high quality document to a given specification, using appropriate DTP applications software which is ready for submission to printers. The content of the document created should contain details describing the nature of DTP and the features of appropriate DTP applications software.

Higher National Unit Specification

General information for centres

Unit title: Human Computer Interface

Unit code: DF6D 35

Unit purpose: This Unit is designed to provide candidates with an understanding of the interaction between humans and computers and the skills required to design, prototype and evaluate effective human computer interfaces.

On completion of the Unit the candidate should be able to:

1. Describe the factors affecting interface design.
2. Design an interface for a given application.
3. Produce a prototype for an application.
4. Plan and carry out a usability evaluation of an interface.

Credit value: 1 HN Credit at SCQF level 8: (8 SCQF credit points at SCQF level 8*)

**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.*

Recommended prior knowledge and skills: Access to this Unit will be at the discretion of the centre. However it is recommended that candidates should have previous experience of studying Web Development or Multimedia Computing at Higher National level. Although differing programmes of study may be sufficient to prepare candidates for this unit, it is recommended that they should have completed the HN Unit: Interface Design and Authoring, prior to commencement of this Unit. It is recommended that candidates should have experience of utilising interactive applications either through prior study or through work experience. This may be evidenced by the possession of relevant National Units, HN units or experience.

Core skills: There may be opportunities to gather evidence towards core skills in this Unit, although there is no automatic certification of core skills or core skills components.

Context for delivery: If this Unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes. The candidate may be able to choose a topic for assessment through consultation with the assessor.

General information for centres (cont)

Assessment: This Unit is assessed by one practical case study covering all the Outcomes. If a workplace situation is used the assessor must ensure that there are sufficient opportunities available for the candidate to complete all the evidence requirements for the Unit.

Higher National Unit specification: statement of standards

Unit title: Human Computer Interface

Unit code: DF6D 35

The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Please refer to *Knowledge and/or skills for the Unit* and *Evidence requirements for the Unit* after the Outcomes.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Describe the factors affecting interface design.

Knowledge and/or skills

- Understanding client needs
- Establishing the functional requirements of the application
- Establishing design constraints
- Categories of target end-user and the implications for interface design

Evidence requirements

Details of the evidence requirements are given under Outcome 4.

Assessment guidelines

The assessment of this Outcome is combined with Outcomes 2, 3 and 4. Details of the assessment are given under Outcome 4.

Outcome 2

Design an interface for a given application.

Knowledge and/or skills

- Selection and justification of menu system and interaction style
- Visual style guide
- Methods for displaying design concepts

Evidence requirements

Details of the evidence requirements are given under Outcome 4

Higher National Unit specification: statement of standards (cont)

Unit title: Human Computer Interface

Assessment guidelines

The assessment of this Outcome is combined with Outcomes 1, 3 and 4. Details of the assessment are given under Outcome 4.

Outcome 3

Produce a prototype for an application.

Knowledge and/or skills

- Iterative design
- Approaches to prototyping
- Types of prototype

Evidence requirements

Details of the evidence requirements are given under Outcome 4.

Assessment guidelines

The assessment of this Outcome is combined with Outcomes 1, 2 and 4. Details of the assessment are given under Outcome 4.

Outcome 4

Plan and carry out a usability evaluation of an interface.

Knowledge and/or skills

- Value of evaluating applications
- Methods of evaluating usability including Expert and End-user
- Analysing the results of evaluations

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can describe the factors affecting design, produce designs, create prototypes and evaluate interfaces for an application.

A case study covering all outcomes is to be developed by the candidate. The candidate in consultation with the lecturer can choose the topic. The lecturer will ensure that all aspects of the unit can be assessed.

Higher National Unit specification: statement of standards (cont)

Unit title: Human Computer Interface

For the agreed case study, the candidate will produce:

- Written evidence, maximum 500 words, describing the factors affecting interface design:
 - Including a brief description of client needs
 - A summary of constraints that affect the design
 - A description of the target user groups including reference to at least, their IT skills, literacy skills and the sociological factors involved.
- A set of designs that incorporate the factors identified above using appropriate tools including:
 - A visual style guide detailing fonts, colours and sizes
 - A navigation map
 - Sample screen layouts that show interaction styles and position and type of content
 - Justification for the use of the chosen interaction styles stating clearly the advantages and disadvantages. Three advantages and three disadvantages should be documented with reference to the end-users and client.
- Prototypes which are appropriate for the case study. Prototypes must be in a format and style suitable for the application. Candidates must produce at least one prototype sufficient to demonstrate the screen design features and to show working links that conform to the designed navigation system.
- Evidence that the candidate understands the iterative design process and the different approaches which designers might employ. A description of no more than 300 words that may be supported by a clearly annotated diagram of the development life cycle for the case study.
- A plan for evaluating the usability of the prototypes is to be constructed. The plan will be followed through, the results will be analysed and required the actions recorded. The candidate may choose the method from those delivered (expert or end-user), or any other appropriate method with the assessors approval.
 - A short report of approximately 300 words to demonstrate that the candidate understands the need for evaluating the usability of applications and details the advantages.
 - The plan, results and actions will be evidenced in a suitable, simple format in the form of a table or checklist.

Higher National Unit specification: statement of standards (cont)

Unit title: Human Computer Interface

Assessment guidelines

The assessment of this Outcome is combined with Outcomes 1, 2, and 3.

It is recommended that the candidate's knowledge and/or skills could be demonstrated by analysing requirements for a case study or workplace situation and then developing designs for the case study. It is important that candidates concentrate on the tools and techniques employed in Human Computer Interface rather than the resultant designs.

Case Study

If a case study is to be used it should be given to, or agreed with, candidates as early as possible after the start of the Unit in order to allow time for the production of appropriate prototypes and a suitable evaluation study. Lecturers should encourage discussion relating to design constraints and other issues relating to the unit. Lecturers should encourage class participation for usability evaluation allowing fellow students to act as experts or, if appropriate, as the end-user.

Workplace

Where candidates have the opportunity to generate evidence with reference to their own workplace rather than a case study they may do so. They will need to check with their assessor that the workplace can provide sufficient opportunities to discuss the main areas of study. In this option, candidates should ensure that their work colleagues are able to participate in usability evaluations for the application being designed.

If a work based study is used then the assessor should ensure that it is sufficient to meet the Evidence requirements. The assessor should also ensure the authenticity of the candidates' evidence

Candidates should be provided with the opportunity to work with others throughout the course of the Unit.

Administrative Information

Unit code:	DF6D 35
Unit title:	Human Computer Interface
Superclass category:	CA
Date of publication:	November 2003
Version:	1
Source:	SQA

© Scottish Qualifications Authority 2003

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. The cost for each Unit specification is £2.50. (A handling charge of £1.95 will apply to all orders for priced items.)

Higher National Unit specification: support notes

Unit title: Human Computer Interface

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 for this Unit

This Unit is designed to introduce candidates to the tools and techniques of the Human Computer Interface commonly used in industry. It cannot be too strongly emphasised that these tools and techniques are the important part of this unit, not the content of the case study or workplace task. The case study or workplace task should help the candidate to learn by focusing on typical problems and situations.

Specifically the outcomes cover the following:

Outcome 1 looks at what the client requires. Candidates should seek information relating to the type of application (currently could be Web; CD-ROM; DVD). The content of the application in terms of its multimedia content and where it comes from should be considered. The functions of the application need to be known eg will it utilise database engines, will it include information searching or incorporate questionnaires or multi-choice assessments? A major consideration is taking into account the constraints on the design. Platforms should be considered. Hardware and software for playback may be limiting. Currently, for Web systems, many home users have limited bandwidths and this is a major usability issue. Finally, this outcome considers the target audience. Candidates should be encouraged to build a user profile detailing IT skills, literacy skills, and other social factors. Special needs should also be considered but not just the human needs. A wider perspective looking at work place or environmental needs should be encouraged.

Outcome 2 provides candidates with the opportunity to discuss the relative merits of a number of interaction styles such as direct manipulation, form fill, text entry, and the various menu styles. Candidates should produce comprehensive style guides and should be made aware of issues such as corporate style. Methods of displaying design concepts should be openly discussed and where ever possible samples should be made available. Paper-based methods, storyboards, menu maps and navigation systems should be covered.

Prior to beginning Outcome 3 candidates should have had the opportunity to develop some interactive applications. Knowledge of the iterative design process is important. Different approaches to prototyping (throw away, incremental, etc) should be discussed and candidates should be encouraged to throw away faulty designs. One prototype may not be enough for a particular case study so candidates might have to produce an interface prototype to show the visual aspects, a navigation prototype showing the styles of interaction and working links and perhaps they will have to test the quality of the content or the playback system.

Higher National Unit specification: support notes (cont)

Unit title: Human Computer Interface

Outcome 4 is where candidates should learn the value of evaluating the usability and suitability of their designs and prototypes. A range of expert and end-user methods should be discussed and some should be attempted in class. The iterative design process should be put into practice with the designs being tested and recommendations for improvement being documented.

GUIDANCE ON THE DELIVERY AND ASSESSMENT OF THIS UNIT

There is one overall assessment for this Unit and candidates will be assessed on analysing requirements for a case study or workplace situation and then developing designs for the case study using the appropriate tools and techniques they have previously learned.

The assessment of this Unit is clearly presented in the Evidence requirements. The case study upon which the assessment will be based should be given to students at a very early point in the delivery of the Unit in order that they can familiarise themselves with the content. If a work based study is used then the assessor should ensure that it is sufficient to meet the Evidence requirements. The assessor should also ensure the authenticity of the candidates' evidence

Open learning

If this Unit is delivered by open or distance learning methods, additional planning and resources may be required for candidate support, assessment and quality assurance. A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes.

For further information and advice, please see *Assessment and Quality Assurance of Open and Distance Learning* (SQA, February 2001 — publication code A1030).
HN Unit D76H 35: Professional Issues in Computing 9

Special needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

General information for candidates

Unit title: Human Computer Interface

This unit is designed to enable you to gain an understanding of the interaction between humans and computers and the skills required to design, prototype and evaluate effective human computer interfaces. By the end of this Unit you should have learned how to develop the Human Computer Interface (HCI) in a professional manner by employing the tools and techniques commonly used in industry.

The important emphasis of this Unit is placed upon you learning and trying out the tools and techniques that industry use to produce their designs and to test how good your designs and prototypes are. You should realize at an early stage that the content of the case study or workplace task that you will be presented with is not the important part of this Unit.

You will be encouraged to evaluate each other's designs and to give constructive feedback. You will also be supported when your own designs are evaluated and feedback is given to you.

You may be able to select a case study that is of interest to you. Perhaps one that you will take forward and develop for another unit in your course. Your lecturer should help with your choice.

There are four Outcomes in this Unit and on completion you should be able to:

1. Describe the factors affecting interface design.
2. Design an interface for a given application.
3. Produce a prototype for an application.
4. Plan and carry out a usability evaluation of an interface.

In Outcome 1 you should learn about the factors affecting interface design and come to understand the needs of clients, the various categories of end-users, the functional requirements of an application and how to establish design constraints.

Outcome 2 should provide you with insights into designing an interface for a given application. Here, you should learn how to select and justify menu systems and interaction styles, how to use and produce visual style guides and how to employ the various methods for displaying design concepts.

In Outcome 3 you should learn how to produce a prototype for an application. You should also learn about different approaches to prototyping, the different types of prototype and about the need for iteration in the design process.

During the course of Outcome 4 you should learn how to plan and carry out a usability evaluation of an interface. You should discover how to evaluate applications and of the importance placed on the value of evaluation in relation to the HCI. You should also learn about the methods of evaluating usability, eg Expert and End-user, and how to analyse the results of evaluations

General information for candidates (cont)

There is one overall assessment for this Unit and you will be assessed on analysing requirements for a case study or workplace situation and then developing designs for the case study using the appropriate tools and techniques you have previously learned.

Higher National Unit Specification

General information for centres

Unit title: Internet: Client Side Web Scripting

Unit code: DF6P 35

Unit purpose: This Unit is designed to provide candidates with a practical understanding of client-side Web scripting and become proficient in designing and implementing scripts within Web documents.

On completion of the Unit the candidate should be able to:

1. Use the features of a client side web scripting language
2. Use a client side scripting language to enhance the functionality of a Web document

Credit value: 1 HN Credit at SCQF level 8: (8 SCQF credit points at SCQF level 8*)

**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.*

Recommended prior knowledge and skills: Access to this Unit is at the discretion of the centre. However, it is recommended that candidates have at least a basic understanding of elementary programming constructs and knowledge of developing World Wide Web documents and form components. It is recommended that candidates have completed the HN Units DF6C 34 *Software Development: Introduction* and DF60 35 *Internet: Web Development* or similar Units before this Unit.

Core skills: There may be opportunities to gather evidence towards core skills in this Unit, although there is no automatic certification of core skills or core skills components.

Context for delivery: If this Unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes.

General information for centres (cont)

Assessment: This Unit is assessed by a single holistic instrument of assessment requiring candidates to devise and implement a solution to a given problem or set of problems using a variety of scripting techniques designed to enhance functionality within a Web document or series of Web documents. The threshold of achievement is 60% of the total available marks. The assessment should be carried out under conditions sufficient to ensure confidence in the authenticity of candidates' submission.

Higher National Unit specification: statement of standards

Unit title: Internet: Client Side Web Scripting

Unit code: DF6P 35

The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Please refer to Knowledge and/or skills for the Unit and Evidence requirements for the Unit after the Unit Outcome.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Use the features of a client side web scripting language

Knowledge and/or skills

- ◆ Declaring and making use of variables and arrays
- ◆ Implementing control structures and utilising appropriate language constructs
- ◆ Using operators, functions, methods, events and event handlers
- ◆ Implementing methods of data input, extraction, validation and output
- ◆ Browser and plug-in detection

Outcome 2

Use a client side scripting language to enhance the functionality of a Web document

Knowledge and/or skills

- ◆ Add functionality to a form within a web document
- ◆ Add interactivity or enhanced usability to a Web document using script
- ◆ Maintaining quality of implemented program code
- ◆ Testing and debugging of the solution

Higher National Unit specification: statement of standards (cont)

Unit title: Internet: Client Side Web Scripting

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can design and implement a solution to a given problem or set of problems using a variety of scripting techniques to enhance functionality within a Web document or series of Web documents. The implemented solution must contain evidence of at least the following:

- ◆ Variables and arrays appropriately defined, named and initialised and used;
- ◆ Control structures must be used appropriately including at least:
 - Sequence, selection, iteration (conditional, unconditional) and nesting of control structures;
- ◆ Arithmetic and logical operators must be used appropriately;
- ◆ User defined or predefined functions must be used appropriately;
- ◆ Events must be handled appropriately and methods assigned;
- ◆ Input must be accepted and retained in memory, including:
 - Form component input or script input dialog;
 - Check for existence before reading from file (e.g. cookie or text file);
 - Read from file (e.g. cookie or text file);
- ◆ Selected user input must be validated for compliance using script;
- ◆ Selected user input must be extracted, manipulated and output, including:
 - Output to screen (e.g. form results);
 - Output to file (e.g. cookie or text file);
- ◆ Deletion of written file that is no longer required (e.g. expired cookie);
- ◆ Detection of either a plug-in, browser technology or browser script support;
- ◆ Apply features of a scripting language to a form within a Web document;
- ◆ Use features of a scripting language to add interactivity or extended usability to a Web document;
- ◆ Maintain code readability using internal documentation and indentation in accordance with organisational standards;
- ◆ Test code and debug and/or rewrite code as required for:
 - Errors, browsers, browser versions and platform compliance;

This assessment will be completed over an extended period under supervised conditions sufficient to ensure confidence in the authenticity of individual candidate's submissions.

Candidates must gain 60% of the total marks available to achieve a pass in this Unit. In the event that script does not function as expected, candidates may still achieve a pass on the condition that bugs are documented and understood by the candidate to a standard deemed acceptable by the centre and where the total mark gained is equivalent to or greater than 60%.

Higher National Unit specification: statement of standards (cont)

Unit title: Internet: Client Side Web Scripting

Assessment guidelines

It is recommended that the assessment should take the form of an appropriate case study or scenario. Candidates who have access to a suitable workplace may base their assessment work on suitable client-side web scripting situations drawn from their place of work.

Administrative Information

Unit code:	DF6P 35
Unit title:	Internet: Client Side Web Scripting
Superclass category:	CE
Date of publication:	December 2003
Version:	01
Source:	SQA

© Scottish Qualifications Authority 2003

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. The cost for each Unit specification is £2.50. (A handling charge of £1.95 will apply to all orders for priced items.)

Higher National Unit specification: support notes

Unit title: Internet: Client Side Web Scripting

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 for this Unit

This Unit has been designed to address the need for candidates to acquire scripting knowledge and skills that may be used to enhance functionality within standard mark-up language (e.g. HTML) documents.

It is recommended that candidates undertake this Unit after they have completed the HN Units “Internet: Web Development” and “Software Development: Introduction”.

Internet: Client Side Web Scripting may serve as an ideal pre-cursor to the HN Unit “Software Development: Developing for the WWW” and as a means of preparing a candidate for study related to server-side scripting. At the time of writing, JavaScript, VBScript or Macromedia Flash ActionScript would be among the client-side scripting language considered suitable for use with this unit. However, centres may opt for a client-side scripting language that fits best with local delivery needs.

This Unit contains two outcomes which should be assessed holistically. Outcome 1 aims to instil fundamental scripting skills by means of controlled exploration. Outcome 2 aims to challenge the knowledge and skills acquired by the candidate in Outcome 1 by requiring that a solution to a problem or set of problems be devised, implemented and tested.

Outcome 1

Candidates should learn how to define, describe, initialise and use variables and arrays using the scripting language. Candidates should use the scripting language to implement: control structures for sequence, selection and iteration (conditional and unconditional) and use nested control statements; operators (logical, Boolean, comparison and arithmetical); parameter passing; functions; methods and events. Candidates should gain experience in handling data input, extraction, validation, manipulation and of outputting the data to the screen and to a file (e.g. as a cookie). Additional features such as plug-in and browser detection, alert boxes, motion and custom scripts may also be explored. The scope is extensive. Some candidates may encounter a steep learning curve. Due caution should be given to avoid overburdening candidates. The main aim of this Outcome is to instil within candidates a solid set of scripting skills that can be used in Outcome 2 and provide a basis on which candidates can expand upon for use within industry. It is suggested that the different ways browsers handle scripting languages is dealt with at as early a stage as possible and that solutions for dealing with different browsers (including browser detection) are considered.

Higher National Unit specification: support notes

Unit title: Internet: Client Side Web Scripting

Outcome 2

Candidates should use the knowledge and skills gained in Outcome 1 to devise, implement and test a solution to a problem or set of problems requiring functionality to be added to one or more Web documents. Centres may wish to supply candidates' with pre-written Web documents to which script that adds functionality must be incorporated. Candidates will be expected to add functionality to a form and add interactively at least one web document. Readability of the script should be stressed and candidates encouraged to: indent code; use sensible naming conventions; produce logical structures and make ample use of internal documentation to explain the purpose of script sections. Once a solution has been designed and implemented, it would be appropriate for candidates to thoroughly test their script for bugs, browser and (where feasible) platform conformity. Candidates are encouraged to debug all scripting errors and document those to which a fix cannot be made.

Some candidates may wish to progress their skills beyond the evidence requirements - this is to be encouraged, however, caution should be given to ensure that the evidence requirements are being met.

Guidance on the delivery and assessment of this Unit

This Unit should take approximately 40 hours to complete. It is recommended that, approximately twenty-five hours should be spent on the delivery of Outcome 1 and ten hours should be allocated to the delivery of Outcome 2. The assessment should take approximately five hours. Candidates should be encouraged to spend at least a further 40 hours developing their scripting skills in their own time.

This Unit may be delivered as a stand alone Unit or as part of a group award. At the centres discretion, it is possible that this Unit could be delivered as part of the Higher National Certificate. However the Unit may sit more comfortably as a second year HND Unit. It is recommended that candidates complete the HN units "Internet: Web Development" and "Software Development: Introduction" prior to commencement of this Unit. This Unit is also an ideal precursor to the HN Unit "Software Development: Developing for the WWW".

Candidates should have access to a computer system with a text editor and various web browsing applications installed. At the time of writing, access to Internet Explorer v4, v6, Opera v7 and a version of Netscape Navigator would be appropriate. Access to Linux, Apple MacIntosh and Windows operating systems and browser software would also be beneficial. Access to the likes of WAP and 3G devices would be an added bonus.

Higher National Unit specification: support notes (cont)

Unit title: Internet: Client Side Web Scripting

To maximise candidates learning experiences, Outcomes 1 and 2 should be assessed holistically. Supplementary problems to be solved should be included within the instrument of assessment where an evidence requirement is not being met in full by the main problem, scenario or case study. The threshold of achievement for candidates to achieve a pass in this Unit is 60% of the total marks available.

Open learning

If this Unit is delivered by open or distance learning methods, additional planning and resources may be required for candidate support, assessment and quality assurance. A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes. For further information and advice, please see *Assessment and Quality Assurance for Open and Distance Learning* (SQA, February 2001 – publication code A1030).

SPECIAL NEEDS

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

General information for candidates

Unit title: Internet: Client Side Web Scripting

This Unit is designed to enable you to understand the concepts of client side web scripting, and to enable you to gain hands-on experience of designing and implementing scripts to deal with common problems associated with Web documents.

On completion of the unit you should be able to:

1. Use the features of a client side web scripting language
2. Use a client side scripting language to enhance the functionality of a Web document

In Outcome 1 you will learn how to use the scripting language to solve common problems by gaining key skills in the use of variables and arrays, implementation of control structures for sequence, selection and iteration (conditional and unconditional) and the use of nested statements, operators (logical, Boolean and arithmetical), parameter passing, functions, methods and events. You will also gain experience of handling data input, extraction, validation, manipulation and of outputting the data to the screen and to a file (e.g. as a cookie). Additional features such as plug-in and browser detection, alert boxes, motion and custom scripts may also be explored. The main aim of this Outcome is to provide you with a solid set of scripting skills that can be used in Outcome 2 and as a basis on which you may wish to expand for future use within industry.

In Outcome 2 you should learn how to devise, implement and test a solution to a problem or set of problems which require functionality to be added to one or more Web documents. This should include interaction and functionality to form components. An emphasis should be placed on readability of code and you should be encouraged to follow industry standards of internal documentation in explaining the purpose of script sections. Having developed a solution, you will test the script for bugs, debug as appropriate and test for browser/platform conformity.

There should be one assessment for this Unit. This will be completed over an extended period under supervised conditions. The assessment is likely to take the form of a case study or scenario and should require you to develop a solution to a problem or series of smaller problems. In order to achieve a pass in this Unit you will need to gain a minimum of 60% of the available marks.

Higher National Unit Specification

General information for centres

Unit title: Internet: Introduction to Technologies

Unit code: DF62 33

Unit purpose: This Unit is designed to enable candidates to gain an understanding of Internet Technologies. Candidates will learn how to use the services provided by the Internet such as e-mail and the World Wide Web (WWW). Candidates will also learn how to create basic web pages, technical aspects of the Internet, how it works and the languages used by the Internet. Candidates will also learn about the hardware and software used by the Internet and of current Internet technologies.

On completion of this Unit the candidate should be able to:

1. Describe the development of the Internet and the World Wide Web.
2. Describe the structure, operation and terminology of the Internet.
3. Describe current Internet technologies.
4. Use a range of Internet services.
5. Create basic web pages.

Credit value: 1 HN Credit at SCQF level 6: (8 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.*

Recommended prior knowledge and skills: Access to this Unit will be at the discretion of the Centre. However, it is essential that the candidate have prior experience of using a computer system. This may be evidenced by the possession of relevant National Units, HN units or practical experience.

Core skills: There may be opportunities to gather evidence towards core skills in this Unit, although there is no automatic certification of core skills or core skills components.

Context for delivery: This Unit is included in the framework of a number of HNC and HND group awards. It is recommended that it should be taught and assessed within the context of the particular group award to which it contributes.

General information for centres (cont)

Assessment: There are five Outcomes within this Unit, the first 3 of which are theory and the last 2 which are practical. The first 3 Outcomes require candidates to produce answers to 20 short or restricted response questions testing underpinning knowledge. Candidates are required to obtain 12 correct answers out of 20 (60%) in each outcome in order to achieve a pass on Outcomes 1, 2 and 3.

The fourth and fifth Outcomes are practical in nature and should provide the candidate with the basic skills necessary to use the services of the Internet and to create web pages. Assessment evidence for Outcomes 4 and 5 will be in the form of assessor checklists and hard copies of the appropriate information. Practical assessment must therefore be carried out in supervised conditions.

Higher National Unit specification: statement of standards

Unit title: Internet: Introduction to Technologies

Unit code: DF62 33

The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Describe the development of the Internet and the World Wide Web.

Knowledge and/or skills

- ◆ Key elements of the development of the Internet and the World Wide Web
- ◆ Internet protocols and their functions
- ◆ The description of a mark up language
- ◆ The functions of a mark up language
- ◆ Key terminology used for the Internet and the World Wide Web.

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by producing answers to a set of 20 short or restricted response questions in which they can describe:

- ◆ Key elements of the development of the Internet and the World Wide Web.
- ◆ Internet protocols and their functions.
- ◆ An appropriate mark up language.
- ◆ The functions of a mark up language.
- ◆ Key terminology used for the Internet and the World Wide Web.

Each of the knowledge and/or skills must be covered in the assessment and the questions allocated on an equal basis. The assessment will be closed book and is to be completed under supervised conditions within 1 hour. Candidates must obtain 12 out of 20 (60%) correct answers in order to obtain a pass in this outcome.

Assessment guidelines

Candidates may not bring to the assessment event any notes, textbooks, handouts or other material.

Higher National Unit specification: statement of standards (cont)

Unit title: Internet: Introduction to Technologies

Outcome 2

Describe the structure, operation and terminology of the Internet.

Knowledge and/or skills

- ◆ Structure of the Internet.
- ◆ Software and hardware elements needed for connecting to the Internet.
- ◆ Main services provided by the Internet
- ◆ Types of search engines and their operation

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by producing answers to a set of 20 short or restricted response questions in which they can describe:

- ◆ All elements of hardware and software, which are required to connect a PC to the Internet
- ◆ An outline of the principal features of Internet architecture, including network, servers and Internet Service Providers (ISPs)
- ◆ At least 3 of the main services provided by the Internet
- ◆ At least 2 types of search engines and their operation.

Each of the knowledge and/or skills must be covered in the assessment and the questions allocated on an equal basis. The assessment will be closed book and is to be completed under supervised conditions within 1 hour. Candidates must obtain 12 out of 20 (60%) correct answers in order to obtain a pass in this outcome.

Assessment guidelines

Candidates may not bring to the assessment event any notes, textbooks, handouts or other material.

Higher National Unit specification: statement of standards (cont)

Unit title: Internet: Introduction to Technologies

Outcome 3

Describe current Internet technologies.

Knowledge and/or skills

- ◆ How bandwidth can affect multimedia on the Internet.
- ◆ Methods of data compression for the Internet.
- ◆ Standards and file formats used on the Internet.

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by producing answers to a set of 20 short or restricted response questions in which they can describe:

- ◆ How bandwidth can affect multimedia on the Internet
- ◆ At least 3 methods of data compression for the Internet.
- ◆ At least 3 standards used on the Internet.
- ◆ At least 3 file formats used on the Internet.

Each of the knowledge and/or skills must be covered in the assessment and the questions allocated on an equal basis. The assessment will be closed book and is to be completed under supervised conditions within 1 hour. Candidates must obtain 12 out of 20 (60%) correct answers in order to obtain a pass in this outcome.

Assessment guidelines

Candidates may not bring to the assessment event any notes, textbooks, handouts or other material. Where appropriate, candidates should be encouraged to carry out research for extended information on current and future technologies of the Internet.

Higher National Unit specification: statement of standards (cont)

Unit title: Internet: Introduction to Technologies

Outcome 4

Use a range of Internet services.

Knowledge and/or skills

- ◆ Use an email package to send and retrieve messages.
- ◆ Send and retrieve email attachments.
- ◆ Use the World Wide Web to access information.
- ◆ Use search engines effectively to locate and access web sites.
- ◆ Use communities/newsgroups to post/answer messages.

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can:

- Send and receive a minimum of 2 e-mail messages on topics relating to the candidate's subject area.
- Send and receive a minimum of 2 file attachments.
- Access a minimum of 2 web sites via the World Wide Web relating to the candidate's subject area. One of the web sites is to be accessed using a URL and the other using a search engine.
- Post and answer 2 messages using a community related to the candidate's subject area.

Evidence will be in the form of an observation checklist and hard copies of work carried out for emails and attachments sent and received. Information to be accessed via the World Wide Web must be relevant to the candidates' subject area.

Assessment must be carried out in supervised conditions sufficient to ensure confidence in the authenticity of each candidates work. Hard copies of this evidence and the assessor's observation checklist should be produced and included in the candidate's portfolio of evidence.

Assessment guidelines

Evidence for Outcome 4 may be generated throughout the delivery of the Unit, provided that it is carried out under supervised conditions.

Higher National Unit specification: statement of standards (cont)

Unit title: Internet: Introduction to Technologies

Outcome 5

Create basic web pages.

Knowledge and/or skills

- ◆ Create web pages using an appropriate mark up language
- ◆ Create web pages using a web editor.

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can produce for two different given topics:

- ◆ Using an appropriate mark up language web page generator
 - A minimum of two pages, including at least one external hyperlink and one internal hyperlink.
- ◆ Using an appropriate web editor
 - A minimum of two pages, including at least one external hyperlink and one internal hyperlink.

Evidence to satisfy this outcome will take the form of:

- ◆ Hard copies of the appropriate mark up language code produced by:
 - The web page generator
 - The text editor.
- ◆ Screen dumps of the web pages produced by:
 - The web page generator
 - The text editor.

This assessment must be carried out within a short timeframe, i.e. no more than 2 hours for each of the two different given topics. Assessment must be carried out in supervised conditions sufficient to ensure confidence in the authenticity of each candidate's work. Hard copies of this evidence and the assessor's observation checklist must be produced and included in the candidate's portfolio of evidence.

Assessment guidelines

Candidates should be given a list of topics to choose from to develop their web pages. A different topic should be selected for each method of production of the web pages.

Administrative Information

Unit code:	DF62 33
Unit title:	Internet: Introduction to Technologies
Superclass category:	CE
Date of publication:	December 2003
Version:	01
Source:	SQA

© Scottish Qualifications Authority 2003

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. The cost for each Unit specification is £2.50. (A handling charge of £1.95 will apply to all orders for priced items.)

Higher National Unit specification: support notes

Unit title: Internet: Introduction to Technologies

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. This could be allocated as indicated in the table below.

Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5
8 hours	8 hours	8 hours	4 hours	12 hours

The use of notional design length for programme design and scheduling is advisory only. In centres where less than the notional design length is allocated, it is recommended that time is deducted from that allocated to assessment rather than from the teaching/learning allocation.

Guidance on the content and context for this Unit

This unit provides an overview of how the Internet functions. It is important that candidates are made aware of how the Internet functions in order to use the Internet to its fullest potential now and at a later stage. The candidates should also gain basic skills of creating web pages using an appropriate mark up language, probably HTML and web editors.

Outcome 1 deals with the key elements of the development of the Internet and the World Wide Web. Candidates should be encouraged to conduct their own research into the history and development of the Internet and WWW by using its own features and functions to discover the relevant information. At the time of writing examples of key elements and protocols include:

- ◆ Key elements could be TCP/IP, packet switching, ISP, URL, Plug-ins, firewalls
- ◆ Protocols could be TCP/IP and DNS, FTP, HTTP, HTTPS, SMTP and POP, NNTP, PPP, SLIP.

In describing the features of a mark up language candidates should be introduced to for example, HTML tags such as titles, headings (H1, H2, etc) body settings such as background, fonts, colours, size, line breaks, paragraph breaks, rules, hyperlinks, tables, graphics and text.

Relevant terminology for the Internet and the World Wide Web should be used throughout the Unit. It is recommended that candidates build up their own 'Glossary of Terms' which would include relevant descriptions and meanings.

It may be appropriate to delay the assessment for Outcome 1 until well into the delivery of Outcome 5 which introduces candidates to the practical aspects of the use of mark up language code.

Higher National Unit specification: support notes (cont)

Unit title: Internet: Introduction to Technologies

Outcome 2 introduces candidates to the structure of the Internet, the software and hardware elements needed for connecting to the Internet, the main services provided by the Internet and the types of search engines and their operation. The structure of the Internet should include, for example:

- ◆ Linear
- ◆ Hierarchical
- ◆ Web or Mesh

Software and hardware elements needed for connection to the internet should include, for example:

- ◆ Data connecting equipment (modem) and data terminating equipment (computer), connectors and cables
- ◆ Analogue telephone lines, digital telephone lines (ISDN), leased lines, and routers.
- ◆ The operating system
- ◆ Web server software
- ◆ Protocols (in relation to 'connection')
- ◆ Internet naming (e.g. DNS) and addressing systems
- ◆ Security (e.g. firewalls, gateways)
- ◆ Proxy servers

The range of Internet Services should cover, for example:

- ◆ Email
- ◆ WWW (World Wide Web)
- ◆ IRC (Internet Relay Chat), conferencing
- ◆ Newsgroups, Newsnet, bulletin boards
- ◆ File transfer
- ◆ Telnet

The types of search engine should cover, for example:

- ◆ FTP
- ◆ Free
- ◆ MP3
- ◆ Meta
- ◆ Internet

It may be appropriate to delay assessment of Outcome 2 until well into the delivery of Outcome 4 which introduces candidates to the practical aspects of Internet service provision.

Higher National Unit specification: support notes (cont)

Unit title: Internet: Introduction to Technologies

Outcome 3 introduces candidates to how bandwidth can affect multimedia on the Internet, methods of data compression for the Internet and the standards and file formats used on the Internet. Candidates should gain sufficient knowledge to determine how multimedia publications, files and web pages may be affected by bandwidth. Candidates should learn about for example:

- ◆ Definition of bandwidth
- ◆ Analogue and digital bandwidth,
- ◆ Base band and broadband,
- ◆ Bandwidth measurement (Hertz)
- ◆ Throughput dependencies on Internetworking devices, e.g.
 - Types of data being transferred
 - Network topology
 - Network infrastructure
 - Number of users on the network
 - User computer
 - Server computer
 - Power conditions
 - BIT speeds
- ◆ Sending and receiving large data files and the effect on transmission time and costs
- ◆ Data compression techniques (not in great depth as this is covered in other units) and how to compress a data file. (This latter could be carried out as part of Outcome 4 activities)
- ◆ The various file formats used on the Internet, especially in relation to multimedia publications. (This need not be covered in great depth either as this topic is covered in other units)

Outcome 4 introduces candidates to using an email package to send and retrieve messages and attachments. Candidates should also learn how to use the World Wide Web to access information and to use search engines effectively to locate and access web sites. Candidates should learn how to use communities and newsgroups to post and answer messages. Web sites to be accessed should be related to candidates chosen subject area and candidates should be encouraged to use the Internet as a method of research for information on current and future technologies required for Outcome 3. Candidates should learn how to access the Internet, for example, to: locate and access search engines; apply suitable search techniques and search criteria; access given websites; save and store frequently-used website addresses; locate and download information; send, receive and reply to email messages; send and receive attachments; maintain an email address book; handle distribution lists; file email appropriately; virus check email and email attachments as appropriate.

Higher National Unit specification: support notes (cont)

Unit title: Internet: Introduction to Technologies

The aim of **Outcome 5** is to provide candidates with some basic skills in using an appropriate mark up language, probably HTML, and a web page editor. This should enable candidates to experience the differences between using a text processor to code for web pages and using a web page generator that produces the mark up language for them. It is recommended that the candidate be shown how to design and build basic web pages using for example:

- ◆ Text, graphics and numbers
- ◆ Tables, forms, interactive features, for example, full text search, table of contents
- ◆ Hyperlinks (text and graphic) within a web page, to another page at some web site, to an external WWW site, to email, to an FTP server document
- ◆ HTML tags, e.g. headings (H1, H2, etc), body settings such as background, foreground, fonts, colours, size etc
- ◆ Line breaks, paragraph breaks, rules etc.

Guidance on the delivery and assessment of this Unit

It is recommended that Outcome 4 is delivered close to the start of the unit and continues throughout the length of the unit. Communication between candidate and tutor could be done via email, therefore covering this part of Outcome 4. Communities could be used instead of newsgroups. This would need to be set up at the beginning of the course and used by candidates throughout the Unit to post messages. It may be more appropriate to deliver Outcome 3 towards the end of the Unit by which time candidates should have gained much more insight into the application of the knowledge and/or skills required for this Outcome.

Outcome 1

The first Outcome requires candidates to produce answers to 20 short or restricted response questions that test underpinning knowledge. The assessment instruments for Outcome 1 should be updated taking into consideration future technology when required.

Candidates are required to obtain 12 correct answers out of 20 (60%) in order to achieve a pass in Outcome 1.

Outcome 2

The second Outcome requires candidates to produce answers to 20 short or restricted response questions that test underpinning knowledge. The assessment instruments for Outcome 2 should be updated taking into consideration future technology when required.

Candidates are required to obtain 12 correct answers out of 20 (60%) in order to achieve a pass in Outcome 1.

Higher National Unit specification: support notes (cont)

Unit title: Internet: Introduction to Technologies

Outcome 3

The third Outcome requires candidates to produce answers to 20 short or restricted response questions that test underpinning knowledge. The assessment instruments for Outcome 3 should be updated taking into consideration future technology when required. This outcome is described in the statement of standards and should require candidates to carry out some research of their own. The current technologies of the Internet at the time of writing may not be current when the unit is delivered. However, it is recommended that the candidates be given the most up-to-date information.

Candidates are required to obtain 12 correct answers out of 20 (60%) in order to achieve a pass in Outcome 1.

Outcome 4

It is recommended that a portfolio of hard evidence should be started at the beginning of the unit with the candidate adding each hard copy of evidence as and when completed. Hard copies of this evidence and the assessor's observation checklist should be produced and included in the candidate's portfolio of evidence. Evidence for Outcome 4 may be generated throughout the delivery of the Unit, provided that it is carried out under supervised conditions. Practical assessment should be carried out in supervised conditions.

Outcome 5

Evidence to satisfy this outcome will take the form of hard copies of mark up code of web pages produced by use of a web page generator and hard copies of code for web pages produced by using a web editor. Screen dumps for both types of web pages should also be included in a portfolio of evidence. It is recommended that this assessment be carried out within a short timeframe, i.e. 2 hours or 1 class session for each. A minimum of two web pages, including at least one external hyperlink and one internal hyperlink must be produced. Using a different topic, another two web pages should be created using a web page editor such as Microsoft FrontPage. The web pages should include titles, headings, font face, sizes, colours, backgrounds, graphics, tables, horizontal rules, images, text and hyperlinks (external and internal). Practical assessment should be carried out in supervised conditions.

Higher National Unit specification: support notes (cont)

Unit title: Internet: Introduction to Technologies

Open learning

If this Unit is delivered by open or distance learning methods, additional planning and resources may be required for candidate support, assessment and quality assurance.

A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes. For further information and advice, please see *Assessment and Quality Assurance for Open and Distance Learning* (SQA, February 2001 — publication code A1030).

Special needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

General information for candidates

Unit title: Internet: Introduction to Technologies

This Unit is designed to enable you to use some of the services provided by the Internet and to learn about the various technical aspects of the Internet. You should also gain the skills to create basic web pages using both a text editor and web page generator where you should experience the differences between creating pages by coding with an appropriate mark up language and having mark up language code generated for you.

On completion of the Unit you should be able to:

- ◆ Understand the hardware and software requirements for accessing the Internet.
- ◆ Know about the current technologies of the Internet.
- ◆ Have a basic understanding of Internet protocols.
- ◆ Know about the key factors influencing the Internet.
- ◆ Know about the file formats and standards used by the Internet.
- ◆ Know about methods of file compression and how to compress large data files.
- ◆ Use the Internet to send and receive email.
- ◆ Use email to send and receive files.
- ◆ Use the Internet to carry out research.
- ◆ Create basic web pages.

Outcome 1, 2 and 3 are based on theory and underpinning knowledge of the Internet. These three outcomes will each be assessed using 20 short response questions. The assessments will be conducted in a supervised environment under closed-book conditions. This means that you will not be allowed to have any study material with you during the assessment period. Each assessment will last for 1 hour. In order to achieve a pass in Outcomes 1, 2 and 3, you will need to answer 12 out of the 20 questions correctly (i.e. gain 60%) on each of the three assessments.

Outcomes 4 and 5 are practical in nature, although both contain some elements of required knowledge that will be presented to you. You must demonstrate a satisfactory level of performance in a number of practical tasks that cover these two Outcomes. Evidence of each completed task will be submitted to your tutor and stored in a portfolio. All practical assignments will be carried out under supervised conditions.

Higher National Unit Specification

General information for centres

Unit title: Software Development: Introduction

Unit code: DF6C 34

Unit purpose: This Unit is designed to enable candidates to gain an understanding of the fundamental techniques used in the development of computer programs. The Unit should introduce candidates to the process of program development beginning with the analysis of a problem through to designing, coding, testing and evaluating a solution in the form of computer program that meets the requirements of a given specification.

On completion of the Unit candidates should be able to:

1. Describe the process of software development
2. Use the basic structure and features of a programming language
3. Produce a computer program to meet a given specification

Credit value: 1 HN Credit at SCQF level 7: (8 SCQF credit points at SCQF level 7*)

**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.*

Recommended prior knowledge and skills: Access to this Unit will be at the discretion of the Centre. However, it is essential that candidates have prior experience of using a computer system. This may be evidenced by the possession of relevant National Units, HN units or relevant experience.

Core skills: There may be opportunities to gather evidence towards core skills in this Unit, although there is no automatic certification of core skills or core skills components.

Context for delivery: If this Unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes.

Assessment: The Unit will be assessed using two assessments. In Outcome 1 candidates are asked to provide brief description based responses to a set of 15 questions about the process of program development. The threshold of achievement for Outcome 1 will be set at 60% of the available marks.

General information for centres

Outcomes 2 and 3 will be assessed by a practical exercise or series of small exercises that will test candidates' knowledge and/or skills in designing, coding, testing and evaluating a solution in the form of computer program that meets the requirements of a given specification. Candidates will also be required to produce appropriate program documentation which conforms to organisational standards.

Higher National Unit specification: statement of standards

Unit title: Software Development: Introduction

Unit code: DF6C 34

The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Describe the process of software development

Knowledge and/or skills

- ◆ Software development life cycle
- ◆ Categories of programming language
- ◆ Methods of program code translation
- ◆ Code levels

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by producing answers to a set of 15 questions requiring a written description demonstrating that they can:

- ◆ Describe the software development life cycle with reference to an appropriate model;
- ◆ Describe categories of programming language: non-procedural, procedural, event-driven, object-oriented;
- ◆ Identify at least one language for each of category of programming language;
- ◆ Describe methods of program code translation: interpretation and compilation;
- ◆ Describe code levels: source code and object code;

Each of the knowledge and/or skills must be covered in the assessment. The assessment will be open book and is to be completed under supervised conditions within 1.5 hours. Candidates must attain 60% of the available marks in order to obtain a pass in this outcome.

Assessment guidelines

Description based evidence requirements may typically attract a response of between 20 – 50 words per question. Candidates may benefit from scope to illustrate aspects of their responses.

Higher National Unit specification: statement of standards (cont)

Unit title: Software Development: Introduction

Candidates who have access to a suitable workplace can base their assessment work on suitable client-side computer programming situations drawn from their place of work. Where a workplace situation is used, care should be taken to ensure that it would provide candidates with sufficient opportunity to meet the evidence requirements of the Unit.

It may be appropriate for the assessor to ensure that a particular workplace environment will enable candidates to generate sufficient and suitable evidence. Assessment in the workplace environment must be carried out under supervised conditions sufficient to ensure confidence in the authenticity of each candidate's submission.

Outcome 2

Use the basic structure and features of a programming language

Knowledge and/or skills

- ◆ Variables, arrays and data types are defined, initialised and used appropriately
- ◆ Language constructs and control structures are used effectively
- ◆ Standard file input and output is used effectively
- ◆ Readability of code is maintained
- ◆ An appropriate testing strategy is devised

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by using the basic structure and features of a programming language to produce program code containing evidence of the following:

- ◆ Declaration, initialisation and use of variables and arrays with meaningful names;
- ◆ Use of operators: arithmetic, logic, comparison;
- ◆ Use of selection;
- ◆ Use of iteration: conditional and unconditional;
- ◆ Use of nested control structures;
- ◆ Use of functions: predefined or user-defined;
- ◆ Data read in to the program from an existing file;
- ◆ Data from within the program is written to an external file;
- ◆ Readability of code maintained: internal documentation, indentation and naming conventions;
- ◆ Creation of an appropriate testing strategy with tests to be performed on normal and abnormal program usage and the result expected for each of the tests performed.

If being assessed as a discrete Outcome, the candidate will be required to produce a solution to a series of small problems. The evidence generated will cover each of the knowledge and/or skills and evidence requirements of this Outcome. Evidence must be produced in the form of a checklist of completed evidence, printout and soft copy of all relevant program code.

Higher National Unit specification: statement of standards (cont)

Unit title: Software Development: Introduction

In order to obtain a pass in this Outcome evidence must be provided showing that candidates have produced program code which satisfies each of the evidence requirements pertaining to the knowledge and/or skills of Outcome 2.

Assessment must be carried out in conditions sufficient to ensure the authenticity of the candidates work. The assessment will be open book and will most likely take place over an extended period with candidates having access to notes, reference books, the Internet and so forth. Candidates will not be permitted to use code taken directly from online resources, reference materials or reference personnel but may adapt and make use of code extracts from lecture notes.

Assessment guidelines

It is recommended that Outcome 2 be integrated with Outcome 3 and assessed by means of a larger, non-trivial, problem designed to assess the knowledge and/or skills and evidence requirements of both outcomes together.

Candidates who have access to a suitable workplace can base their assessment work on suitable software development situations drawn from their place of work.

Where a workplace situation is used, care should be taken to ensure that it would provide candidates with sufficient opportunity to meet the evidence requirements of the Unit. It may be appropriate for the assessor to ensure that a particular workplace environment will enable candidates to generate sufficient and suitable evidence.

Assessment in the workplace environment must be carried out under supervised conditions sufficient to ensure confidence in the authenticity of each candidate's submission.

Outcome 3

Produce a computer program to meet a given specification

Knowledge and/or skills

- ◆ Analyse a problem
- ◆ Produce paper based design
- ◆ Implementation of solution
- ◆ Testing and debugging of solution
- ◆ Evaluation of solution

Higher National Unit specification: statement of standards (cont)

Unit title: **Software Development: Introduction**

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by:

- ◆ Analysing and breaking down the problem
- ◆ Producing an outline design using one of: flowcharts, structure charts, pseudocode, or another appropriate design tool, which conforms to the given specification
- ◆ Producing program code that includes the use of variables, an array, a range of language constructs, control structures for selection and iteration and conforms to organisational standards in the use of appropriate indentation, naming conventions and internal documentation
- ◆ Producing a test strategy (pro-forma may be used) with data to test against normal and abnormal input and/or usage, indicating also the expected system response
- ◆ Using test strategy and test data to compare and log actual results against expected results;
- ◆ Using available debug facilities to resolve implementation issues
- ◆ Producing an evaluative summary stating: whether or not the solution solved the problem; the issues encountered; the issues outstanding; installation instructions and recommendations for improvement
- ◆ Producing a stand alone executable file or, if script, embedding of code into an appropriate environment

Specifications for candidates will require that a solution in the form of a computer program be devised to a non-trivial problem.

The program generated must closely match the specification. A testing strategy must be devised to ensure that the program produces, as far as possible, accurate results and meets the specification. Code must conform to organisational standards and must include the use of internal documentation and indentation.

Evidence must be produced in the form of a checklist and in the form of a printout and soft copy of program code and, where applicable, an executable file with all required support or library files (DLL's, text files, database files, etc).

In order to obtain a pass in this Outcome evidence must be provided showing that candidates have produced program code which demonstrates correct and consistent use of all of the elements above. The solution need not be fully operational in order for the candidate to achieve a pass, but must satisfy all of the knowledge and/or skills and evidence requirements being assessed.

The assessment must be carried out in conditions that ensure the authenticity of the candidates work. The assessment will be open book and will most likely take place over an extended period with candidates having access to notes, reference books, the Internet and so forth.

Higher National Unit specification: statement of standards (cont)

Unit title: Software Development: Introduction

Candidates will not be permitted to use code taken directly from online resources, reference materials or reference personnel but may adapt and make use of code extracts from lecture notes.

Assessment guidelines

Outcomes 2 and 3 could be assessed together by means of a larger, non-trivial, problem designed to assess the knowledge and/or skills and evidence requirements of both outcomes using a single instrument of assessment.

Candidates who have access to a suitable workplace can base their assessment work on suitable software development situations drawn from their place of work.

Where a workplace situation is used, care should be taken to ensure that it would provide candidates with sufficient opportunity to meet the evidence requirements of the Unit. It may be appropriate for the assessor to ensure that a particular workplace environment will enable candidates to generate sufficient and suitable evidence. Assessment in the workplace environment must be carried out under supervised conditions sufficient to ensure confidence in the authenticity of each candidate's submission.

Administrative Information

Unit code:	DF6C 34
Unit title:	Software Development: Introduction
Superclass category:	CB
Date of publication:	December 2003
Version:	01
Source:	SQA

© Scottish Qualifications Authority 2003

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. The cost for each Unit specification is £2.50. (A handling charge of £1.95 will apply to all orders for priced items.)

Higher National Unit specification: support notes

Unit title: Software Development: Introduction

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 for this Unit

Terminology should be presented in context throughout the Unit.

Outcome 1 relates to the process of program development. Candidates will learn about the software development lifecycle and be able to describe at least one model that could be used to in development activity related to Outcome 3. Categories of programming languages such as non-procedural, procedural, event-driven and object-orientated should be discussed, with candidates being able to name at least one programming language within each of the categories selected. Code translation and code levels are also covered by Outcome 1.

Outcome 2 relates to the use of a programming language. Initialisation of variables, arrays and the use of meaningful user-defined names should be emphasised. Candidates should gain experience of declaring, initialising and using one-dimensional arrays. If opportunities present themselves, it may be advantageous to the candidates learning experience and depth of understanding to construct and manipulate two-dimensional and three-dimensional arrays. Candidates should be able to use a range of operators, (e.g. arithmetic, comparators, logic, Boolean and so forth) and would ideally be made aware of operator precedence. Candidates should learn how to use predefined routines (e.g. procedures and functions) or create their own as appropriate to the programming language used. Candidates should also gain an understanding of the reasons for, and use of, Selection and Iteration. For selection, IF..THEN..ELSE and/or CASE structures would be appropriate. Pre-tested, post-tested and fixed iterations may be examined. Nesting of control structures should be utilised as appropriate. Language category specific features should be utilised as appropriate. For example, if using an event-driven language the candidate would be expected to have an awareness features such as events, event-handlers and methods. Candidates should learn how to read data in from an external text file (for example, reading from a comma delimited text file or database file into an array) and writing data from the program (for example, data from a variable or array to a comma delimited text file or database file).

Outcome 3 relates to the creation and testing of computer programs to meet a given specification. Candidates should learn how to design a solution before coding. Candidates should learn how to use at least one method of design (e.g. structure charts, structured English, flowcharts or any other suitable programming design method). Candidates should also learn how to generate programs to closely match any given specification and how to devise a simple testing strategy to ensure that programs produced, as far a possible, are robust, provide accurate results and meet the specification. Error trapping techniques would be beneficial to ensuring robustness and deepening the candidate's knowledge and

Higher National Unit specification: support notes

Unit title: Software Development: Introduction

understanding. Candidates should be encouraged to use any available debugging facilities as appropriate. Finally, candidates need to understand that code should conform to organisational standards, including the use of internal documentation and indentation. It is recommended that candidates are introduced to the idea of documenting programs and are taught how to implement appropriate internal documentation from the beginning of Unit delivery.

Candidates should have individual access to a workstation or PC. It is recommended that an integrated program development environment be used. A simple text editor may also be used, where appropriate.

Higher National Unit specification: support notes

Unit title: Software Development: Introduction

Guidance on the delivery and assessment of this Unit

Candidates should have opportunities to develop their practical skills throughout the Unit, and should be assessed at appropriate points. Terminology should be presented in context throughout the Unit. It is recommended that this Unit is delivered in Outcome order.

Outcome 1 is theoretical in nature and relates to the process of software development at an introductory level. Candidates should be introduced to an appropriate software development lifecycle suited to the style of delivery and proposed development language. Models that may be suitable for use include: Waterfall, Iterative, Spiral, Fountain, Rational (Booch), OPEN, (Concurrent) Incremental, DSDM, prototyping, evolutionary, etc. Candidates may benefit from an overview of a selection of models placed in context. Candidates should be able to describe their chosen model. For example, if the Waterfall model were to be chosen then it would be appropriate for the candidate to be able to identify and briefly describe stages within the model (stages may typically include, but are not restricted to: Requirements Specification, Analysis, Design, Implementation, Testing and Maintenance). It would also be appropriate for candidates to be aware of the importance of 'evaluation' as being a key, reflective, stage. Centres may also want to include stages such as: Feasibility study, documentation, integration and deployment.

Candidates should be able to describe categories of programming language and key characteristics (for example: procedures, events, event-handlers, methods, objects, classes, inheritance, etc). Categories that may be considered include, but are not restated to: non-procedural, procedural, event-driven, object-orientated, extending perhaps to include scripting, declarative, low-level, high-level, etc

Candidates should be able to describe in general terms the purpose of a compiler and interpreter and give examples of languages or programs that are interpreted or compiled. Candidates should also be able to describe the terms 'source code' and 'object code'.

Candidates will need evidence to demonstrate their knowledge and/or skills by producing answers to a set of 15 questions about the process of program development. Sampling is permitted provided that all knowledge and/or skills are evidenced within the instrument of assessment. It is suggested that the questions be structured in such a way that candidates must provide a brief descriptive response, typically in the region of 20-50 words, for each question. Some candidates may find it helpful if they were permitted to provide an illustration as part of a description. The assessment will be open book and is to be completed under supervised conditions within 1.5 hours. Candidates must obtain 60% of the available marks in order to obtain a pass in this outcome.

In Outcome 2 candidates will be assessed on: initialisation of variables and arrays, and the use of meaningful names, using a range of operators and operator precedence; using predefined routines and/or user defined functions; use of sequence, selection and iteration control

Higher National Unit specification: support notes

Unit title: Software Development: Introduction

structures. It would be appropriate for candidates to be provided with specifications that will require them to produce a number of simple computer programs covering the knowledge and/or skills Outcome 2 as formative exercises. The knowledge and skills gained from developing solutions to a range of simple problems may serve as building blocks to prepare candidates for tackling a larger, more complex problem that could cover assessed knowledge, skills and evidence requirements of Outcome 2 and Outcome 3.

Evidence should be produced in the form of a checklist and in the form of hard copies and disk copies of program code. In order to obtain a pass in Outcome 2 evidence should be provided showing that candidates have produced program code which demonstrates correct and consistent use of all of the Knowledge and/or Skills elements. The assessment will be open book and will probably take place over an extended period of time. Candidates should be allowed access to notes, reference texts, the Internet and so forth.

Outcome 3 relates to the creation and testing of computer programs to meet a given specification. A solution should be designed before coding commences, but this need not go to multiple levels of development. The design may take the form of structure charts, structured English, flowcharts or any other suitable programming design method. The program generated should closely match the given specification. A testing strategy should be devised to ensure that, as far as possible, programs produce expected results and meet the specification. Code should conform to organisational standards. This should include the use of internal documentation and indentation.

An example of a typical problem that a candidate may be given to solve, assessing Outcome 2 and Outcome 3, might be to produce a multiple choice quiz program in which questions, choices and answers are read into an array or series of arrays from a comma delimited text file. The program would also include an incrementing score counter for correct answers and loss of lives for incorrect responses. A text file with leader board information could be written from memory to another text file. Care should be taken to construct a scenario in which all of the assessed knowledge and/or skills and evidence requirements are covered.

Evidence should be produced in the form of a checklist and in the form of hard and disk copies of program code.

The assessment will be open book and will probably take place over an extended period of time. Candidates should be allowed access to notes, reference books, the Internet and so forth. However, candidates should not be permitted to use a solution taken directly from online resources, reference materials or reference personnel but may adapt and make use of code extracts from lecture notes.

In order to obtain a pass in this Outcome evidence should be provided showing that candidates have produced program code which demonstrates correct and consistent use of all of the Knowledge and/or Skills elements.

Higher National Unit specification: support notes

Unit title: Software Development: Introduction

Open learning

If this Unit is delivered by open or distance learning methods, additional planning and resources may be required for candidate support, assessment and quality assurance. A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes. For further information and advice, please see *Assessment and Quality Assurance for Open and Distance Learning* (SQA, February 2001 – publication code A1030).

Special needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

General information for candidates

Unit title: Software Development: Introduction

This Unit is designed to enable you to gain an understanding of the fundamental programming concepts and structures required to produce computer programs.

On completion of the Unit you should be able to:

1. Describe the process of software development.
2. Use the basic structure and features of a programming language.
3. Produce a computer program to meet a given specification.

Throughout the Unit you will learn about the terminology used in software development.

In Outcome 1 you should learn about the process of program development. You will learn about the software development life cycle and be able to describe at least one lifecycle model. You will learn about categories of programming language and be able to identify languages within each category. The Outcome ends by looking at methods of program code translation and code levels. The assessment for Outcome 1 will involve you in producing answers to a set of 15 questions about the process of program development with 1.5 hours. You will need to gain 60% of the marks available in order to achieve a pass in Outcome 1.

In Outcome 2 you should begin to learn how to use a programming language. You will learn about variable and arrays, initialisation and the use of meaningful variable and array names, how to use a range of operators, e.g. arithmetic, comparators, logic and so forth, and about operator precedence. You will gain an understanding of the reasons for and use of Sequence, Selection and Iteration in programming in controlling programming flow and about the use of use predefined routines, e.g. procedures and functions, as appropriate to the programming language used. You should also learn how to input and output data from and to a file. You will also gain an appreciation of readability of code through the user of logical naming conventions, indentation and internal documentation.

In Outcome 3 you should learn how to develop and test computer programs to meet a given specification. You should also learn how to design a solution before coding your design into a program. You should learn how to use at least one method of design, e.g. structure charts, structured English, or flowcharts. You should learn how to generate programs, both simple and non-trivial or complex, to match any given specification and how to devise a simple testing strategy to help ensure that programs produce accurate results and meet the specification. You will also learn how to produce program documentation that conforms to organisational standards.

Outcomes 2 will either be assessed by a number of discrete practical exercises or, if integrated with Outcome 3, by a single larger problem that will test your knowledge and/or skills in analysing a problem, designing paper based solution, implementing the solution from the design, testing and bugging the solution, then evaluating the solution.

General information for candidates (cont)

In order to obtain a pass in Outcomes 2 and 3 you will be required to produce program code from a given specification which demonstrates correct and consistent use of all of the assessed elements within Outcomes 2 and 3 and to document your program code in accordance with organisational standards.

Higher National Unit Specification

General information for centres

Unit title: Internet: Web Development

Unit code: DF60 35

Unit purpose: This Unit is designed to provide candidates with essential Web design and authoring skills with an underpinning knowledge of factors affecting Web development.

On completion of the Unit the candidate should be able to:

1. Describe factors influencing the development of World Wide Web (WWW) documents.
2. Plan and design World Wide Web documents
3. Use the features of a development language to produce World Wide Web documents
4. Publish, test and evaluate World Wide Web documents.

Credit value: 2 HN Credits at SCQF level 8: (16 SCQF credit points at SCQF level 8*)

**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.*

Recommended prior knowledge and skills: Access to this unit will be at the discretion of the Centre. However, it is recommended that candidates should have some prior knowledge and skills in Computing/IT. This may be evidenced by the possession of relevant National Units, HN units or experience.

Core skills: There may be opportunities to gather evidence towards core skills in this Unit, although there is no automatic certification of core skills or core skills components.

Context for delivery: If this Unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes.

Assessment: This Unit will be assessed with a minimum of two assessments. Outcome 1 will be assessed separately by means of written and restricted response questions. Outcomes 2, 3 and 4 are to be assessed by means of a case study, scenario or small project

Higher National Unit specification: statement of standards

Unit title: Internet: Web Development

Unit code: DF60 35

The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Describe factors influencing the development of World Wide Web documents.

Knowledge and/or skills

- ◆ Define the World Wide Web
- ◆ Current development standards
- ◆ Emerging development technologies
- ◆ Development tools and techniques
- ◆ Facilitating and influencing search engine indexing and results
- ◆ Use of plug-ins and scripting languages
- ◆ Physical factors affecting development

Evidence requirements

The candidate will need evidence to demonstrate his/her knowledge by showing that they can:

- ◆ Describe the concept of the World Wide Web as a subset of the Internet;
 - The description should make reference to browsers, hyperlinks, text, graphics, mark-up language, URL/URI/IP address.
- ◆ Describe a current Web development standard and identify emerging technologies for the development of WWW documents;
- ◆ Describe the role of the World Wide Web Consortium (W3C) in promoting standards and interoperability;
- ◆ Identify and compare categories of World Wide Web document development tools;
 - Proprietary and Non-proprietary
- ◆ Describe methods of influencing search engine indexing and exclusion within a World Wide Web document;
- ◆ Identify browser plug-ins, uses, drawbacks, alternatives and trends;
- ◆ Describe how a scripting language and cookies can be used to enhance World Wide Web documents;

Higher National Unit specification: statement of standards (cont)

Unit title: Internet: Web Development

- ◆ Describe the physical factors influencing the development of World Wide Web documents with reference to digital media and relevant compatibility issues (eg bandwidth, file types, files sizes versus quality and the need for compression techniques, platform and browser).

The assessment for Outcome 1 will take the form of a series of questions that sample a minimum of 60% of the evidence requirements. The instrument of assessment will contain questions that require candidates to identify information and to provide responses in the form of a written description. It is permissible to allow each candidate two sides of handwritten A4 personal research notes to which they may refer when completing the assessment. These notes should not be supplied by the Centre or be the result of a collaborative exercise between candidates and should be submitted with the candidates' assessment responses.

Candidates must gain 60% of the available marks in order to achieve a pass in Outcome 1.

Assessment guidelines

A written response to a question requiring a description would typically be in the region of 20 – 50 words. A response of fewer words may not satisfy fully a description based evidence requirement. It is unlikely that a candidate would exceed 200 words in responding to any given question requiring a descriptive response. Restricted response or missing word questions can be set for the purposes of satisfying identification based evidence requirements.

For complex descriptive questions, it may be advantageous to have separate components to a question where shorter responses can be given (e.g. a three part question).

Opportunities for independent research and further reading should be encouraged.

Outcome 2

Plan and design World Wide Web documents

Knowledge and/or skills

- ◆ Analyse requirements
- ◆ Identify aims and objectives
- ◆ Design specification and test strategy

Evidence requirements

Candidates will need evidence to demonstrate their skills and/or knowledge by showing that they can:

- ◆ Analyse requirements and define aims and objectives

Higher National Unit specification: statement of standards (cont)

Unit title: Internet: Web Development

- ◆ Document a suitable design specification incorporating:
 - The purpose of the World Wide Web documents, how the World Wide Web documents are related and/or the main focal point, target audience, accessibility for users with special needs, proposed development scope, technical requirements and limitations/constraints
 - hardware: development system specification, client system requirements;
 - software: development tools, skills, browser and platform interoperability, plug-ins, script, screen resolution, colour-depth, typography and bandwidth considerations
 - Navigation map
 - Storyboard for each of the proposed World Wide Web documents
 - Justification of design decisions, layout, colour scheme, interaction styles and digital media elements
- ◆ Maintain an asset log for each of the digital media elements
- ◆ Produce a test strategy with test data and methods of end-user acceptance testing, usability and functionality

This Outcome will be assessed by means of a report of approximately 750 words documenting the aims and objectives and detailing the design decisions taken. A navigational map, storyboards, assets list, test plan with expected results and acceptance tests will be attached as appendices and updated as required.

Assessment guidelines

It may benefit the candidate if they were to become familiar with the concepts, knowledge and skills being conveyed in outcome 3 prior to undertaking a formal instrument of assessment for outcome 2. It is recommended that candidates be provided with opportunities to gain an awareness of the features, specifications and limitations of the chosen development language and of any other relevant factors that may influence the candidates planning and/or design decisions.

It is recommended that a holistic approach be taken to generating assessment evidence and that this outcome be combined with outcomes 3 and 4, thus permitting assessment to take the form of a small project relating to the development of approximately five World Wide Web documents. It would be advantageous if the centre were to prepare a project brief, scenario or case study for the candidate to work from. An example would be an on line curriculum vitae.

Outcome 3

Use features of a development language to produce World Wide Web documents.

Knowledge and/or skills

- ◆ Produce documents suitable for publishing on the WWW
- ◆ Incorporate text and digital media content

Higher National Unit specification: statement of standards (cont)

Unit title: Internet: Web Development

- ◆ Use features of the development language to structure and organise browser visual content
- ◆ Control presentation style and layout consistency across WWW documents
- ◆ Use form components to facilitate user input within a WWW document
- ◆ Use script or suitable alternative to validate user input and provide feedback
- ◆ Incorporate code to influence search engine indexing and results
- ◆ Conform to recognised standards for structural and syntactical integrity of code

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can:

- ◆ Adhere to recognised structural and syntactical standards of the development language in the production of interoperable, non-browser specific documents suitable for publication to a World Wide Web server
- ◆ Set document title and page properties (background colour/image, margins, default colour for text and the various hypertext states)
- ◆ Incorporate text content and manipulate properties and attributes of text content
 - headings, font (face, style, colour, size), alignment (left, right, centre, justified), breaks, paragraphs, indent and out dent
- ◆ Incorporate image content within World Wide Web documents and manipulate image properties and attributes (height, width, alignment, alternative text)
- ◆ Link to other online documents through text and image content (absolute and relative reference, external World Wide Web documents, open in a new browser window, link to at least one other MIME type)
- ◆ Structure visual layout by incorporating:
 - lists (ordered, unordered),
 - tables (row, column, cell, padding, spacing, border, colour, relative and absolute sizing, horizontal and vertical alignment, nested tables),
 - layers (size, position),
 - use of templates
- ◆ Use a style sheet or suitable alternative to centralise, manage and control presentational style, layout and consistency of multiple World Wide Web documents (colour schemes, fonts etc.)
- ◆ Create a frameset and provide support for browsers that cannot display frame content
- ◆ Incorporate an image map
- ◆ Incorporate form components (text field, text area, select box, checkbox, option buttons, submit and reset buttons, hidden and required fields)
- ◆ Use features of the development language or supported scripting language to provide simple form content validation and feedback about successful/unsuccessful form submission (missing mandatory data, invalid data type, exceeds maximum string length)
- ◆ Include non-browser displayed content (meta head content: keywords and description)
- ◆ Define suitable site and directory structure using interoperable naming conventions
- ◆ Optimise code to comply with the validation tools of the development language

Higher National Unit specification: statement of standards (cont)

Unit title: Internet: Web Development

- ◆ Demonstrate competence in the use of advanced features of a Web authoring tool
- ◆ Resolve development issues through the use of supported debug and help facilities

Evidence to show competence in using an authoring tool will be demonstrated by means of a small project that integrates with Outcomes 2 and 4.

At least five World Wide Web documents must be produced sampling a minimum of 60% of the evidence requirements from Outcome 3. Text, text properties, headings, sub-headings, graphical content, a list, a table, a nested table, a form, non-displayed content (e.g. metadata), hypertext and hyperlinks must be included and assessed within the project. All documents should conform to recognised standards and be supported by major World Wide Web browsers unless the candidate has provided sound reasons for not doing so in Outcome 2. All redundant code should be removed. Documents should be validated using an appropriate method.

Assessment guidelines

Assessment for Outcome 3 may take the form of a series of short practical exercises over an extended period of time. It would be advantageous if the candidate were to be able to demonstrate proficiency in using the development language without relying on a WYSIWYG authoring tool - unless being utilised for advanced features (eg layers, image maps, behaviours, library script or templates). In all cases, the candidate should be aware of the purpose of code and be able to edit raw code.

On completion of the checklist, competence in using an authoring tool could be demonstrated by means of a small project that integrates with Outcome 2 and Outcome 4, thus providing a more holistic approach to gathering evidence.

Outcome 4

Publish, test and evaluate World Wide Web documents

Knowledge and/or skills

- ◆ Upload
- ◆ Test and debug
- ◆ Promote
- ◆ Evaluate

Higher National Unit specification: statement of standards (cont)

Unit title: Internet: Web Development

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can:

- ◆ Transfer all relevant files to remote server
- ◆ Test published WWW documents using a test plan
- ◆ Debug post-publishing issues
 - A log should be maintained with details of uploaded file modifications
 - A bug report should be produced where constraints prevent correction of known bugs
- ◆ Carry out end-user acceptance testing
- ◆ Submit URL/IP address to appropriate search engines and/or directory services
- ◆ Evaluate final product by addressing the main development issues through to the final solution with reference to feedback from the target users and comment on accessibility (including users with special needs), usability, functionality, adherence to original aims and objectives, use of technologies, problems encountered and details of how problems were addressed
- ◆ Make recommendations for future improvement and development

This outcome will be assessed by means of an observation checklist, logs or screen dumps, test results and an evaluation report of approximately 500 words. The evaluation report must address the following development issues: accessibility, functionality, usability, adherence to aims and objectives, use of technologies, problems encountered, feedback from end-users (or from a cognitive walkthrough) and must make recommendations for future development/enhancements. To satisfy the final two evidence requirements of Outcome 4, the candidate must gain a minimum of 60% of the available marks for the evaluation report.

Assessment guidelines

It is recommended that a holistic approach be taken and that this outcome be combined with outcomes 2 and 3, thus permitting assessment to take the form of a small project relating to the development of approximately five World Wide Web documents.

Administrative Information

Unit code:	DF60 35
Unit title:	Internet: Web Development
Superclass category:	CB
Date of publication:	December 2003
Version:	01
Source:	SQA

© Scottish Qualifications Authority 2003

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. The cost for each Unit specification is £2.50. (A handling charge of £1.95 will apply to all orders for priced items.)

Higher National Unit specification: support notes

Unit title: Internet: Web Development

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 80 hours.

Guidance on the content and context for this Unit

This Unit is intended to provide candidates with the knowledge, skills and an understanding of designing, developing, publishing, testing and evaluating documents suitable for the World Wide Web.

The Unit has been designed to support a mark-up language as the basis for delivery. However, Centres may opt for the implementation language and tools most suited to their own local needs and/or resources.

At the time of writing, the predominant mark-up language is HTML 4 (for further details, please refer to the World Wide Web Consortium HTML 4.01 Technical Specification). It is anticipated that the HTML 4.01 specification will be superseded as the mainstream mark-up language by an extensible variation of HTML. In situations where the candidate has existing knowledge of a mark-up language such as HTML 4, Centres may wish to consider delivery of the Unit using an extensible mark-up language (eg XHTML), extensible mark-up specification (e.g. XML) and extensible style language (eg XSL). Note that Document Type Definitions (DTD's) and XML Schema go beyond the scope for which this Unit is intended.

Outcome 1 is theory based and focuses on factors influencing the development of mainstream World Wide Web documents. The Outcome begins by encouraging the candidate to become aware of the concept of the World Wide Web and how it relates to the Internet. It may be advantageous to provide the candidate with a superficial knowledge of common Internet services such as e-mail, Usenet, FTP and IRC in order to make a clearer distinction of what the World Wide Web is. The Outcome progresses to examine current development standards and emphasises the importance of interoperability between platforms and browser technologies. The candidate will examine the role of the World Wide Web Consortium (W3C) as a vendor neutral, non-profit making international body, set up by Tim Berners Lee in 1994, with the aim of promoting standards and specifications for interoperability. The candidate would benefit from a general insight as to how a mark-up language such as HTML 4.01 operates (tags/elements, structuring and formatting of text and the inclusion of digital media) and the concept of interlinking documents using hypertext/links to form a 'web' like structure.

The Outcome also aims to raise the candidate's awareness of emerging Web development technologies - examples include the emergence of server-side, database driven technologies such as ASP, JSP, PHP and extensible languages/specifications as an increasingly preferred

Higher National Unit specification: support notes (cont)

Unit title: Internet: Web Development

choice over traditional static web content. Scope exists to shift the focus to truly emerging technologies. At the time of writing, this would include developments in the mobile and wireless field (e.g. WAP, 3G and Bluetooth), X3D and Scalable Vector Graphics. The candidate would not be expected to gain depth of knowledge of emerging technologies, therefore, a very brief overview or awareness that these technologies exist and the future implications of such technologies will suffice.

Candidates will learn about the various categories of development tool (including proprietary tools such as Macromedia Dreamweaver, Non-proprietary tools such as Microsoft Word and simplistic ASCII/text tools such as Microsoft Notepad). Scope exists to investigate the use of plug-in and/or Active-X components, scripting languages and cookies.

Physical factors are taken into consideration along with the general issues that a Web developer should be aware of. This could be the physical resources of the typical end-user where the candidate could take into consideration issues concerning compatibility of file types, bandwidth, file size versus file quality, the need for compression of digital media (lossy/lossless), interoperability of code and digital media between browser technologies and platforms. The candidate would benefit from an overview of methods used by Web developers in influencing search engine indexing ranking and also of the steps that can be taken to help avoid certain content from being automatically indexed by passing search engine robots, spiders or other automated indexing tools (eg Meta tags, robots.txt).

Opportunities for practical activities that serve to enhance the learning experience of the candidate are to be encouraged, especially where the concepts being conveyed can be demonstrated through practical means.

Outcome 1 is intended to raise awareness within the candidate. It is not intended to provide depth of knowledge. The suggested lecture based timescale for this Outcome is 15 hours.

Outcome 2 is concerned with the planning and design of documents suitable for publishing on the World Wide Web. Prior to embarking on this Outcome, the candidate may benefit greatly from an understanding of the concepts being conveyed in Outcome 3. As such, it is suggested that the content of Outcome 3 be delivered before Outcome 2. In doing so the candidate would have had the opportunity to gain substantial practical development experience and would be better equipped to complete Outcome 2 through their awareness of the development language and its limitations. Outcomes should not necessarily be assessed in this order. It is recommended that assessment follow a more linear path: Outcome 2 followed by Outcome 3 and Outcome 4.

In Outcome 2 it is important that the candidate be able to analyse a problem and identify aims and objectives (this can be as simple as the candidate stating clearly and concisely what it is that they are trying to do and how they intend to go about doing it). The candidate could

Higher National Unit specification: support notes (cont)

Unit title: Internet: Web Development

extend this to identify the target audience and define a reasonable scope of development. Scope could include factors such as the technical requirements, skills, limitations and any constraints. The evidence requirements for this section are generally self-explanatory. A simple navigation map will clearly show how the candidate intends to sequence and link documents. A storyboard will be produced for each of the proposed documents. Preferably these will be hand drawn and illustrate layout, colour scheme and refer to typography. Centres should recognise that the electronic document may differ from the original storyboard. However where the difference is significant, the Centre may request that the candidate update their storyboards accordingly. It is recommended that the Centre produce a storyboard pro-forma. It is advisable that a spreadsheet be used to record a digital media asset log. Ideally a separate worksheet would be used for each media type (graphics, audio, video, animation). An asset log of graphics may typically contain the following information about each graphical element: *Filename (compressed), File Type, Bit Depth, Dots Per Inch, Height, Width, Size (Kb), Date, Filename (editable original), File Type, Location of media on disk, Copyright and Source (where graphic was originally sourced from)*. The information would be added to, updated and maintained throughout the development life cycle. Centres may customise asset log headings to suit local delivery needs. It is important that the candidate gives due consideration to the quality of the end product (including accessibility, usability and functionality). As such a test strategy with test data incorporating these factors could be produced and used later in Outcome 4 as part of the testing process. End-user acceptance tests may take the form of surveys or questionnaires where the candidate can reflect on the information gathered and effectively incorporate their findings into the Outcome 4 evaluation report. It would be advantageous if test data and questionnaires/surveys were developed during the planning and design phase within Outcome 2. The candidate may also make use of cognitive walkthroughs for testing and evaluation purposes.

Outcome 3 is practical in nature and aims to provide the candidate with opportunities to gain an understanding of the development language and tools. It is recommended that the general content of Outcome 3 be delivered before Outcome 2. This would enable the candidate to gain an understanding of the development language and allow him/her to gain an awareness of what can realistically be achieved. Ideally this would take the form of a lecturer-led exposition with relevant supporting notes, slides or teaching aids with a series of short practical exercises that encourage the candidate to put theory into practice. To illustrate: if HTML 4 were to be used as the development language, the candidate could perhaps start by learning about the uses, limitations and structure of HTML documents and about basic HTML elements/tags (e.g. `<HTML>`, `<HEAD>`, `</HEAD>`, `<TITLE>`, `</TITLE>`, `<BODY>``</BODY>` and `</HTML>`). The candidate could then demonstrate their knowledge and understanding of the concepts being conveyed and apply these to create a simple World Wide Web document incorporating each of the tags learned. This would essentially form the basis from which subsequent sessions would build. To extend the example: in a further session the candidate may be introduced to additional elements, properties and attributes such as ``, ``, `<I>`, `</I>`, `<U>`, `</U>`, ``, ``, ``, `<HR>`, `<P>`, `
`, `<DIV>`, `<H1>`, `<H2>`, etc.

Higher National Unit specification: support notes (cont)

Unit title: Internet: Web Development

A subsequent session could extend knowledge further by introducing how to incorporate images, anchor tags, lists and tables. It would be beneficial if the candidate were to gain hands-on practical experience of producing World Wide Web documents in the first instance by using a simple text editor such as Microsoft Notepad. After the initial learning curve of the implementation language has been achieved, it would be appropriate for the candidate to begin to gain experience of using a WYSIWYG authoring tool. Candidates should be encouraged to spend time examining the code produced by the authoring tool and acquire the ability to identify and remove unnecessary code inserted by the authoring tool. Assuming that HTML was to be used as the development language, the candidate may use an authoring tool such as Macromedia Dreamweaver to produce advanced content such as image maps and layers (where supported). Again, it is important that the candidate be encouraged to examine the code produced by the authoring tool. The Centre may supply pre-written script content to the candidate for the purposes of validating form content. However, it is recommended that the candidate insert the script into their code with minimal assistance. Where possible, it would be advisable if all World Wide Web documents produced by the candidate for assessment purposes were to conform to W3C standards and successfully validate against W3C online tools or an appropriate alternative. At the time of writing, the W3C HTML 4.01 online validation tool was located at <http://validator.w3.org>.

Outcome 4 requires the candidate to publish, test and evaluate their World Wide Web documents. It would be beneficial to the candidate if they were to use the File Transfer Protocol (FTP) for the purposes of uploading their documents to the server. A brief explanation of FTP may also be beneficial to the learning experience. Documents would ideally be uploaded to a remote server that is accessible to World Wide Web users and for the URL or IP address to be submitted to search engines. Where this is not possible, the local host (127.0.0.1) or an intranet server can be used. In the case of the latter, the candidate would benefit from going through the motions of submitting their URL to a search engine and taking screen dumps for evidence requirements. Testing can be completed using different browsers (e.g. Internet Explorer 5 and 6, Netscape Navigator, Opera), using different screen resolutions (e.g. 640x480, 800x600, 1024x768, etc), different colour depths or pallets (web safe colours) and different platforms. The extent of testing may depend on the resources of the Centre. Centres should encourage candidates to use their test data to test the resilience of their end product and actively seek out bugs, logging and rectifying these where possible. A cognitive walk-through would also be appropriate. End-user acceptance testing should be encouraged. This may take the form of a survey, questionnaire or simple feedback/grading form. The aim of the evaluation report is to encourage the candidate to reflect on their work and to re-examine their original aims and objectives and identify strengths and weaknesses, taking into consideration the feedback from end-users and suggesting actions/recommendations.

Higher National Unit specification: support notes (cont)

Unit title: Internet: Web Development

Guidance on the delivery and assessment of this Unit

Outcome 1 is theory based and can be delivered and assessed on its own. At this level, the knowledge gained by the candidate is likely to be somewhat superficial. Centres are encouraged to seek opportunities that serve to enhance the student learning experience. This could perhaps be achieved by introducing practical activities or tutor-led demonstrations of the concepts being conveyed. The instrument of assessment for Outcome 1 should be entirely theory based and take the form of a series of questions that have been written in such a way that they cover a minimum of 60% of the Outcome and evidence requirements. A written response to a question requiring a description would typically be in the region of 20 – 50 words. A response of fewer words may not satisfy fully a description based evidence requirement. It is unlikely that a candidate would exceed 200 words in responding to any given question requiring a descriptive response. Restricted response or missing word questions can be set for the purposes of satisfying evidence requirements that require the candidate to identify information. For complex descriptive questions, it may be advantageous to have separate components to a question, thus allowing shorter focussed responses (e.g. a three part question). A marking scheme with a threshold of achievement would be beneficial. The threshold in which a candidate can be deemed to have reached the minimum pass standard should be set at 60% of the available marks within the instrument being used. Candidates should not be aware of the questions beforehand but need only cover 60% of the total evidence requirements. Due to the volume of technical information and because this assessment is to be completed under supervised conditions, it would be permissible to allow each candidate two sides of handwritten A4 personal research notes to which they may refer when completing the instrument of assessment. These notes should not be supplied by the Centre or be the result of a collaborative exercise between candidates. Research notes should be submitted with the candidates' responses. It is recommended that 15 hours be allocated to the delivery of this Outcome. Delivery can be tailored to suit local needs. For example, some centres may prefer to complete this outcome within the first or the last 15 hours of the Unit delivery schedule. Other centres may prefer to deliver Outcome 1 by allocating, for example, 1-hour of a 3-hour session over 15 sessions. The remaining 2-hours of each session could then be used for the delivery of Outcomes 2, 3 and 4. It is recommended that assessment time be in addition to the suggested 15 hours and that a further two hours be set aside for a closed book instrument of assessment, sampling a minimum of 60% of the Outcome 1 evidence requirements.

Outcomes 2, 3 and 4 are to be assessed by means of a case study, scenario or small project. It is recommended that Centres progress directly to Outcome 3 on completion of Outcome 1. It is recognised that a candidate with little or no experience of the chosen development language may find it difficult to complete Outcome 2 to a satisfactory standard without first having the opportunity to gain fundamental knowledge of the chosen development language (e.g. HTML). It is suggested that this be achieved by means of hands-on practical experience. Lecturer-led exposition with relevant supporting notes, slides or teaching aids and a series of short practical exercises that encourage the candidate to put theory into practice would be ideal. As a guideline, a candidate may take approximately 35-hours to reach the standard

Higher National Unit specification: support notes (cont)

Unit title: Internet: Web Development

outlined in the evidence requirements for Outcome 3. This does not include time to complete the assessment. It is suggested that a simple checklist covering the evidence requirements of Outcome 3 be used in the first instance. It is recommended that further evidence be generated on a sampling basis (minimum sample is 60%) as part of a case study, scenario or small project that integrates Outcomes 2, 3 and 4.

A candidate, having been through the delivery of Outcome 3, may be better placed to gain a fuller appreciation of Outcome 2. The candidate may also benefit from the opportunity to participate in a tutor/mentor led activity involving the examination of good and bad web page design based on existing examples sourced from the World Wide Web. This could perhaps be for a common theme (eg music site, book store or online retail outlet). Layout, colour scheme and complementary web-safe colours, typography, aesthetics, screen resolution, content, relevance to audience, ease of use, functionality, usability, interactivity, use of plug-ins, scripting and interoperability and access for users with disabilities could be investigated and may serve to enhance the candidate learning experience.

Candidates will produce a critical evaluation report of approximately 500 words to meet the final two evidence requirements of Outcome 4. The candidate will be required to gain a minimum of 60% of the marks available for the evaluation. Given the scope for content within the evaluation report, a marking scheme with percentages allocated to bands might be most the appropriate (e.g. Satisfactory .. 60%; Good .. 70%; Excellent .. 80%+).

Open learning

If this Unit is delivered by open or distance learning methods, additional planning and resources may be required for candidate support, assessment and quality assurance. A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes. For further information and advice, please see *Assessment and Quality Assurance of Open and Distance Learning* (SQA, February 2001 – publication code A1030).

SPECIAL NEEDS

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

General information for candidates

Unit title: Internet: Web Development

This Unit is designed to provide you with the knowledge and skills required to create efficient, effective and comprehensive World Wide Web documents using a variety of techniques — including a simple text editor and an industry standard Web authoring tool.

Outcome 1 is theory based and serves to build your awareness of the current factors affecting the development of World Wide Web documents. Outcome 1 examines current standards for developing World Wide Web documents and investigates emerging standards – in particular, those endorsed by the World Wide Web Consortium (W3C). At the time of writing, factors that would have been taken into consideration would have included: server-side web technologies such as XML, PHP, JSP, ASP, .NET, webdav, delivery of media to mobile and DITV devices, broadband, X3D and Scalable Vector Graphics.

You will examine a range of Web authoring tools including simple text editors such as notepad, proprietary packages such as Dreamweaver, and non-proprietary tools such as Microsoft Word, identifying their strengths and weaknesses and giving examples of how each may be used within an industrial environment. You will understand how search engine results can be influenced through the use of Meta tags and identify steps that can be taken to optimise and/or exclude content from being indexed by a search engine such as robots and spiders. You will take time to investigate the use of browser plug-ins, examining their uses and identifying potential limitations of use including bandwidth constraints.

Outcome 2 requires you to effectively plan and design your Web application, taking your target audience and users with special needs into consideration. You will manage your time carefully and design your Web application in line with the supplied client brief or scenario, identifying the most appropriate methods of interaction and highlighting browser and cross-platform compatibility issues. You will use industry standard methods of documentation such as workflow diagrams, navigational maps and storyboards. A low-fidelity prototype and test strategy should be produced prior to progressing to the implementation stage.

Outcome 3 focuses on the implementation of your World Wide Web documents and allows you to gain hands on experience of different tools used to develop World Wide Web documents and essential coding skills. At all times, you will be expected to conform to industry standards in relation to syntax, structure and language constraints. You will incorporate both text and graphical content. The latter may come from an approved image library or be developed as part of the delivery of a unit such as Multimedia Computing: Screen Based Graphics. In the development of your World Wide Web documents you will incorporate a range of elements including head and meta elements, links, frames, tables, layers, a style sheet, an image map, user input forms and script based feedback.

Outcome 4 requires that you publish your completed Web application to a suitable Web server using the File Transfer Protocol. Once published, you must fully test your Web application against the tests devised as part of your test strategy and the URL submitted to at least one relevant search engine or online directory. Finally, your Web application must be critically evaluated against its original aims and objectives. The evaluation will be in the form of a report of approximately 750 words.

Higher National Unit Specification

General information for centres

Unit title: Multimedia Computing: Animation 1

Unit code: DF64 34

Unit purpose: This Unit is designed to introduce candidates to industry standard animation file formats and the production of multimedia-rich animation suitable for use in web pages and disk-based multimedia applications.

On completion of the Unit the candidate should be able to:

1. Describe industry standard animation file formats.
2. Create an animated presentation incorporating sound and interaction.
3. Publish an animated presentation in various industry standard file formats.

Credit value: 1 HN Credit at SCQF level 7: (8 SCQF credit points at SCQF level 7*)

**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.*

Recommended prior knowledge and skills: Access to this unit will be at the discretion of the Centre. However, it is recommended that candidates should have some prior knowledge and skills in Computing/IT. In addition, knowledge of scripting, Computer Graphics, and electronic image generation packages would be advantageous. This may be evidenced by the possession of relevant National Units, HN units or experience.

Core skills: There may be opportunities to gather evidence towards core skills in this Unit, although there is no automatic certification of core skills or core skill components.

Context for delivery: If this Unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes.

Assessment: When assessing this Unit, it should be borne in mind that many of the concepts are related and advantage should be taken of this fact for the purposes of assessment. Outcome 1 covers underpinning knowledge and should be conducted as a closed book objective assessment under supervised conditions. Outcomes 2 and 3 should be open book assessments that may be integrated into one holistic, practical assessment.

Higher National Unit specification: statement of standards

Unit title: Multimedia Computing: Animation 1

Unit code: DF64 34

The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Describe industry standard animation file formats

Knowledge and/or skills

- ◆ Industry standard animation file formats
- ◆ Uses of industry standard animation file formats
- ◆ Advantages and disadvantages of industry standard animation file formats in different applications.

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can:

- ◆ Describe the standard animation file formats used in industry
- ◆ Describe the uses of industry standard animation file formats
- ◆ Identify the advantages and disadvantages of industry standard animation file formats in different applications

This assessment will be in the form of 20 short response questions. Each of the knowledge and/or skills must be covered in the assessment and the questions allocated on an equal basis. The assessment will be carried out in a supervised environment, will be closed book and is to be completed in 1 hour. Candidates must answer 12 out of the 20 (60%) questions correctly in order to obtain a pass in this outcome.

Assessment guidelines

Where Outcome 1 is not achieved on the first attempt, the candidate should be given an alternative objective assessment.

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Animation 1

Outcome 2

Create an animated presentation incorporating sound and interaction.

Knowledge and/or skills

- ◆ How to prepare a storyboard
- ◆ How to create composite images from the painting or drawing tools of an appropriate application package
- ◆ How to create motion and apply to objects
- ◆ How to add sound and interaction to an animation
- ◆ How to incorporate elements into a cohesive presentation based on storyboard

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can use the features of an industry standard animation package to create a cohesive animated presentation based on the storyboard they have developed.

The storyboard must either be hand or digitally drawn. The storyboard must include placeholders for main objects such as text, graphics, buttons and so forth. Annotations should be included in the storyboard explaining the main purpose and content of each screen, as well as detailing events including, at least, motion, sound, interaction and animation. Screen prints of the finished presentation will not be accepted as a storyboard, as the storyboard should be completed prior to implementation. Hard copy of the storyboard must be produced.

A composite image must be either drawn or painted and included in the presentation. At least 2 shapes and colour flood-fill must be incorporated in the image. At least one type of motion, sound and interaction must be included in the composite image. Evidence of achievement will be by observation checklist, prints of each of the screens and the finished presentation being submitted on disk in the application packages native file format.

Assessment guidelines

The assessment of this Outcome could be combined with Outcome 3 as one integrated practical exercise.

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Animation 1

Outcome 3

Publish an animated presentation in various industry standard file formats.

Knowledge and/or skills

- ◆ How to publish an animated presentation in various formats
- ◆ How to optimise files sizes for best performance
- ◆ How to analyse and compare various published formats for performance

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can publish the presentation created in Outcome 2 in at least three different industry standard animation file formats. At least one of the file formats must be web-compatible. File sizes must be as small as possible, compression techniques must be as current and effective as possible and the published file formats chosen must represent current technology. Evidence of achievement will be by observation checklist and the 3 published files being submitted on disk.

In addition, candidates will analyse and compare in report form the performance of the published formats. The report will be approximately 500 words. The analysis must include how the file sizes compare, and performance features including, at least, motion, sound, animation and interaction. Suitability of the utilisation of the formats used for various applications must be commented on in light of the content of Outcome 1.

Assessment guidelines

This Outcome is designed to be assessed along with Outcome 2 as part of one integrated practical exercise. Both Outcomes must be given equal weight in the assessment.

Administrative Information

Unit code:	DF64 34
Unit title:	Multimedia Computing: Animation 1
Superclass category:	CE
Date of publication:	December 2003
Source:	SQA
Version:	01

© Scottish Qualifications Authority 2003

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. The cost for each Unit specification is £2.50. (A handling charge of £1.95 will apply to all orders for priced items.)

Higher National Unit specification: support notes

Unit title: Multimedia Computing: Animation 1

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 for this Unit

The Unit has been designed to flow smoothly from a research-based theoretical examination of animation technologies and file formats in Outcome 1 to construction of an animated presentation (Outcome 2) to publishing the presentation (Outcome 3) in some of the very formats examined in Outcome 1. The goal is to have the candidate gain experience by experimentation of the actual performance of the chosen file formats, thereby confirming and reinforcing the underpinning knowledge of the first Outcome. The candidate should, therefore, gain valuable first-hand knowledge of the various technologies that will assist them in future choices of which animation formats are appropriate for various contexts.

At the time of writing the common animation formats are Flash, Shockwave, Quicktime, AVI, MPEG and animated GIF. These may be used for this unit or substituted with any new ones that have emerged. For the context of Outcome 1, uses, disadvantages and advantages of various file formats should be discussed across a broad spectrum of multimedia applications, not just those that are web-based.

Candidates may either be given topics by their lecturer or choose their own. Although not required by the assessment, coverage should be given to the concepts of project brief, target audience and content to assist candidates in the preparation of storyboards. A strong emphasis should be placed on good visual design. The best-of-breed animation package is currently Macromedia Flash MX, but animations can be carried out using any suitable commercially available animation software package. Candidates should be encouraged to produce vector-based presentations (or suitably compressed bitmap presentations) because of their smaller file size. Other techniques to optimise file sizes for quick downloading might include; re-use of symbols for elements that occur more than once; use of tweening for animations, instead of numerous keyframes; limitations being placed on the number of fonts and font styles; use of MP3 compression to store sound; don't animate bitmap elements — use them only as backgrounds or static elements; group elements as much as possible; use colour gradients sparingly — solid colours take up less space.

The published file formats for Outcome 3 should be chosen from vector, bitmap, or streaming formats. Some packages will statistically compare download times as part of the publishing process. If this feature is not available, an estimate can be used based on file size. Interaction performance can be judged by running the published version with a web browser or some other platform.

Higher National Unit specification: support notes (cont)

Unit title: Multimedia Computing: Animation 1

Guidance on the delivery and assessment of this Unit

This Unit is designed to introduce candidates to the subject of animation. Although most animation these days is aimed at browser delivery across web pages, this is not exclusively so. The candidate should be exposed to animation delivery across a wide selection of applications.

Outcome 1 will be assessed in the form of 20 short response questions. Each of the knowledge and/or skills must be covered in the assessment and the questions allocated on an equal basis. The assessment will be carried out in a supervised environment, will be closed book and is to be completed in 1 hour. Candidates must answer 12 out of the 20 questions correctly in order to obtain a pass in this outcome.

It is recommended that Outcomes 2 and 3 are integrated into one assessment based on a practical exercise. The assessment should concentrate on examining the candidates skills in using the features of an industry standard animation package to create an animated presentation based on a storyboard they have previously developed. The candidates skills in developing a storyboard must also be assessed and show evidence of the inclusion of placeholders, annotations and events. Candidates must also show skills in drawing or painting composite images and in incorporating these into the native file formats of the application package used.

Where the candidate is unsuccessful in achieving an outcome, provision should be made for remediation and reassessment. Where Outcome 1 is not achieved on the first attempt, the candidate should be given an alternative objective assessment.

Open learning

If this Unit is delivered by open or distance learning methods, additional planning and resources may be required for candidate support, assessment and quality assurance. A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes. For further information and advice, please see *Assessment and Quality Assurance for Open and Distance Learning* (SQA, February 2001 — publication code A1030).

Special needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

General information for candidates

Unit title: Multimedia Computing: Animation 1

This Unit will introduce you to the subject of computer animation. On completion of the Unit you should be able to understand industry standard animation file formats and to produce a multimedia-rich animation suitable for use in web pages or with disk-based multimedia applications. Specifically, you should be able to:

1. Describe industry standard animation file formats
2. Create an animated presentation incorporating sound and interaction.
3. Publish an animated presentation into various industry standard file formats.

The Unit has been designed to flow smoothly from a theoretical examination of animation technologies and file formats in Outcome 1 to construction of an animated presentation (Outcome 2) to publishing the presentation (Outcome 3) in some of the very formats you examined in Outcome 1. The goal is to have you gain skills by experimenting with the actual performance of the chosen file formats, thereby confirming and reinforcing the knowledge you gained in the first Outcome. You should, therefore, gain valuable first-hand knowledge of the various technologies that will assist you in future choices of which animation formats are appropriate for various contexts.

The assessment for Outcome 1 will be in the form of 20 short response questions. The assessment will be carried out in a supervised environment, will be closed book and is to be completed in 1 hour. You must answer 12 out of the 20 questions correctly in order to obtain a pass in this outcome.

For Outcomes 2 and 3, a single practical exercise will be given where you will be asked to construct an animated presentation and then publish it in various animated file formats. Some of the skills you will learn include:

1. Preparing a storyboard
2. Creating an image from the package's paint or drawing facilities
3. Applying motion to objects
4. Adding sound and interaction
5. Incorporating these elements into a cohesive presentation
6. Optimising animated file sizes
7. Publishing your completed presentation in various animation formats
8. Comparing the performance of your published files

You will be assessed on all of the above elements in Outcomes 2 and 3 and you will also be asked to produce a report of approximately 500 words in which you analyse and compare the performance of the published file formats.

Higher National Unit Specification

General information for centres

Unit title: Multimedia Computing: Animation 2

Unit code: DF65 35

Unit purpose: This Unit is designed to enable candidates to knowledge and/or skills in 3-dimensional (3D) animation for use in interactive applications. Candidates should gain knowledge and/or skills in the fundamentals of 3D animation and in creating 3D animation sequences using appropriate software. Candidates should gain knowledge and/or skills in how to create and integrate 3D animation sequences into interactive applications and how to publish the application. Candidates should gain an understanding of why 3D animation is used in multimedia, how it is best utilised and the process of designing, developing, integrating and testing 3D animation within a completed multimedia application. This Unit should help to enhance candidate's knowledge and/or skills for both future multimedia projects and to familiarise them with this specialist aspect of industrial projects.

On completion of the Unit the candidate should be able to:

1. Describe the fundamentals of 3-D animation
2. Use modelling techniques to simulate solid objects
3. Apply animation to a 3-D model
4. Create a 3-D animation presentation and integrate it with an interactive application
5. Demonstrate a 3-D animation has been successfully published and runs error free on an appropriate delivery medium

Credit value: 2 HN Credits at SCQF level 8: (16 SCQF credit points at SCQF level 8*)

**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.*

Recommended prior knowledge and skills: Access to this Unit is at the discretion of the Centre. However, it is recommended that DF64 34 Multimedia Computing: Animation 1 has already been achieved by candidates. It would be advantageous if candidates had some prior knowledge of scripting, Computer Graphics, electronic image generation, 2-D computer animation or 3-D modelling. This may be evidenced by the possession of relevant National Units, HN units or experience.

Core skills: There may be opportunities to gather evidence towards core skills in this Unit, although there is no automatic certification of core skills or core skills components.

General information for centres (cont)

Context for delivery: If this Unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes.

Assessment: This unit will be assessed using 2 assessments. For Outcome 1 a report will be produced to demonstrate the candidate's knowledge of the fundamentals of 3D animation: the stages involved in creating an animation, its purpose in interactive applications, file formats, compressed formats and underlying technologies. This report could be completed at the end of the Unit after candidates have gained sufficient knowledge and/or skills to be able to integrate the theory learned with the practical lessons.

It is strongly recommended that Outcomes 2, 3, 4 and 5 be integrated into one practical project assessment in which candidates are required to design, develop and publish a 3-D animated sequence and ensure that it runs successfully on the chosen published media. However, Centres may wish to assess each Outcome on an individual basis.

Higher National Unit specification: statement of standards

Unit title: Multimedia Computing: Animation 2

Unit code: DF65 35

The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Describe the fundamentals of 3-D animation

Knowledge and/or skills

- ◆ The differences between 2-D and 3-D animation
- ◆ The differences between dedicated 3D animation software packages and software packages which support 3D features
- ◆ The purpose of 3D animation in interactive applications
- ◆ The 3 fundamental stages of animation work
- ◆ File formats used for 3D animation

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can write a report of approximately 750 words outlining the following fundamentals of 3D animation:

- ◆ The differences between 2D and 3D animation
- ◆ The purpose of 3D animation in interactive applications
- ◆ Explain what Modelling is
- ◆ Different styles of animation - keyframes, frame by frame animation
- ◆ Explain what rendering is
- ◆ Current file formats used for 3D animation — compressed and uncompressed,
- ◆ File size considerations for online and offline applications
- ◆ The advantages and disadvantages of current software packages used to create 3D animation.

Assessment guidelines

It is recommended that the report for this Outcome is completed by candidates towards the end of the unit. The advantages of this approach should be that candidates should be able to use their newly gained practical experience to support their findings and that information on compression can be integrated with 'Compression for 3D animation' in Outcome 5.

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Animation 2

Outcome 2

Use modelling techniques to simulate solid objects.

Knowledge and/or skills

- ◆ How to create primitives
- ◆ How to modify primitives
- ◆ How to import plans
- ◆ How to import models and meshes
- ◆ How to apply multiple textures with various mappings to objects
- ◆ How to apply appropriate lighting to objects
- ◆ Naming conventions for models, lights and materials

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can use the main features, including at least two complex features, of an appropriate software package to create a 3D model.

A still life must be designed and created to a given brief. An analysis of the design and of the objects to be modelled must be carried out and documented. In order to achieve the correct design decision for the objects candidates must supply research data, gather plans and import them into the workspace before starting construction.

The final design must be justified as suitable in terms of the objects form, the relevant techniques to be applied to the object, the aims of the brief, type of project, topic, target audience, delivery medium and playback platform.

Multiple textures with various mappings must be applied to the still life, these must be suitable for the object and can be from a library or captured from a digital source. Appropriate lighting must be added. Evidence of achievement will include an analysis document and portfolio of reference materials, assessors' checklist, prints of each of the screens, and the finished image submitted on disk using an appropriate file format.

Assessment guidelines

The assessment for this outcome can be integrated with Outcomes 3, 4 and 5 as one practical exercise. See assessment guidelines for Outcome 5. If Centres decide to use a separate assessment for this Outcome then they must ensure that the assessment covers all of the Knowledge and/or Skills and Evidence Requirements elements shown above.

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Animation 2

Outcome 3

Apply animation to a 3-D model.

Knowledge and/or skills

- ◆ How to apply a variety of camera techniques
- ◆ Naming conventions for cameras
- ◆ How to apply a variety of animation techniques

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can use the main features, including at least two complex features, of an appropriate 3D modelling/animation package to apply a variety of animation techniques to a model. At the very least one simple and one complex animation technique should be applied. At least 2 camera techniques must be applied to the model.

Where this Outcome is integrated with Outcomes 2, 4 and 5, evidence must be demonstrated in the requirements document and storyboards that the candidate has planned the animation to be used and understands the terminology for this.

Where this Outcome is assessed separately, candidates must be given an appropriate brief and produce an analysis for such. Animation solutions must be justified through different examples.

Assessment guidelines

The assessment for this outcome can be integrated with Outcomes 2, 4 and 5 as one practical exercise. See assessment guidelines for Outcome 5. If Centres decide to use a separate assessment for this Outcome then they must ensure that the assessment covers all of the Knowledge and/or Skills and Evidence Requirements elements shown above.

Outcome 4

Create a 3-D animation presentation and integrate it with an interactive application.

Knowledge and/or skills

- ◆ How to create a storyboard sequence
- ◆ How to render a 3-D animation
- ◆ Compression for 3-D animation
- ◆ How to implement a 3D-animation with an interactive application project
- ◆ How to control a 3D-animation in an interactive application

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Animation 2

Evidence requirements

Candidates will need evidence to demonstrate their skills and/or knowledge by showing that they can use the features of an appropriate package for creating 3D animation, to render a completed animation sequence and select appropriate compression settings.

The Rendered animation must be designed in context with the application in terms of design and content. The chosen design solution must be reported. The animation has to be implemented into an interactive application project whereby interactivity is applied to control the animation. The candidate must carry all of these processes out.

Storyboards must be created to a given brief. Each storyboard must either be hand or digitally drawn and must include placeholders for main objects such as text, graphics, buttons, images, animated sequences, video. The storyboards must include annotations for each media element and explain the main purpose for each screen, as well as detailing events such as sound, interaction and animation. Screen prints of the finished presentation will not be accepted as a storyboard, as the storyboard should be completed prior to implementation. A hard copy of the storyboard must be produced.

Evidence of achievement will include an assessors checklist, a hard copy of the storyboards, prints of each of the screens and the rendered animation submitted on disk in a suitable compressed and uncompressed (where applicable) file format. The completed application must be saved in a suitable file format for the intended playback medium.

Where this Outcome is assessed separately, candidates must be given an appropriate brief and produce an analysis for such. Animation solutions must be justified through different examples.

Assessment guidelines

The assessment for this outcome can be integrated with Outcomes 2, 3 and 5 as one practical exercise. See assessment guidelines for Outcome 5. If Centres decide to use a separate assessment for this Outcome then they must ensure that the assessment covers all of the Knowledge and/or Skills and Evidence Requirements elements shown above

Outcome 5

Demonstrate a 3-D animation has been successfully published and runs error-free on an appropriate delivery medium.

Knowledge and/or skills

- ◆ How to prepare an authored application
- ◆ How to publish an authored application
- ◆ How to trouble shoot 3-D animation runtime errors

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Animation 2

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can publish their presentation to at least one delivery medium (e.g. CD or DVD or Website). File sizes must be as small as possible, and candidates must ensure that compression techniques are as current and effective as possible, and that the published file formats chosen represent up-to-date technology. Evidence must include an assessors' checklist and the published file submitted on disk. Where the presentation has been incorporated into a webpage, the files must be supplied on disk and the Uniform Resource Locator (URL) given.

In addition, the candidate will analyse and compare in report form, the performance of the published formats and submit the results on hard copy. The report must be in the form of a data table. The analysis must include how the file sizes compare, and the effect on the performance features, such as motion, sound, animation and interaction. Suitability of the utilisation of the formats used for various applications must be commented on in light of the content of Outcome 1.

Any runtime errors and the solutions applied must be documented accurately and in detail.

Candidates must provide:

- ◆ At least one Storyboard
- ◆ At least two 3D models
- ◆ A copy of the completed animation in an appropriate file format
- ◆ The Compressed file of the animation
- ◆ The unpublished version of the interactive application must be supplied on disk.
- ◆ The published file of the interactive application.
- ◆ The report on compressed files.
- ◆ The report of test data — runtime error(s) and the successful solution(s)
- ◆ The report on the evaluation of the animation — (e.g. were aims and objectives achieved, if not why not, what else should have been considered)

Assessment guidelines

The assessment for this outcome can be integrated with Outcomes 2, 3 and 4 as one practical exercise. If Centres decide to use a separate assessment for this Outcome then they must ensure that the assessment covers all of the Knowledge and/or Skills and Evidence Requirements elements shown above. If a separate assessment is used it is recommended that candidates either use the 3D animations they created earlier in the unit or appropriate files supplied by the Centre. In either case, storyboards and all required reports should be produced. The scope of the project is to design, develop and integrate the animation with an interactive application.

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Animation 2

The details on the compressed file quantity and quality could be incorporated in the report for Outcome 1. Test information and evaluation findings must be in separate reports. The application should be published and the animation should be tested and modified until it runs error free.

If any runtime errors do occur candidates should investigate and provide solutions as appropriate. Where no runtime errors have occurred candidates should report on the common runtime errors that can occur and on their solutions. Centres may wish to provide candidates with a file that has errors in it. Runtime errors and their solutions should also be documented appropriately. Candidates should be allowed to obtain limited help from lecturers, technicians, classmates or other persons as appropriate. The use of help facilities and literature should be encouraged throughout the delivery of the Unit.

Administrative Information

Unit code:	Multimedia Computing: Animation 2
Unit title:	DF65 35
Superclass category:	CE
Date of publication:	December 2003
Version:	01
Source:	SQA

© Scottish Qualifications Authority 2003

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. The cost for each Unit specification is £2.50. (A handling charge of £1.95 will apply to all orders for priced items.)

Higher National Unit specification: support notes

Unit title: Multimedia Computing: Animation 2

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 80 hours.

Guidance on the content and context for this Unit

This Unit is designed to enable candidates to gain knowledge and/or skills in 3-dimensional (3D) animation for use in interactive applications. Outcome 1 covers the theory of 3D animation, from what it is, why it is used in multimedia, when it should be used as opposed to other media elements, to how it is incorporated into a completed interactive application. Different applications should be reviewed in terms of their strengths and weaknesses. This approach should help candidates to make design decisions based on the software tool(s) they will be using and to become aware of the alternatives they may be required to select in industry. The knowledge gained in Outcome 1 should help candidates gain a better understanding of the content of Outcomes 2, 3, 4 and 5 where the theory learned should be put into practice.

At the time of writing the common animation formats are Shockwave, QuickTime, AVI, MPEG and animated GIF. These may be used for this unit or substituted with any new ones that have emerged. For the context of Outcome 1, uses, disadvantages and advantages of various file formats should be discussed across a broad spectrum of multimedia applications, not just web-based.

For Outcomes 2-5, candidates may either be given topics by their lecturer or choose their own. A suggested brief could be to produce learning materials for the various departments in the Centre. Each of Outcomes 2-5 could either be assessed by a series of small projects or integrated into one large project. In either case an analysis of the project should be reported. This analysis should, at the very least, cover the project brief, type, topic, content, target audience, objects to be modelled, relevant techniques, delivery medium and playback platform. This should assist candidates in the preparation of their storyboards. A strong emphasis should be placed on good visual design.

By the end of the Unit candidates should have followed a structured method for completing a published project, whereby they have carried out analysis, design, implementation, testing, modifications and evaluation.

It is not necessary to use specialized 3D animation software for this Unit. Any software application that has the ability to create and animate 3D models will be suitable. At the time of writing 3D Studio Max 5 and LightWave are examples of specialized 3D animation software applications, whereas the authoring package Director MX has facilities to produce 3D animations. Techniques to optimise file sizes for quick downloading and playback should be applied and the results noted.

Higher National Unit specification: support notes (cont)

Unit title: Multimedia Computing: Animation 2

Interaction and runtime performance can be judged by running the published version with a web browser or some other platform. Where errors occur, candidates should report these and the solution(s). Should no errors occur, then it may be appropriate to supply candidates with at least one file with errors in it. Candidates would then be required to modify the file and include other common runtime errors and their solutions in the report. This should aid candidates to avoid common runtime error problems in future projects.

Guidance on the delivery and assessment of this Unit

This Unit is designed to introduce candidates to 3D animation and its purpose in interactive applications. The candidate should be exposed to animation delivery across a wide selection of applications, both online and offline. Candidates should seek limited help from lecturers, technicians, classmates and any other person(s) throughout the assessments. The use of help facilities, online documentation and books should be encouraged to find solutions.

Where the candidate is unsuccessful in achieving an Outcome, provision should be made for remediation and reassessment. Where Outcome 1 is not achieved on the first attempt, the candidate should be given an alternative objective assessment.

Outcome 1 will be an open-book assessment requiring candidates to submit a report of approximately 1000 words. This can be carried out either early on in the unit, or as a summative report which is developed in tandem with the theory and practical skills covered throughout the unit. The evidence gained in Outcome 4, for compression and Outcome 5, for runtime errors, could be included in the file format and use of 3D animation in interactive applications section of Outcome 1, for this report.

Outcomes 2-5 are practically based assessments where candidates will be assessed on their ability to create 3D models of objects, animate them, integrate the animation into an interactive application, and produce an error free published version of the application. The successful design and delivery of the project(s) should be achieved through analysis, design, implementation, testing, modification and evaluation. Observation checklists carried out by the assessor should evidence practical achievement of Outcomes 2-5. Where candidates have carried out work in their study time, the assessor must question the techniques applied. The majority of practical work should be carried out in class time.

In addition to the report for Outcome 1, documentation for other outcomes will be required, as stated in the evidence requirements.

To achieve a pass in this unit, candidates must meet all the evidence requirements for each outcome.

Higher National Unit specification: support notes (cont)

Unit title: Multimedia Computing: Animation 2

Open learning

If this Unit is delivered by open or distance learning methods, additional planning and resources may be required for candidate support, assessment and quality assurance. A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes. For further information and advice, please see *Assessment and Quality Assurance for Open and Distance Learning* (SQA, February 2001 — publication code A1030).

Special needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

General information for candidates

Unit title: Multimedia Computing: Animation 2

This unit will enable you to learn about the subject of 3D computer animation.

On completion of the Unit you should be able to understand what 3D animation is, how it is used in multimedia, how to create design solutions, develop and deliver a 3D animation to web or disk-based multimedia applications, using industry standard animation file formats. Specifically, you should be able to:

1. Describe the fundamentals of 3-D animation
2. Use modelling techniques to simulate solid objects
3. Apply animation to a 3-D model
4. Create a 3-D animation presentation and integrate it with an interactive application
5. Demonstrate a 3-D animation has been successfully published and runs error free on an appropriate delivery medium

The Unit has been designed to flow smoothly from the theory of 3D animation and its role in interactive applications in Outcome 1 to the construction of an animated sequence (Outcomes 2 and 3), to integration with an interactive application (Outcome 4) and finally publishing an error free application (Outcome 5). The goal is to introduce you to 3D animation, not to provide you with the necessary knowledge and/or skills for you to become a professional 3D animator. Instead this unit will help you to understand the processes involved, what file formats you should be using for the intended playback medium and how to ensure that the animation will run smoothly and not interfere with the rest of the website or multimedia application.

Outcome 1 is assessed by means of a report of approximately 750 words in which you will be asked to outline the fundamentals of 3D animation.

For Outcomes 2, 3, 4 and 5, you will either be presented with four separate assessments or with a single practical exercise. In either case you will be asked to construct an animated presentation and then publish it in various animated file formats. Some of the skills you will learn include:

1. Preparing a storyboard.
2. Creating an appropriate 3D model for a given topic. The model must have multiple textures with various mappings.
3. Applying a variety of animation, camera and lighting techniques to objects, selecting the most appropriate for the model and sequence.
4. Incorporating these elements into a cohesive presentation.
5. Adding interaction.
6. Optimising animated file sizes.
7. Publishing your completed presentation into a suitable format for web or disk-based multimedia, eg CD or DVD.
8. Comparing the performance of your published files
9. Solving runtime errors with the animation

General information for candidates (cont)

Unit title: Multimedia Computing: Animation 2

To achieve a pass in Outcomes 2–5, you must successfully construct an animated presentation and then publish it in various animated file formats to either, CD, DVD or a Website. You should be able to seek limited help from lecturers, technicians, classmates and any other person(s) throughout the assessments. You should be encouraged to use help facilities, online documentation and books throughout the duration of the Unit.

Higher National Unit Specification

General information for centres

Unit title: Multimedia Computing: Screen Based Graphics

Unit code: DF69 34

Unit purpose: This Unit is designed to introduce candidates to the various aspects of digital image production techniques for use on screen. The Unit will develop the candidate's ability to use hardware and software to capture, create, manipulate and optimise images for their intended use.

On completion of the Unit the candidate should be able to:

1. Identify and describe characteristics of screen-based graphics
2. Capture, create and manipulate screen-based graphics
3. Optimise and incorporate screen-based graphics into a multimedia or Web application

Credit value: 2 HN Credits at SCQF level 7: (16 SCQF credit points at SCQF level 7*)

**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.*

Recommended prior knowledge and skills: Access to this Unit is at the discretion of the centre. However, knowledge of computer applications packages and the World Wide Web would be advantageous. This may be evidenced by the possession of relevant National Units, HN units or experience.

Core skills: There may be opportunities to gather evidence towards core skills in this Unit, although there is no automatic certification of core skills or core skills components.

Context for delivery: If this Unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes.

Assessment: Outcome 1 will be assessed in the form of 20 written response questions. The majority of these questions will require a brief description in the region of 20 – 50 words. Restricted response questions may be set where the candidate is required to identify information. Questions will test candidates' knowledge and/or skills relating to the hardware, software, manipulations, image file types, file format characteristics and image protection techniques.

General information for centres (cont)

Assessment evidence for Outcome 2 will be a series of practical activities designed to demonstrate candidates' knowledge and/or skills in capturing, creating and manipulating screen-based graphics. Candidates will be required to build a portfolio of images over an extended period. The assessor will observe an instance of each of the assessed evidence requirements then sign and date an observation checklist. Each candidate must submit their completed portfolio and accompanying assessors' checklist to achieve a pass in Outcome 2.

Evidence for Outcome 3 will be in the form of a practical assessment carried out under supervised conditions designed to demonstrate candidates' knowledge and/or skills in optimising and incorporating screen-based graphics into a multimedia or Web application. Candidates will be required to deliver the completed multimedia or web based application on an appropriate medium, e.g. disk, CD-ROM, DVD or online. The assessor will observe an instance of each of the evidence requirements then sign and date an observation checklist. The candidate must submit their completed application and accompanying assessors' checklist to achieve a pass in Outcome 3.

Outcome 3 provides opportunities for cross-assessment with the HN units: *DF63 34 Multimedia Computing: Interface Design and Authoring* and *DF60 34 Internet: Web Development*, but can be assessed discretely, requiring the candidate to optimise images and incorporate these into a suitable multimedia application or Web page.

Higher National Unit specification: statement of standards

Unit title: Multimedia Computing: Screen Based Graphics

Unit code: DF69 34

The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Identify and describe characteristics of screen-based graphics

Knowledge and/or skills

- ◆ Screen-based graphics hardware;
- ◆ Screen-based graphics software;
- ◆ Characteristics of graphic formats;
- ◆ Uses for different graphic formats;
- ◆ Digital image protection

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can:

- ◆ Describe common screen-based graphics hardware:
 - scanner, digital camera, tablet, graphics adapter, monitor;
- ◆ Describe categories and characteristics of screen-based graphics:
 - raster, vector, metafile, animated
- ◆ Identify graphic manipulation applications:
 - paint/photo, draw/illustration, animation
- ◆ Describe at least two raster and one object-orientated graphic file format, identifying:
 - characteristics of file types, compression, uses, limitations;
- ◆ Describe common graphic attributes, such as:
 - resolution, bit-depth, palette, grey scale, hue, saturation, brightness and RGB additive primary colour space, etc;
- ◆ Describe techniques used to compress screen-based graphics:
 - lossy, lossless
- ◆ Describe three common graphic manipulations, such as:
 - resize, resample, rotate, flip, skew, stretch, crop, adjustment of brightness and contrast, gamma correction, removal of moiré patterns, anti-aliasing, layers, filters, effects, etc;

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Screen Based Graphics

- ◆ Identify methods that can be used in protecting ownership of images, such as:
 - watermarks: visible, invisible, script, embedded copyright information, file permissions, copyright and legislation

Assessment for Outcome 1 will be in the form of 20 written response questions. The majority of these questions will require a brief description. A description-based response will typically be 20 – 50 words. Restricted response questions may be set where the candidate is required to identify information. Each of the knowledge and/or skills must be covered in the assessment and sample a minimum of 50% of the items contained in each of the indented sub bullet points - except for the 'common graphic manipulation' evidence requirement where three manipulations should be selected and described (manipulations are not restricted to those shown by the sub-bullet point of the evidence requirement). The assessment must be take place under supervised conditions, will be closed book and is to be completed in no more than 2 hours. Candidates must gain a minimum of 60% of the available marks within the assessment to obtain a pass in Outcome 1. Candidates may not bring to the assessment event any notes, text books, handouts or other material (including electronic/online resources).

Assessment Guidelines

It may be possible to assess the hardware aspect of Outcome 1 with the HN Unit *Multimedia Computing: Multimedia Technology*.

Outcome 2

Capture, create and manipulate screen-based graphics

Knowledge and/or skills

- ◆ Capturing images for screen-based use;
- ◆ Creation of images for screen-based use;
- ◆ Manipulating images for screen-based use;

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can:

- ◆ Use a scanner to capture and digitise an image from an analogue source:
 - As appropriate from: TWAIN, pre-scan, select area to scan, select scan resolution, scale factor, select image type (colour, grey scale, bi-tone), select bit-depth, adjust contrast and brightness as required;
- ◆ Capture an image using a digital imaging device, such as a graphic tablet or digital stills camera and transfer the captured image to a local system;
- ◆ Use a suitable paint or photographic editing application to perform appropriate manipulations, as required, on captured images (e.g crop, colour balance, red eye, etc);

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Screen Based Graphics

- ◆ Create, manipulate and save raster images in a format which preserves editable content:
 - Create a minimum of five raster images, and
 - set parameters including: width and height in pixels, resolution, background colour, colour-depth and mode;
 - make appropriate use of at least five tools available within the application (e.g. pen, pencil, paintbrush, airbrush, shapes, selection, move, lasso, magic wand, eraser, zoom, eye dropper, blur, smudge, sharpen, dodge, burn, clone, retouch, healing, crop, etc – selection of tools should be appropriate to application used);
 - Manipulate at least one image by demonstrating appropriate use of layers, text and at least ten of the following: resize canvas, resize image, resample image, flip, rotate, skew, perspective, importing other images, fills, gradient, filters, effects, anti-aliasing, matting, mask, opaque, transparency, opacity, alpha channel, image slicing, adjustment of colour palette, colour reduction, colour channel, tonal correction, lighting, hue, saturation, brightness, contrast, gamma correction, colour casts, blur, smudge, sharpen, dodge, burn, clone, healing or other manipulation tools appropriate to the application;
 - Apply two forms of image protection to an image
 - Save images in a format suitable for preserving editable content;
- ◆ Use appropriate software to create, manipulate, arrange and save vector objects:
 - Use at least three draw tools: pens, pencil, paintbrush, line, rectangle, rounded rectangle, ellipse, arc, polygon, star, twirl, type or other appropriate draw tools;
 - Perform at least four transform operations: move, scale, rotate, flip, skew, reflect, shear, arrange, group, ungroup;
 - Use at least four from: brushes, layers, effects, filters, masking, opacity, gradient, blends, stroke, fills, shade, tint, envelope, extrude, stretch, path manipulations (e.g. anchor points, direction lines, etc);
 - Use features of software to manually or automatically trace a bitmap or lineart converting image information to a vector format;
 - Save vector in a format that preserves editable data;
 - Save vector in a suitable format for inclusion within a multimedia application or in a format appropriate for online publication;

Candidates will build a portfolio of screen-based graphics over an extended period. In each instance, portfolio evidence should contain the original image and a version which been modified to meet a particular evidence requirement or series of evidence requirements. Sub-bullet points have been included within selected evidence requirements to assist with assessment criteria and to aid the assessor, whom shall observe an instance of an assessed evidence requirement then sign and date an observation checklist. Each candidate must submit their completed portfolio and completed checklist to achieve a pass in Outcome 2.

Assessment Guidelines

It is recommended that candidates give due consideration to the requirements of Outcome 3 and produce a range of images suitable for use in a multimedia application or Web page. For example: buttons, rollovers, scanned images, digital camera images, a banner, logos,

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Screen Based Graphics

graphical interfaces or other forms of navigational elements and give consideration to the type of image that may be best suited as a vector and how this may be incorporated into an multimedia application or Web page. It is recommended that the portfolio of evidence be submitted on CD or DVD with an appropriate directory structure.

Outcome 3

Optimise and incorporate screen-based graphics into a multimedia or Web application

KNOWLEDGE AND/OR SKILLS

- ◆ Selection of appropriate images for incorporation into a multimedia or Web application;
- ◆ Optimising images for intended use;

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that:

- ◆ The images selected are appropriate for intended use:
 - File type, size, platform, technical characteristics;
- ◆ The images selected are optimised for use in a multimedia or Web application:
 - file size, quality, compression, colour-safety;
 - as appropriate from: anti-aliasing, interlacing, transparency, dithering, gamma correction, alpha channel transparency, watermarking, minimisation of time required to download over a slow connection;
- ◆ The images are incorporated into a multimedia or Web application:
 - Select three from: buttons, rollover variations, photograph, scanned image, logo or suitable vector object, banner, graphical interface, graphical navigational structure or graphical menu, suitable alternatives.

Evidence for Outcome 3 will be in the form of a practical assessment carried out under supervised conditions designed to demonstrate candidates' knowledge and/or skills in optimising and incorporating screen-based graphics into a multimedia or Web application. Candidates will be required to produce the completed multimedia or web based application on an appropriate medium, e.g. disk, CD-ROM, DVD or Web. The assessor will observe an instance of each of the assessed evidence requirements then sign and date an observation checklist. Each candidate must submit their completed application and accompanying assessors' checklist to achieve a pass in Outcome 3

Assessment Guidelines

There may be opportunities to cross-assess part of Outcome 3 with an appropriate Outcome in an appropriate Unit that assesses the creation or development of a multimedia or Web application.

Administrative Information

Unit code:	DF69 34
Unit title:	Multimedia Computing: Screen Based Graphics
Superclass category:	CE
Date of publication:	December 2003
Version:	01
Source:	SQA

© Scottish Qualifications Authority 2003

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. The cost for each Unit specification is £2.50. (A handling charge of £1.95 will apply to all orders for priced items.)

Higher National Unit specification: support notes

Unit title: Multimedia Computing: Screen Based Graphics

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 80 hours.

This could be allocated as indicated in the table below.

Outcome 1	Outcome 2	Outcome 3	Assessment
22 hours	33 hours	10 hours	15 hours

The use of notional design length for programme design and scheduling is advisory only. In centres where less than the notional design length is allocated, it is recommended that time is deducted from that allocated to assessment rather than from the teaching/learning allocation.

The emphasis for this unit should be in teaching and candidate learning rather than in assessment. It is recommended that all topics be taught and that a selection of these be used to assess the candidate.

Guidance on the content and context for this Unit

This unit is one of a series of units at Higher National level relating to Multimedia Computing and Web development. It is recommended that candidates should have a basic knowledge of using a Graphical User Interface prior to commencement of this Unit. This experience could have been gained by undertaking another unit in the series of graphics units, for example, by candidates who have already undertaken some other course of study at a lower level than Higher National level.

Candidates may use the available image production and display software to complete all tasks in this unit. Where resource restrictions are prohibitive in terms of available hardware (e.g. digital stills camera, graphic tablet, Apple Macintosh, etc) it should be possible to cover an evidence requirement by taking a theoretical, rather than practical, approach.

At the time of writing a number of applications were considered suitable for use in the delivery of this unit. These include: **Paint:** Adobe Photoshop, Adobe Photoshop Elements, Jasc Paint Shop Pro, Macromedia Fireworks or a suitable alternative. **Draw:** Adobe Illustrator, Macromedia Freehand, CorelDraw or suitable alternative. Emphasis should not be placed on software specific skills but rather on the knowledge and skills contained within the Unit. This should help ensure that revisions of software does not impact on the underlying knowledge and/or skills acquired through the achievement of the Unit.

Higher National Unit specification: support notes (cont)

Unit title: Multimedia Computing: Screen Based Graphics

Outcome 1

Candidates should begin by gaining a basic understanding of hardware commonly associated with the production of screen-based graphics. It should be borne in mind that the phrase “At the time of writing....” should preface much of what is said in relation to the examples given below of hardware, software, applications packages, file types, etc. Scope for discussion is extensive, but could include a degree of technical discussion in relation to: the monitor (CRT, LCD, refresh rate, dot pitch, size, etc), graphic adapter (processor, memory and support for display standards), scanner (types including flatbed, scan head, CCD array, resolution, interpolation, TWAIN, scanner software, etc), digital camera (CCD, CMOS, resolution, etc), graphics tablet and the mouse.

This should lead on to discussion on the following topics:-

- ◆ Categories of digital images: raster (bitmapped), vector (object-orientated) and metafile;
 - Discussion on animated images may also be beneficial to the candidates’ understanding – however, detailed discussion relating to animated images is perhaps better dealt with in context through HN units such as ‘Multimedia Computing: Animation 1’ and ‘Multimedia Computing: Animation 2’.
- ◆ Uses of screen based graphics in the likes of Web sites, multimedia applications, computer games and computer-aided design, such as: interfaces, icons, buttons, logos, banners, digital photographs, etc;
- ◆ Common attributes, such as resolution, bit-depth, colour palette (including: Microsoft Windows, Apple Macintosh system and Web Safe), colour modes, models and spaces (mono, greyscale, HSB and RGB);
- ◆ Lossy and lossless compression and awareness of appropriate compression algorithms (e.g. LZW, RLE, Huffman, CCITT group 4 and 4, JPEG compression, etc);
- ◆ Common graphic formats (Windows Bitmap, GIF, GIF87a and GIF89a, JPEG and JPEG2000, Portable Network Graphic, Tagged Image File Format, Scalable Vector Graphic, X3D, Fractal file format and application specific formats (AutoDesk DXF, Adobe Illustrator, Macromedia Freehand, CorelDraw), ShockWave Flash, Windows MetaFile and PhotoShop Document file);
- ◆ Graphic development and manipulation applications (Paint: Adobe Photoshop, Jasc Paint Shop Pro; Draw: Adobe Illustrator, CorelDraw, Macromedia Freehand; Animation: Macromedia Flash, Serif PhotoPlus);

Higher National Unit specification: support notes (cont)

Unit title: Multimedia Computing: Screen Based Graphics

- ◆ Characteristics and limitations of current image formats, such as:
 - generic raster issues like pixellation, support of vector formats online, cross platform colour palettes (e.g. 256 Windows system palette, 256 Apple MacIntosh system palette, 216 common Web Safe colours);
 - file format specific issues like colour capability, dithering, supported compression, etc;
 - special attributes, such as: transparency, progression, interleaving, anti-aliasing, animation, gamma correction, alpha channel transparency,
 - optimisation (e.g. file size, quality, bit-depth, download speed, etc);
 - issues relating to external support for file format;
 - intended use.

- ◆ Candidates should be able to describe and practice common image manipulations, such as:
 - resize, resample, crop, flip, rotate, transform, skew;
 - colour balance, hue, saturation, brightness, contrast, gamma correction;
 - removal of moiré patterns from grey scale images;
 - anti-aliasing;
 - layers, opacity, transparency;
 - filters, effects;

- ◆ Candidates should also gain an understanding of current copyright legislation and an awareness of the steps that can be taken to protect the images they create. For example:
 - visible markings or watermarks,
 - reduction in final image resolution or quality,
 - use of scripts or applets to disable right-click or print-screen options
 - embedding additional file information
 - title, author, caption, copyright status, copyright notice, owners URL
 - embedding an invisible digital watermark into image files for a greater level of screen and/or print protection
 - Third party utilities or plug-ins for image applications or stand alone tools:
 - Digimarc Corporation

Candidates should be introduced to each topic and given time to investigate the required technical information. The investigative part of this outcome (and others in this unit) provides an ideal opportunity for candidates to take part in group activities. Candidates could investigate the topic in small groups and discuss their findings to perhaps gain a better understanding of the underlying concepts.

Higher National Unit specification: support notes (cont)

Unit title: Multimedia Computing: Screen Based Graphics

Outcome 2

Relates to capturing and digitising images, creating and manipulating images and the use of various industry-standard image file formats and appropriate software.

Using the available hardware and software, candidates should investigate the method(s) of capture and creation. This will involve the use of a scanner to digitise data from an analogue source. Ideally a digital camera (stills or video) would be available to demonstrate the digital aspect of capture. Access to a graphics tablet and/or pen would be useful but is not essential. Candidates' should make use of a paint program to manipulate capture images (e.g. colour balance, crop, rotate). Images should be created using draw and paint applications (e.g. Adobe Illustrator 10 and Adobe Photoshop 7 or Adobe Photoshop Elements 2). Candidates may typically produce images such as buttons (including rollover variations), logos and interfaces. The scope for image development is broad and is best left to individual centres.

Typical image manipulations include: resolution, colour-depth, colour palette, type, resize, flip, rotate, skew, use of layers, fills/gradients, filters, effects, anti-aliasing, matting, masks, alpha channel, transparency, opacity, crop and use of other available tools within the application (e.g. move, marquee, lasso, magic wand, type effects, etc).

The range of file types to study should include the common screen-based image types - GIF, JPEG and PNG for image stills and GIF 89 and Flash for 2D animation, vector file formats such as .AI or SVG, metafile formats such as WMF and any other image type available at the time of delivery, such as those which support layers, e.g. PSD.

Note that, at the time of writing, traditional vector file formats were generally unsuitable and largely unusable as a Web file format. However, there has been considerable development in areas such as Scalable Vector Graphics. This has been pushed by the fact that the vector format has inherent properties that would be extremely useful for Web design. Candidates can gain experience of SVG by using a draw tool such as Adobe Illustrator 10. Macromedia offer support the use of the vector format on the Web using plug-in player tools for Flash and Director.

Candidates should be introduced to each of the image processes and be given time to practice the skills and techniques required to capture, create and manipulate the images.

Outcome 3

Candidates could expect to gain knowledge and/or skills in the processes involved in image optimisation and integration. Depending on the format and intended use, topics for optimisation should include: quality, compression, file size, colour-safety, anti-aliasing, interlacing, transparency, dithering, gamma correction, alpha channel transparency, digital watermarking, minimise download speed and user selectable save optimisation options for given file formats (for example: diffusion, pattern, noise, selective, perceptual and adaptive).

Higher National Unit specification: support notes (cont)

Unit title: Multimedia Computing: Screen Based Graphics

After optimising the various images, candidates should learn how to use them in the proper context. This may be done by including the images, for example, in a web page or multimedia presentation page. It would be expected that the candidate be able to select file formats appropriate for intended use. This Outcome provides the opportunity for cross-assessment with other Units which deal with the creation of a Web pages or multimedia presentations.

Guidance on the delivery and assessment of this Unit

This unit is likely to form part of a group award which is primarily designed to provide candidates with technical knowledge and skills related to the creation, manipulation, optimisation and use of the various types of images available for producing screen-based images for use in multimedia or Web applications. Note that the follow-on HN Units, Animation 1 and Animation 2 deal specifically with the animation of screen-based images.

The unit is likely to be delivered at the beginning of the award so that candidates can learn the relevant factors to consider when using images in various multimedia contexts. The emphasis for this unit should be on teaching and candidate learning rather than on assessment. It is recommended that all topics be taught and that a selection of these be used to assess the candidate. It should be borne in mind that this unit, for many candidates, will be the first that they have studied with the intention of developing their graphics knowledge and skills. Candidates are not expected to produce elaborate or sophisticated graphics as part of this unit. Focus should remain on fundamental knowledge, skills, principles and techniques.

Outcome 1 is theory based. Consideration should be given to enhancing the candidate learning experience by tutor-led demonstrations. A personal computer or laptop with Adobe Photoshop/Elements/Paint Shop Pro/Suitable alternative and Adobe Illustrator/Macromedia Freehand/CorelDraw/Suitable alternative installed and connected to a multimedia projector, scanner, graphics tablet/pen and digital camera (where resources permit) may help with the candidates' understanding of the concepts being conveyed.

Outcome 1 will be assessed in the form of 20 questions, the majority of which will require a brief description from the candidate. Each of the knowledge and/or skills must be covered in the assessment. The assessment will be carried out in a supervised environment, will be closed book and is to be completed in no more than 2 hours. Candidates must gain a minimum of 60% of the available marks in order to obtain a pass in Outcome 1. Note that scope may exist to cross-assess the hardware aspect of Outcome 1 with the HN Unit – 'Multimedia Computing: Multimedia Technology'.

Assessment evidence for Outcome 2 will be a series of practical tests designed to demonstrate candidates' knowledge and/or skills in capturing, creating and manipulating screen-based graphics. Candidates will be required to build a portfolio of images over an extended period. The assessor will observe an instance of each of the sampled evidence requirements then sign and date an observation checklist. Each candidate must submit their completed portfolio and accompanying assessors' checklist to achieve a pass in Outcome 2.

Higher National Unit specification: support notes (cont)

Unit title: Multimedia Computing: Screen Based Graphics

Outcome 3 could be cross-assessed with HN Units such as 'Multimedia Computing: Interface Design and Authoring' or 'Internet: Web Development' in which screen-based graphics are required to be used as part of the development of an application. If this unit is being delivered on a stand-alone basis or if the centre chose not to cross-assess with another unit, the candidate would be required to build their own application (online or offline) which included the use of optimised graphics. Examples of graphics include: buttons, rollover variations (e.g. pressed, mouse-over state), a logo or photograph, interface, shapes, navigation structure.

Evidence for Outcome 3 will be in the form of a practical assessment carried out under supervised conditions designed to demonstrate candidates' knowledge and/or skills in optimising and incorporating screen-based graphics into a multimedia or Web application. Candidates will be required to produce the completed multimedia or web based application on an appropriate medium, e.g. disk, CD-ROM, DVD or Web. The assessor will observe an instance of each of the evidence requirements then sign and date an observation checklist. Each candidate must submit their completed application and accompanying assessors' checklist to achieve a pass in Outcome 3.

Open learning

This unit could be delivered by distance learning. However, it would require planning by the centre to ensure the sufficiency and authenticity of candidate evidence. The assessment arrangements outlined above should be suitable for open learning provided regular contact can be maintained with the tutor.

For information on normal open learning arrangements, please refer to the SQA guide *Assessment and Quality Assurance of Open and Distance Learning* (SQA, 2000).

Special needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

General information for candidates

Unit title: Multimedia Computing: Screen Based Graphics

This Unit is designed to introduce you to the various aspects of digital image production. The Unit will develop your ability to capture, create, manipulate, optimise and use the various graphic formats available for screen-based images. The topics covered include: applicable hardware and software, raster and vector graphics, characteristics of various image formats, producing images, optimising images and using images in a multimedia or Web application.

On completion of the Unit you should be able to:

1. Identify and describe characteristics of screen-based graphics
2. Capture, create and manipulate screen-based graphics
3. Optimise and incorporate screen-based graphics into a multimedia or Web application

In Outcome 1 you will learn about the characteristics of the common image formats available for use in professional and commercial presentation documents and about the hardware and software required to create and manipulate such images. Examples of common screen-based image types that you may learn about are GIF, JPEG, PNG and SVG for image stills and GIF 89 and Flash for 2D animation. Outcome 1 is assessed by 20 questions, most of which will require a description of between 20 – 50 words. You will need to gain a minimum of 60% of the available marks in order to obtain a pass in this outcome.

Outcomes 2 and 3 relate to the capturing, creating, manipulating, optimisation, storing and use of various industry-standard images file formats. You should learn how to capture and create a number of screen-based image files and to optimise these for their intended use, for example, screen-based graphics to be used in a Web site or multimedia presentation.

Using the available hardware and software, you should learn how to investigate the method(s) of capture and creation by, for example, using draw and paint software, Web imaging software, scanner, digital stills or video camera. You should learn about the processes for the optimisation of each image. Depending on the format and intended use, topics for optimisation should include: quality, compression, file size, colour-safety, anti-aliasing, interlacing, transparency, dithering, gamma correction, alpha channel transparency, digital watermarking and minimise download speed.

After optimising the various images, you should learn in Outcome 3 how to use them in the proper context. This may be done by including the images, for example, in a web page or multimedia presentation.

Outcomes 2 and 3 are practical in nature. The assessment for outcome 2 will require you to build a portfolio of images over an extended period. Your portfolio will contain unedited and edited versions of each image. It is strongly recommended that you maintain an editable archive version of each image in a suitable format. The assessor will sign off an observation checklist at various stages. You will submit your portfolio and checklist as assessment evidence for outcome 2.

General information for candidates (cont)

Unit title: Multimedia Computing: Screen Based Graphics

In outcome 3 you will be asked to optimise a number of graphical images for further use in a multimedia application. You will then incorporate these images into an appropriate multimedia or web application.

You will submit your completed application on an appropriate medium and an assessors' checklist as assessment evidence for outcome 3.

Higher National Unit Specification

General information for centres

Unit title: Multimedia Computing: Multimedia Technology

Unit code: DF68 34

Unit purpose: This Unit is designed to introduce candidates to the hardware, software and delivery media used in industry to produce interactive applications. Candidates will develop knowledge of hardware technology, software categories, proprietary software applications, standard file formats, technology of distribution media and the processes involved in publishing to disk and web. This Unit should help candidates to contextualise the working of interactive computer development which will be useful in their study of subsequent multimedia units.

On completion of the Unit the candidate should be able to:

1. Describe the function of equipment used to create interactive applications.
2. Describe the software utilised in the development of interactive applications.
3. Describe methods for distribution of interactive applications.

Credit value: 1 HN Credit at SCQF level 7: (8 SCQF credit points at SCQF level 7*)

**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.*

Recommended prior knowledge and skills: Access to this Unit will be at the discretion of the Centre. However, it is essential that the candidate have prior experience of using a computer system. This may be evidenced by the possession of relevant National Units, HN units or experience.

For core skills it would be beneficial if candidates had some information technology skills. This could be demonstrated by the achievement of the core skill Using Information Technology at Intermediate 2 or equivalent.

Core skills: There may also be opportunities to gather evidence towards other core skills in this Unit, although there is no automatic certification of these other core skills or core skills components.

General information for centres (cont)

Context for delivery: If this Unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the context of the particular group to which it contributes.

Assessment: There are 3 Outcomes in this unit which will consist of 2 assessments. Outcome 1 requires candidates to produce short responses to written questions to test underpinning knowledge. Outcomes 2 and 3 are integrated and require candidates to produce a report. This report can be a word processed document or interactive presentation. The report for Outcomes 2 and 3 could be produced on an individual basis or as a result of a group case study where candidates are presented with an appropriate scenario. An observation of each candidate publishing a ready-made application must be carried out, to demonstrate each candidate's practical knowledge and skills.

This Unit may be delivered in such a way that the core skill *Using Information Technology* at Higher **may** be achieved.

For further information, please see page 10 of the Support Notes.

Higher National Unit specification: statement of standards

Unit title: Multimedia Computing: Multimedia Technology

Unit code: DF68 34

The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Describe the function of equipment used to create interactive applications.

Knowledge and/or skills

- ◆ Computer system requirements – development and playback systems
- ◆ Image capture
- ◆ Cameras
- ◆ Sound equipment
- ◆ Video Capture equipment
- ◆ Storage devices – internal/external
- ◆ Set up equipment and trouble-shoot basic problems

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by describing the type of equipment required to produce interactive applications in a professional working environment.

Candidates will be able to:

- ◆ Describe the types of computer systems used by industry for developing interactive applications
- ◆ Describe the considerations taken when designing for different end playback systems.
- ◆ Identify the different hardware peripherals and understand the technology behind these
- ◆ Describe the purpose of the peripherals
- ◆ Set up equipment and trouble shoot basic problems — select devices, check connections.

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Multimedia Technology

This assessment will be in the form of 20 short response questions. Each of the knowledge and/or skills must be covered in the assessment and the questions allocated on an equal basis. The assessment must be carried out in a supervised environment, will be closed book and is to be completed in 1 hour. Candidates must answer 12 out of the 20 (60%) questions correctly in order to obtain a pass in this outcome.

Candidates will also demonstrate their knowledge and/or skills by setting up some equipment and conducting basic trouble shooting.

Candidates should be able to set up equipment; connect to printers, scanners, cameras, capture cards, and trouble shoot basic problems. This should be evidenced using a classroom observation checklist. The candidate is not being assessed on their ability to use the various pieces of equipment.

Assessment guidelines

Candidates should gain a general knowledge of what type of equipment is required to produce multimedia applications in a professional working environment.

Outcome 2

Describe the software utilised in the development of interactive applications.

Knowledge and/or skills

- ◆ Authoring and Web Development software
- ◆ Graphics
- ◆ Sound editing software
- ◆ Video editing software
- ◆ Animation software
- ◆ File formats
- ◆ Database engines
- ◆ Operating systems
- ◆ File and system management

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can describe the industry standard software packages used to create interactive applications. This should be demonstrated by the production of an appropriate report. (See evidence requirements in Outcome 3). File and system management should be evidenced throughout, where candidates must be able to organize and secure work.

Assessment guidelines

Assessment for Outcome 2 may be integrated with Outcome 3 — see guidelines for Outcome 3.

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Multimedia Technology

Outcome 3

Describe methods for distribution of interactive applications.

Knowledge and/or skills

- ◆ Distribution formats
- ◆ Storage media
- ◆ Publishing files to appropriate media

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by describing in a report the processes involved in finalizing interactive projects. For Outcome 3 the report must contain reference to at least the following elements:

- ◆ Common file types used for interactive applications,
- ◆ The different online and offline delivery mediums and their underlying technologies,
- ◆ The process for preparing applications for distribution and publishing applications.

The report must also cover all of the knowledge and/or skills elements of Outcome 2. The report must be in either word-processed format, or presented as an interactive linear presentation.

The candidate must demonstrate their knowledge and/or skills by publishing an application to CD and to the Web, under classroom observation.

- ◆ Presentation format — a minimum of 6 screens must be produced. This should be developed in a presentation package. The candidate's authoring/coding skills are not being assessed. Screens should be aesthetically pleasing with clear layout and appropriate use of graphics.
- ◆ At least 2 data types should be incorporated from: text, graphics, video, audio
- ◆ A research plan outlining sources and expected outcome, must be produced
- ◆ Electronic data sources must include less obvious sources eg newsgroups, forums.
- ◆ Securing and managing data must be evidenced through print outs of directories and ongoing classroom observation.

Assessment guidelines

It is recommended that Outcomes 2 and 3 are integrated into one assessment. In preparation for the report, candidates should have utilised a sample (or been exposed to demonstrations) of the software and publishing techniques

Administrative Information

Unit code:	DF68 34
Unit title:	Multimedia Computing: Multimedia Technology
Superclass category:	CE
Date of publication:	December 2003
Version:	01
Source:	SQA

© Scottish Qualifications Authority 2003

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. The cost for each Unit specification is £2.50. (A handling charge of £1.95 will apply to all orders for priced items.)

Higher National Unit specification: support notes

Unit title: Multimedia Computing: Multimedia Technology

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 for this Unit

Throughout the Unit candidates should be involved in learning about the hardware and software required to produce a range of interactive projects and the components used to deliver them. This unit should form the basis for further learning of multimedia technology.

This unit is regarded as the first in a series of 3 technology units available in the HNC/D Multimedia Computing: Web Development and HND Multimedia Computing, the other 2 units being Multimedia Computing: Internet Technology and Multimedia Computing: Web Technology, respectively.

Outcome 1

It is intended that Outcome 1 should deal with current hardware that is commonly used by industry and also with new developments in this area. At the time of writing examples of some new developments are surround sound audio cards (SPDIF), firewire video capture cards, DVD writers, DV cameras and Flash memory pens (sticks). It may be beneficial to cover the history of these hardware devices to help the candidate better understand the current technology.

Outcome 2

Outcome 2 is concerned with the software applications that are currently used by industry to produce interactive applications. This Outcome should help the candidate to identify the professional applications that they should encounter throughout the course, as opposed to offshoot applications. Candidates should also acknowledge new versions of applications that have been/are in the process of being released. Candidates should be exposed to a representative range of software in order to gain the knowledge and/or skills required.

At the time of writing some of the most recent versions of appropriate software applications are the MX suite of applications, Premiere 6.5 and Photoshop 7.

Outcome 3

Outcome 3 looks at the different methods of delivering interactive applications. At the time of writing, this is split into 2 distinct areas, 'offline' and 'online'. Candidates need to gain knowledge of the technologies involved in these media and an understanding of when an offline delivery medium (CDRom, DVD) is more appropriate than an online (website) platform and vice versa, for an interactive application. Candidates should learn about and

Higher National Unit specification: support notes (cont)

Unit title: Multimedia Computing: Multimedia Technology

gain the requisite publishing skills covered in this outcome. Candidates should be given class exercises to practice these skills, prior to assessment

Outcome 3 should introduce the factors and the technological influences placed upon online and offline media, e.g.

- ◆ What the internet is,
- ◆ The structure of CD Rom/DVD disk –
- ◆ The importance of memory, file formats supported and how these may determine the type of delivery medium.
- ◆ The purpose of the application would also be an area when deciding this e.g. commercial or educational.

Online — The whole process of publishing a website — ‘going live’. This should include bandwidth, internet connections, ISP, domain names, uploading via FTP/web editor/host file manager. Other areas that could be introduced are the importance of directory structures, file-naming conventions, registering sites and technical considerations for other web devices.

Offline — The whole process of preparing a completed multimedia application for delivery. Master copy, disk technology, differences between different formats, different production methods and when they are used, eg when do you need to outsource production runs. Other production considerations such as labelling, packaging and timescales should be covered.

At the time of writing some of the common offline formats are CDRom, CDR, CDRW, DVD, DVDR and DVDRW.

File formats - these are some examples of standard file formats at the time of writing: GIF; JPEG; SWF; QT; RM; HTML; ASP; JSP; CFM; DIR and .EXE. Not all executable formats should be covered, just those pertinent to the authoring package used by the centre. New developments in formats at the time of writing are MPEG4, SVG and MNG.

Higher National Unit specification: support notes (cont)

Unit title: Multimedia Computing: Multimedia Technology

Guidance on the delivery and assessment of this Unit

This Unit should be taught in a contextual basis, whereby the student relates to a realistic development environment. Practical examples and case studies should be used to enable this, as opposed to a completely theoretical approach. Candidates should have a practical introduction to hardware peripherals and cross range of software relevant to the course. This could be through demonstration versions or introductory tutorials. This is a good Unit for covering presentation software eg PowerPoint. Examples of completed professional work should be shown to help the candidate to understand the purpose of the software in industry. .

During the course of delivery of this unit it would enhance learning if reference was made to other current and future units of the course.

Assessment work should be carried out in class, under observation. Where a presentation has been created for this outcome, if candidates have carried out work in their own study time, they will have to demonstrate their knowledge and/or skills to the subject lecturer. Oral evidence, in the form of a set of questions may be used to support this situation.

Two assessments are required for this unit.

Assessment for Outcome 1 will be in the form of 20 short response questions. Each of the knowledge and/or skills must be covered in the assessment and the questions allocated on an equal basis. The assessment must be carried out in a supervised environment, will be closed book and is to be completed in 1 hour. Candidates must answer 12 out of the 20 (60%) questions correctly in order to obtain a pass in this outcome. For Open Learning candidates the closed book assessment could be done by online assessment with limited access, by mentor support where the assessment is sent to and overseen by a nominated third party, or by attendance at a local centre.

In addition for Outcome 1 candidates are also to be assessed on setting up some equipment and conducting basic trouble shooting. Candidates should be able to set up equipment, i.e. connect to printers, scanners, cameras, capture cards, and trouble shoot basic problems. This should be evidenced using a classroom observation checklist. The candidate is not being assessed on their ability to use the various pieces of equipment.

It is recommended that Outcomes 2 and 3 are integrated in the second assessment. The candidate is required to produce a report, which should be either word-processed or in the form of a simple interactive presentation. In preparation for the report, candidates should have utilised a sample (or been exposed to demonstrations) of the software applications. Candidates should gain practical experience in using a presentation package or authoring packing. At the time of writing, PowerPoint is the standard presentation package and Director, Authorware and Toolbook are authoring packages.

Higher National Unit specification: support notes (cont)

Unit title: Multimedia Computing: Multimedia Technology

Research should be carried out into recent developments and references should be included. The findings of the report will be supported by an observation of the candidate publishing a ready made interactive application to 2 different media eg CD and the web, under classroom observation. It is the centres responsibility to create a small sized application. Alternatively, if the student has produced their report as a presentation, they could publish this.

Where Candidates are studying via Open Learning, they could be given a centre-devised application (created in a previously agreed package) and evidence could be obtained via the URL or CD/DVD containing the published product.

It is recommended that the assessment for Outcome 1 be completed and passed before commencing work on assessment 2. It is recommended that a maximum of 4 weeks should be sufficient time for candidates to complete the integrated assessment for Outcomes 2 and 3.

If candidates wish to claim the core skill *Using IT* at Higher, they may be able to use this *Multimedia Computing: Multimedia Technology* Unit to provide evidence that can be considered for the Higher Core Skill Unit *Information Technology D01D 12*. In this case, candidates should seek minimal support for assessments from lecturers, technicians and classmates, and be encouraged to use online help/tutorial support or suppliers' manuals. The core skills evidence must be gathered as part of the assessment of the three outcomes contained in this Unit (*Multimedia Technology*) and centres should ensure that assessment instruments are written in such a way that the required core skills evidence can be extracted easily. **It is strongly recommended that the instruments of assessment by prior moderated by SQA to ensure that the core skills requirements will be met.** Candidates whose evidence meets the evidence requirements of the *Information Technology D01D 12* Unit must then be entered and passed for the core skills Unit, ***in addition*** to this Unit. (This may have cost implications for candidates and/or centres).

The table of Core Skill Requirements and the Minimum Evidence Requirements at the time of writing are provided below. However centres must ensure that they use the most up-to-date statement of the core skills as determined by the SQA.

Core Skill Requirement	Minimum Evidence Requirements
a) Operate a range of IT equipment giving attention to security and to other users.	Candidates should be able to set up equipment; connect to printers, scanners, cameras, capture cards, and trouble shoot basic problems. This should be evidenced through a classroom observation checklist and coincide with Outcome 1. The candidate is not being assessed on their ability to use the various pieces of equipment.

Higher National Unit specification: support notes (cont)

Unit title: Multimedia Computing: Multimedia Technology

Core Skill Requirement	Minimum Evidence Requirements (cont)
	Throughout the Unit, candidates have to be able to maintain a well-structured file system, perform back-ups, adhere to virus protection measures, log on/off and locate files and applications. This should be evidenced in all three Outcomes, whereby the lecturer throughout the Unit will complete a classroom observation checklist. Candidates must provide a digital version of their assessment and print out of their directory structure.
b) Use software in an unfamiliar context requiring some analysis and design, integration of data and decisions on output format.	Outcome 2 and 3. Candidates must design a report in either a traditional or presentation style. At least 2 types of data should be incorporated into this: graphics, video, audio, and text.
c) Carry out searches to extract and present relevant information from electronic data sources.	<p>Outcome 2 and 3. Candidates must search for specific information on the knowledge and skills covered in these Outcomes. A research strategy must be produced which gives clear evidence of time management and the expected outcome.</p> <p>Research findings must be in the form of at least 2 different data types: text, graphics, images, video and audio.</p> <p>Information must be sourced from obvious electronic data sources e.g. help facilities, websites. Less obvious sources must be used e.g. newsgroups, forums, ftp sites.</p>

Open learning

If this Unit is delivered by open or distance learning methods, additional planning and resources may be required for candidate support, assessment and quality assurance. A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes. For further information and advice, please see *Assessment and Quality Assurance for Open and Distance Learning* (SQA, February 2001 – publication code A1030).

Higher National Unit specification: support notes (cont)

Unit title: Multimedia Computing: Multimedia Technology

Special needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

General information for candidates

Unit title: Multimedia Computing: Multimedia Technology

This unit introduces you to the technology involved in creating interactive multimedia applications. The theory covered is supported by practical experience and case studies. By the end of the Unit you should be able to:

- ◆ Describe the function of peripherals that may be used to create interactive applications.
- ◆ Describe the software utilised in the development of interactive applications.
- ◆ Describe methods for the distribution of interactive applications.

The first outcome introduces the various pieces of equipment involved in interactive application development. As well as learning about their purpose and fundamental technology you will gain hands on experience with some equipment. The first assessment will consist of 20 short response questions and will be taken in supervised conditions. You will need to get 12 answers correct (ie 60%) to pass this element of this outcome. You will also be given a short classroom observation by your lecturer to assess your practical knowledge and skills in setting up equipment and troubleshooting basic problems.

Outcome 2 covers the range of software used to create interactive applications, common file formats and how to manage files. This will help you to become familiar with the range of software packages you will use on your course and in industry. File management is an important aspect, as large development teams have to share files and storage space, so it is important to use good methods of practice.

With the knowledge of the equipment and software involved in producing applications, the final outcome deals with the technologies involved in publishing interactive applications. Outcomes 2 and 3 are combined into one assessment. Various research methods and sources must be used, to source at least 2 types of data. To put theory into practice you will be observed publishing an interactive application and adhering to procedures for data security.

By the end of this unit you should know:

- ◆ The equipment involved in producing interactive applications
- ◆ The fundamental technology of the equipment
- ◆ How to set up equipment and trouble shoot basic problems
- ◆ Software categories
- ◆ The purpose of different software applications
- ◆ Standard file formats used in interactive applications
- ◆ How to manage and secure data
- ◆ The process involved in publishing interactive applications and the technology behind this
- ◆ How to publish an interactive application to 2 different types of media

General information for candidates (cont)

Unit title: Multimedia Computing: Multimedia Technology

As part of this Unit you might also be assessed on the core skill 'Using Information Technology: Higher'. The knowledge and skills you gain in this unit should help you to understand the learning involved in subsequent units and provide you with the basics required for working in industry.

Higher National Unit Specification

General information for centres

Unit title: Multimedia Computing: Audio and Video 1

Unit code: DF66 34

Unit purpose: This Unit is designed to enable candidates to work with audio and video in multimedia and web development roles. The Unit prepares candidates for these roles by ensuring that the underpinning knowledge is gained to enable understanding of the basic operations involved in modern personal computer based multimedia. Practical experience is then gained of recording audio and video data from a variety of sources under varying conditions, then storing this data in a manner reflecting current industry standards. Data is manipulated in ways that reflect the normal requirements used in this sub-set of industry for inclusion in commercial multimedia products. A strong emphasis is placed on the production of content suitable for inclusion in specific briefs. This Unit is also relevant to all those on an Information Technology programme of study who require or wish to enhance their knowledge and skills to include a practical understanding of the use of audio and video in the world of Information Technology.

On completion of the Unit the candidate should be able to:

1. Identify the basic principles involved in the production and inclusion of digital audio and video content in a multimedia or web application.
2. Record, manipulate, store and play audio files relevant to multimedia and web applications
3. Capture, manipulate, store and play video files relevant to multimedia and web applications
4. Include audio and video files in both traditional multimedia applications and multimedia web-pages.

Credit value: 2 HN Credits at SCQF level 7: (16 SCQF credit points at SCQF level 7*)

**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.*

Recommended prior knowledge and skills: Access to this Unit will be at the discretion of the Centre. However, it is recommended that candidates should have a good working knowledge of personal computers in a multimedia role and be capable of using an operating system, such as Windows, for file handling. This may be evidenced by the possession of relevant National Units, HN units or experience.

General information for centres (cont)

Core skills: There may be opportunities to gather evidence towards core skills in this Unit, although there is no automatic certification of core skills or core skills components.

Context for delivery: If this Unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes.

Assessment: Outcome 1 requires the candidate to answer a set of short or restricted responses and one extended response question under supervised, closed book conditions. Outcomes 2, 3 and 4 require candidates to carry out a series of practical exercises in order to demonstrate the various competences. Outcome 4 requires candidates to include audio and video files in both a multimedia and web-based applications, using industry standard techniques. Outcome 2, 3 and 4 will be assessed by means of an observation checklist covering all of the knowledge and/or skills elements from all 3 Outcomes and by candidates presenting their evidence as a portfolio with check-sheets and files (on backing storage). Assessment must be carried out under conditions that ensure confidence in the authenticity and integrity of each candidates work. Outcomes 2, 3 and 4 could be assessed separately but it is recommended that all three Outcomes are integrated into one project based assessment.

Higher National Unit specification: statement of standards

Unit title: Multimedia Computing: Audio and Video 1

Unit code: DF66 34

The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Identify the basic principles involved in the production and inclusion of digital audio and video content in a multimedia or web application.

Knowledge and/or skills

- ◆ Hardware and Software requirements for production and presentation of digital audio and video content in multimedia computing
- ◆ Variables involved in the digitising process
- ◆ Problems involved with sizes of audio and video files and the need for compression
- ◆ Typical industry-standard audio and video file types

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can:

- ◆ Define the functions of the main hardware and software components of a multimedia computer that affect the machine's
 - capability to produce sound and video and
 - quality of processing of sound and video.
- ◆ Define the basic variables involved in digitising analogue data.
- ◆ Calculate uncompressed file sizes from data given
- ◆ State and give a brief description of a range of audio and video file types currently in use within:
 - multimedia applications
 - online materials.

This part of Outcome 1 will be assessed by a series of 10 short response questions based on the 4 main element bullet points above. Candidates must answer 6 out of the 10 questions (60%) correctly in order to obtain a pass in this part of Outcome 1.

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Audio and Video 1

- ◆ Discuss the need for data compression as a partial solution to the problems of storage requirements and data transfer time involved when working with audio and video files

This part of Outcome 1 will be assessed by a question based on the element above. Candidates must provide an extended response of approximately 250 words and must obtain 60% of the available marks in order to achieve a pass in this part of Outcome 1.

The assessment will be carried out in a supervised environment, will be closed book and is to be completed in no more than 1.5 hours. Candidates must be given reasonable notice of the timing of the assessment in order to have sufficient time to prepare.

Assessment guidelines

The assessment should be sufficient to ensure that the candidate has demonstrated that he/she has acquired the background theoretical knowledge relevant to the practical skills inherent in the remaining parts of the Unit.

The questions for the two parts of the Evidence Requirements should be on the same question paper.

Outcome 2

Record, manipulate, store and play audio files relevant to multimedia and web applications.

Knowledge and/or skills

- ◆ Record, manipulate, store and play audio files relevant to multimedia and web applications
- ◆ Create, manipulate, store and play MIDI files relevant to multimedia and web applications.

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can:

- ◆ Record three short audio recordings from a microphone directly connected to the computer
- ◆ Record three short audio recordings taken from an external device into the computer
- ◆ Record three short audio recordings from a CD-ROM or DVD drive
- ◆ Apply audio editing operations to recorded files on at least 2 occasions
- ◆ Apply audio special effects operations to recorded files on at least 2 occasions
- ◆ Undertake MIDI file creation on at least 1 occasion
- ◆ Apply MIDI operations to recorded files on at least 1 occasion

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Audio and Video 1

This outcome will be assessed by means of an observation checklist covering all of the elements above and by candidates presenting their evidence as a portfolio with check-sheets and files (on backing storage).

Assessment guidelines

A set of assessment briefs could be set and a suitable checklist provided to enable candidates to log their progress. It is recommended that assessment should be on-going throughout the series of tasks and should be such that the candidate's skills are clearly demonstrated to the assessor.

It is recommended that the assessments for outcomes 2, 3 and 4 are combined into one project.

Outcome 3

Capture, manipulate, store and play video files relevant to multimedia and web applications.

Knowledge and/or skills

- ◆ Record (from camera), store, manipulate and play video files relevant to multimedia and web applications
- ◆ Capture, store and play video files relevant to multimedia and web applications

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can:

- ◆ Create, from camera, one short video sequence saved in such a manner that it could be included in:
 - a multimedia application developed through industry standard software and
 - a web page developed through industry standard software and delivered to the end user in a manner typical of standard web technology
- ◆ Create, using a video capture card or digital video (DV) interface device one short video sequence saved in such a manner that it could be included in:
 - a multimedia application developed through industry standard software and
 - a web page developed through industry standard software and delivered to the end user in a manner typical of standard web technology

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Audio and Video 1

This Outcome will be assessed by means of an observation checklist covering all of the elements above and by candidates presenting their evidence as a portfolio with check-sheets and files (on backing storage).

Assessment guidelines

Candidates should be set a series of practical tasks that enable them to demonstrate that the skills required have been achieved. A set of assessment briefs could be set and a suitable checklist provided to enable the candidates to log their progress. It is recommended that assessment should be on-going throughout the series of tasks and should be such that integrity is maintained.

It is recommended that the assessments for Outcomes 2, 3 and 4 are combined into one project.

Outcome 4

Include audio and video files in both traditional multimedia applications and multimedia web-pages.

Knowledge and/or skills

- ◆ Prepare media files for inclusion as required
- ◆ Include prepared media files within applications

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can:

- ◆ Prepare one short audio and one short video sequence saved in such a manner that it could be included in:
 - A multimedia application developed through industry standard software and
 - A web page developed through industry standard software and delivered to the end user in a manner typical of standard web technology.

Justification of the file format(s) used should be evident in the submission. It is permissible that the audio be integrated into the video file format.

This outcome will be assessed by means of an observation checklist covering all of the elements above and by candidates presenting their evidence as a portfolio with check-sheets and files (on backing storage).

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Audio and Video 1

Assessment guidelines

Candidates should be given a brief that requires a demonstration, using familiar industry standard software, that they possess the skills to include video files in both traditional multimedia applications and multimedia web-pages. Check sheets should outline the assessable aspects and work should be presented as a formal portfolio.

It is recommended that the assessments for Outcomes 2, 3 and 4 are combined into one project.

Administrative Information

Unit code:	DF66 34
Unit title:	Multimedia Computing: Audio and Video 1
Superclass category:	CE
Date of publication:	December 2003
Version:	01
Source:	SQA

© Scottish Qualifications Authority 2003

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. The cost for each Unit specification is £2.50. (A handling charge of £1.95 will apply to all orders for priced items.)

Higher National Unit specification: Support Notes

Unit title: Multimedia Computing: Audio and Video 1

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 80 hours.

Guidance on the content and context for this Unit

Outcome 1

It is assumed that candidates have prior knowledge of basic computer organisation and architecture. This outcome is therefore concerned with issues pertinent to audio and video in multimedia computing and must include Sound card, Video RAM card, Video capture/processing card, Driver software and relevant Applications software (including MIDI). Variables involved in digitising must include Frequency, Amplitude, Pitch, Sample Rate, Sample Size and Mode (Number of Channels). Calculations made using these variables should be formally structured as equations with formulae being shown. Candidates should be able to show an awareness of the implications of the large file sizes involved in both audio and video on storage and distribution of applications. File formats discussed should reflect industry standards appropriate to the time when the unit is being studied. As an example, at the time of writing, an important selection of the standards for audio are RAW, WAV, VOC, MID, MP3, RAM. For video, candidates should be aware of the difference between the Architecture and the CODEC of the files.

Outcome 2

Basic recording exercises should involve the candidates in using a range of recording settings and commenting on quality as appropriate. Candidates should become aware of the appropriateness of the settings used for the required output. For example, voice recordings need not be of the same quality as music. Editing and special effects for audio recordings should include Delete, Move, Copy and Combine, Amplify, Echo, Fade-in, Fade-out and Pan.

MIDI operations should involve the candidates in generating files using suitable sequencing software. It is envisaged that the files should be both single channel and multiple channels (to a maximum of 3). It is not necessary that the candidates have prior knowledge of music and simple scores should be employed to enable the development of the skills in using the sequencer. The software operations demonstrated by the candidate should include Change voice, Change Pitch, Modify notes, Exclude voice, Add effects and Convert to sampled file, although the possibility of alterations to this because of developments in software should be considered where appropriate whilst maintaining the appropriate level of assessment

Higher National Unit specification: support notes (cont)

Unit title: Multimedia Computing: Audio and Video 1

Outcome 3

The camera based part of this Outcome should involve the candidate in planning the shots required for the proposed files. He/she should demonstrate, through the work, skills of composition, lighting (natural or artificial as appropriate), focussing and camera support. Capturing the video from camera and storing the work should involve the candidate in using industry standard video file formats that will allow compression suitable for the final destination or downloading. At this stage the candidate is expected to have only basic skills and knowledge in file compression but should learn about the effect of compression on quality.

The software based part of this outcome should involve the candidate in capturing video from an analogue or digital source, using relevant software package(s) and in storing the work using industry standard video file formats suitable for given platform(s). The software used in the delivery of this Unit should be capable of producing video output files that can be included in a video sequence with camera based video files (eg animated titles etc). At the time of writing, Adobe Premiere is the recommended video capture and editing tool with an extensive range of video formats supported, but it is recognised that many other software applications are available for this purpose. Macromedia Director is recommended as the multimedia integration tool.

Outcome 4

The preparation of media files for use in both traditional multimedia applications and multimedia web-pages requires the candidate to learn about which file formats are supported by, and reasonable for use with, the final authoring/presentation method. Examples, at the time of writing, would involve the candidates in converting basic files to highly compressed files (eg MP3, WMA, WMV, WME, Quicktime and supported compression codecs) or streaming media files (eg REAL, Quicktime, etc) for inclusion in web pages.

The inclusion of media files should involve the candidate in coding within the selected development software to cause the media files to play appropriately either on load or on selection.

Higher National Unit specification: support notes (cont)

Unit title: Multimedia Computing: Audio and Video 1

Guidance on the delivery and assessment of this Unit

Outcome 1 is theory based and can be delivered and assessed on its own. At this level, the knowledge gained by the candidate is likely to be somewhat superficial. Centres are encouraged to seek opportunities that serve to enhance the student learning experience. This could perhaps be achieved by introducing practical activities or tutor-led demonstrations of the concepts being conveyed.

This first part of Outcome 1 will be assessed by a series of 10 short response questions. Candidates must answer 6 out of the 10 questions correctly in order to obtain a pass in this part of Outcome 1. The second part of Outcome 1 will be assessed by a discussion question and candidates must provide an extended response of approximately 250 words and must obtain 60% of the available marks in order to achieve a pass in this part of Outcome 1. A marking scheme with a threshold of achievement would be beneficial and candidates should not be aware of the questions beforehand. The assessment will be carried out in a supervised environment, will be closed book and is to be completed in no more than 1 hour. Candidates must be given reasonable notice of the timing of the assessment in order to have sufficient time to prepare.

Outcomes 2, 3 and 4 are to be assessed by means of an observation checklist covering all of the knowledge and/or skills of each Outcome and by candidates presenting their evidence as a portfolio with check-sheets and files (on backing storage). It is recommended that the assessment for Outcomes 2, 3 and 4 could take the form of one project which covers the requirements of all three Outcomes.

Higher National Unit specification: support notes (cont)

Unit title: Multimedia Computing: Audio and Video 1

Open learning

If this Unit is delivered by open or distance learning methods, additional planning and resources may be required for candidate support, assessment and quality assurance. A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes. For further information and advice, please see *Assessment and Quality Assurance for Open and Distance Learning* (SQA, February 2001 – publication code A1030).

Special needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

General information for candidates

Unit title: Multimedia Computing: Audio and Video 1

This Unit is designed to enable you to work with audio and video in multimedia and web development roles. The Unit enables you to gain an understanding of the basic operations involved in modern personal computer based multimedia. You will gain practical experience of recording audio and video data from a variety of sources under varying conditions, then storing this data in a manner reflecting current industry standards. A strong emphasis is placed on the production of audio and video content suitable for inclusion in multimedia and web applications.

Outcome 1 introduces you to audio and video in multimedia computing and you will learn about such devices as Sound cards, Video RAM cards, Video capture/processing cards, Driver software and relevant Applications software (including MIDI). You will also learn about the variables involved in digitising audio and video. You will learn how to calculate these variables and to manipulate the formulae used. You will gain an awareness of the implications of large file sizes involved in audio and video on storage and the on the distribution of applications. You will also learn about the different file formats employed in audio and video multimedia computing. The first part of Outcome 1 is assessed by a series of 10 short response questions. You must answer 6 out of the 10 questions correctly in order to obtain a pass in this part of Outcome 1. The second part of Outcome 1 is assessed by an extended response of approximately 250 words and you must obtain 60% of the available marks in order to achieve a pass in this part of Outcome 1.

In Outcome 2 you will be using a range of recording settings for audio and how to judge the quality of audio. You should become aware of the appropriateness of the settings used for the required output. For example, voice recordings need not be of the same quality as music. You will learn about editing and special effects for audio recordings and about MIDI operations.

In Outcome 3 you will use cameras and learn how to plan the shots required for inclusion in your multimedia application. You should learn the skills of composition, lighting (natural or artificial as appropriate), focussing and camera support. Capturing video from camera and storing the work should involve you in using industry standard video file formats and dealing with compression of video files for the final destination or downloading. In the software based part of this Outcome you should be involved in planning the work, developing animation sequences using a software package and in storing the work using industry standard video file formats.

In Outcome 4 you will learn how to prepare media files for use in multimedia applications and multimedia web-pages. You should learn how to convert basic files into highly compressed files or streaming media files for inclusion in web pages.

In Outcomes 2, 3 and 4 you will be presented with a project covering all three Outcomes. You will be assessed by means of an observation checklist (where your assessor will observe you carrying out all the required tasks) and where you present your evidence as a portfolio with check-sheets and files held on disk.

Higher National Unit Specification

General information for centres

Unit title: Multimedia Computing: Audio and Video 2

Unit code: DF67 35

Unit purpose: This Unit is designed to enable candidates to work with audio and video in a multimedia and web development role. The Unit should provide candidates with a greater understanding of the theoretical principles and practices involved in producing quality output. The Unit prepares candidates for this role by building on the knowledge and skills gained in the HN Unit Multimedia Computing: Audio and Video 1. Candidates should gain practical experience in investigating and applying the audio and video techniques utilised in industry to produce quality media files for inclusion in multimedia and web applications. The Unit places strong emphasis on the practical application of standard practices used in the production of audio and video for multimedia and web applications. The Unit may also be relevant to candidates studying on other Computing/Information Technology programmes who may wish to enhance their knowledge and skills to include a practical understanding of the use of audio and video in the world of Information Technology.

On completion of the Unit the candidate should be able to:

1. Describe the principles involved in producing quality audio recordings and the problems typically encountered due to environmental influences.
2. Describe the principles involved in producing quality video recordings and the problems typically encountered due to environmental influences.
3. Describe and compare file compression techniques for audio and video files.
4. Produce a sequence of audio and video files to meet a specific multimedia application brief.

Credit value: 2 HN Credits at SCQF level 8: (16 SCQF credit points at SCQF level 7*)

**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.*

Recommended prior knowledge and skills: Access to this Unit will be at the discretion of the Centre. Although differing programmes of study will be sufficient to prepare candidates for this Unit it is recommended that they should have successfully completed the HN Unit *DF66 34 Multimedia Computing: Audio and Video 1*. If candidates have not completed HN Unit Multimedia Computing: Audio and Video 1 then they should have an understanding of audio and video gained either through prior study or through work experience. This may be evidenced by the possession of relevant National Units, HN Units or experience.

General information for centres (cont)

Core skills: There may be opportunities to gather evidence towards core skills in this Unit, although there is no automatic certification of core skills or core skills components.

Context for delivery: If this Unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes.

Assessment: This Unit should be assessed in such a manner that the candidate has the opportunity to demonstrate both theoretical and practical skills. Where theoretical aspects are being assessed a combination of short and extended responses should be considered. Where practical skills or the practical application of principles are being assessed then candidates should be presented with realistic exercises and/or assignments.

Higher National Unit specification: statement of standards

Unit title: Multimedia Computing: Audio and Video 2

Unit code: DF67 35

The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Describe the principles involved in producing quality audio recordings and the problems typically encountered due to environmental influences.

Knowledge and/or skills

- Properties of sound that are relevant to multimedia computing applications
- Environmental influences relevant to sound recording for multimedia computing applications.
- Problems typically encountered in recording sound and the techniques used to overcome these.

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can:

- Identify the properties of sound relevant to multimedia computing applications. This must include at least:
 - Frequency, amplitude, harmonics, pitch and timbre
- Identify the environmental influences relevant to sound recording for multimedia computing applications. This must include at least:
 - Reflection, absorption, resonance and acoustics
- Identify the problems typically encountered in recording sound and the techniques used to overcome these. This must include at least:
 - Wind, echoes and background noises such as conversation, traffic and so forth.
 - Microphone selection and use of wind barriers as possible solutions to problems.

This part of the assessment for Outcome 1 will be in the form of 20 short response questions. Each of the knowledge and/or skills must be covered in the assessment and the questions allocated on an equal basis. The assessment must be carried out in a supervised environment,

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Audio and Video 2

will be closed book and is to be completed in no more than 1.5 hours. Candidates must answer 12 out of the 20 questions (60%) correctly in order to obtain a pass in this part of Outcome 1.

- Produce a report of approximately 500 words on an investigation carried out in a selection of locations (at least 3) offering different audio recording challenges. The report must be supported by a number of audio recordings (at least 3) sufficient to support the findings. The report must show evidence of the problems typically encountered in recording audio, eg wind, echoes and background noises, and the techniques used to overcome these problems, eg wind barriers.

Assessment guidelines

This outcome is designed to enable candidates to demonstrate that they have acquired the background theoretical knowledge relevant to the practical skills inherent in the unit. Emphasis should be placed on the candidate's investigative/research development with tutors presenting a set of briefs related to possible recording problems. It is strongly recommended that candidates are encouraged to demonstrate an analytical approach to the challenges and their solution when operating at this level.

Outcome 2

Describe the principles involved in producing quality video recordings and the problems typically encountered due to environmental influences.

Knowledge and/or skills

- Principles of camera skills
- Principles of lighting for video
- Principles of video editing

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can:

- Identify the principles involved in the production of camera skills. This must include at least:
 - Composition, shot sizes, camera angles, framing, perspective and camera movements.
- Identify the principles involved in lighting for video. This must include at least:
 - Natural light, white balance, use of additional lighting and use of colour and special effects filters

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Audio and Video 2

- Identify the principles involved in video editing. This must include at least:
 - In-camera editing, jump cuts, line of action, sight lines, cutaways, cutting on action and parallel action.

This part of the assessment for Outcome 2 will be in the form of 20 short response questions. Each of the knowledge and/or skills must be covered in the assessment and the questions allocated on an equal basis. The assessment must be carried out in a supervised environment, will be closed book and is to be completed in no more than one and a half hours. Candidates must answer 12 out of the 20 questions (60%) correctly in order to obtain a pass in this part of Outcome 2.

- Produce a report of approximately 500 words on an investigation carried out in a selection of locations (at least 3) offering different video recording challenges. The report must be supported by a number of video recordings (at least 3) sufficient to support the findings. The report must show evidence of the practical application of the principles of recording video as stated above.

Assessment guidelines

Candidates should be set a series of practical tasks that allow him/her to investigate how the principles involved in producing quality video recordings are used in practice. Emphasis should be placed on the candidate's investigative/research development with tutors presenting a set of briefs related to possible video recording situations. It is strongly recommended that candidates are encouraged to demonstrate an analytical approach to the challenges and their solution when operating at this level.

Outcome 3

Describe and compare file compression techniques for audio and video files.

Knowledge and/or skills

- Compression techniques currently used in digital audio files for multimedia computing applications
- Compression techniques currently used in digital video files for multimedia computing applications

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can:

- Briefly describe the techniques of industry standard compression techniques including:
 - Lossless, lossy, simple, interpolative, predictive, statistical, fractal, compression/de-compression balance and streaming.

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Audio and Video 2

This part of the assessment for Outcome 3 will be in the form of 10 short response questions. Each of the knowledge and/or skills must be covered in the assessment and the questions allocated on an equal basis. The assessment must be carried out in a supervised environment, will be closed book and is to be completed in no more than one hour. Candidates must answer 6 out of the 10 questions (60%) correctly in order to obtain a pass in this part of Outcome 3.

- Produce a report of approximately 250 words on an investigation carried out on the compression of audio recordings using different (at least 3) industry standard compression methods. The report must be supported by a number of audio recordings sufficient to support the findings. The report must show the file sizes of the original uncompressed file and the file sizes after compression together with comments on the quality and usability of the final version for multimedia applications given at a level commensurate with the academic and vocational level of the Unit.
- Produce a report of approximately 250 words on an investigation carried out on the compression of video recordings using different (at least 3) industry standard compression methods. The report must be supported by a number of video recordings sufficient to support the findings. The report must show the file sizes of the original uncompressed file and the file sizes after compression together with comments on the quality and usability of the final version for multimedia applications given at a level commensurate with the academic and vocational level of the Unit.

Assessment guidelines

Candidates should be given the opportunity to investigate the subject matter in this Outcome using guided resource based learning. At the time of writing many sources of suitable material have been identified (eg the Internet). It is envisaged that this outcome should provide the candidate with the opportunity to develop investigating/research skills relevant to the multimedia computing industry. It is strongly recommended that candidates are encouraged to demonstrate an analytical approach to the challenges and their solution when operating at this level.

Outcome 4

Produce a sequence of audio and video files to meet a specific multimedia application brief.

Knowledge and/or skills

- Identify necessary media content
- Plan and record audio content
- Plan and record video content
- Produce a multimedia application or web site to match the given brief.

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Audio and Video 2

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can:

- Produce a portfolio of evidence which must include:
 - The original brief
 - A description of the proposed content and a justification of how it meets the brief
 - A recording plan for the necessary audio files together with the actual files and a justification for the file-types used
 - A recording plan for the necessary video files together with the actual files and a justification for the file-types used
 - A construction plan for the application or website together with the relevant application and/or web-site files.
- The portfolio must be formally presented in a logical order and include all of the relevant files stored on a suitable medium.

Assessment guidelines

The candidate should be given a brief that requires audio and video content to be recorded to suit the brief. Candidates could be encouraged to submit a brief related to some area of personal interest. However, tutor guidance should be given sufficient to ensure that the brief is substantial enough to give a suitable challenge for this academic level. It is strongly recommended that candidates are encouraged to demonstrate a professional approach to the work and final presentation required in this Outcome commensurate with the academic and vocational level of the Unit.

Administrative Information

Unit code:	DF67 35
Unit title:	Multimedia Computing: Audio and Video 2
Superclass category:	CE
Date of publication:	December 2003
Version:	01
Source:	SQA

© Scottish Qualifications Authority 2003

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. The cost for each Unit specification is £2.50. (A handling charge of £1.95 will apply to all orders for priced items.)

Higher National Unit specification: support notes

Unit title: Multimedia Computing: Audio and Video 2

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 80 hours.

Guidance on the content and context for this Unit

Outcome 1

Properties of sound include frequency, amplitude, harmonics, pitch and timbre. Environmental influences include reflection, absorption, resonance and acoustics. Typically, sound recordings are influenced by wind, echoes and background noises such as conversation, traffic etc. Candidates should be encouraged to consider microphone selection and use of wind barriers as possible solutions to problems. It should be borne in mind that the candidate is not expected to demonstrate the skills of a fully skilled sound recordist but to demonstrate an awareness of problems typically encountered when recording sound.

Outcome 2

Principles of camera skills include: composition, shot sizes, camera angles, framing, perspective and camera movements.

Principles of lighting skills include the use of natural light, white balance, use of additional lighting and use of colour and special effects filters. It is not considered necessary for the centre to provide fully equipped studios or lighting sets providing the candidate can demonstrate a knowledge of industry used set-ups.

Principles of editing include in-camera editing, jump cuts, line of action, sight lines, cutaways, cutting on action, parallel action etc.. Again, it should be borne in mind that the candidate is not expected to demonstrate the skills of a fully skilled camera person but to demonstrate an awareness of techniques typically employed when recording video.

Outcome 3

Compression techniques introduced in the outcome should reflect the principles of current industry algorithms. At the time of writing a sample set of these would include lossy/lossless, simple, interpolative, predictive, statistical, fractal, compression/de-compression balance and streaming. It is envisaged that candidates could be encouraged to use available CODECS to compress files to compare the playback quality produced.

Higher National Unit specification: support notes (cont)

Unit title: Multimedia Computing: Audio and Video 2

Outcome 4

Many excellent examples exist of applications which include both audio and video sequences to enhance the information interchange. At the time of writing The BBC Learning Zone offers on-line language tuition courses in various non-English languages. Various encyclopaedia CD-ROMs are available. Both of these are examples that demonstrate appropriate inclusion of media files. Candidates should be encouraged to be able to justify the inclusion of media rather than simply including it because they know how to.

Guidance on the delivery and assessment of this Unit

This unit should provide candidates with opportunities to develop and display the research, analytical and job tenacity skills that should be expected of a person operating at this level in a multimedia and/or web development role. The theoretical aspects are well covered in a range of suitable books, websites and other publications to which candidates can be guided for research based learning whilst the practical aspects can be delivered and assessed through a series of well-planned exercises/assignments. An emphasis should be placed on the practical application of the theory with candidates being encouraged to see and accept the benefits of this rather than see the two in isolation. Candidates should be encouraged to undertake written work with due regard to the level of communication expected at this level of education/training.

Outcome 1 will be assessed in two parts. The first part will be by 20 short-response questions testing candidates' knowledge and skills on the properties of sound, the environmental influences and the problems involved in producing audio recordings. In the second part of Outcome 1 candidates will be asked to produce a report of approximately 500 words on a practical investigation carried out in a selection of locations offering different audio recording challenges.

Outcome 2 will also be assessed in two parts. The first part will be by 20 short-response questions testing candidates' knowledge and skills on the principles involved in producing quality video recordings and the problems involved in producing video recordings. In the second part of Outcome 1 candidates will be asked to produce a report of approximately 500 words on a practical investigation carried out in a selection of locations offering different video recording challenges.

In Outcome 3 candidates will be assessed on their knowledge and/or skills in relation to compression techniques. The assessment will be in two parts, the first will be by 10 short-response questions and the second by the production of two reports of 250 words each. Candidates will need to achieve a minimum of 60% of the available marks to obtain a pass in Outcomes 1, 2 and 3.

Higher National Unit specification: support notes (cont)

Unit title: Multimedia Computing: Audio and Video 2

For Outcome 4 candidates will be asked to produce a portfolio of written and practical work to demonstrate their knowledge and/or skills in producing a sequence of audio and video files to meet a specific multimedia application brief.

Open learning

This unit could be delivered by distance learning. However, it would require planning by the centre to ensure the sufficiency and authenticity of candidate evidence. The assessment arrangements outlined above should be suitable for open learning provided regular contact can be maintained with the tutor.

For information on normal open learning arrangements, please refer to the SQA guide *Assessment and Quality Assurance of Open and Distance Learning* (SQA, 2000).

Special needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

General information for candidates

Unit title: Multimedia Computing: Audio and Video 2

This Unit is designed to enable you to work with audio and video in a multimedia and web development role. You should gain practical experience in investigating and applying the audio and video techniques utilised in industry to produce quality media files for inclusion in multimedia and web applications.

On completion of the Unit you should be able to:

1. Describe the principles involved in producing quality audio recordings and the problems typically encountered due to environmental influences.
2. Describe the principles involved in producing quality video recordings and the problems typically encountered due to environmental influences.
3. Describe and compare file compression techniques for audio and video files.
4. Produce a sequence of audio and video files to meet a specific multimedia application brief.

In Outcome 1 you should learn about the properties of sound including frequency, amplitude, harmonics, pitch and timbre. You will also learn about the environmental influences involved in producing audio recordings such as reflection, absorption, resonance and acoustics. You should find out how to deal with, for example, the problems associated with echoes, wind and background noises such as conversation and traffic by using appropriate forms of microphone selection. You should be given practice in and learn how to use audio equipment to produce high quality audio recordings. In the first part of Outcome 1 you will be assessed by 20 short-response questions testing your knowledge and skills on the properties of sound, the environmental influences and the problems involved in producing audio recordings. You will need to answer 12 questions correctly (i.e. obtain 60%) in order to achieve a pass in this part of Outcome 1. In the second part of Outcome 1 you will be asked to produce a report of approximately 500 words on a practical investigation carried out in a selection of locations offering different audio recording challenges. Your report will be supported by a number of audio recordings which will support the findings of your investigation.

In Outcome 2 you should learn about the principles of camera skills including: composition, shot sizes, camera angles, framing, perspective and camera movements. You should also find out about the principles of lighting, including the use of natural light, white balance, additional lighting, colour and special effects filters. You should also learn about the principles of editing, including, for example, in-camera editing, jump cuts, line of action, sight lines, cutaways, cutting on action and parallel action. You should be given practice in and learn how to use audio equipment to produce high quality video recordings. In the first part of Outcome 2 you will be assessed by 20 multiple-choice or short-response questions testing your knowledge and skills on the principles involved in producing high quality video recordings. You will need to answer 12 questions correctly (i.e. obtain 60%) in order to achieve a pass in this part of Outcome 1. In the second part of Outcome 1 you will be asked to produce a report of approximately 500 words on a practical investigation carried out in a selection of locations offering different video recording challenges.

General information for candidates (cont)

Unit title: Multimedia Computing: Audio and Video 2

Your report will be supported by a number of video recordings which will support the findings of your investigation.

Outcome 3 introduces you to the topic of the compression techniques that may be used in industry for audio and video recording. You should learn about the theory of compression techniques such as: lossy/lossless, simple, interpolative, predictive, statistical, fractal, compression/de-compression balance and streaming. You should also be given practice in and learn how to use various compression techniques with audio and video files.

In the first part of Outcome 3 you will be assessed by 10 short-response questions testing your knowledge and skills on compression techniques. You will need to answer 6 questions correctly (i.e. obtain 60%) in order to achieve a pass in this part of Outcome 3. In the second part of Outcome 3 you will be asked to produce two reports of approximately 250 words each on practical investigations into audio and video compression techniques respectively.

In Outcome 4 you should put your knowledge and skills to good practical use and produce a sequence of audio and video files to meet a specific multimedia application brief. You should learn how to identify media content, plan and record audio and video content and to produce a multimedia application or web site to match a given brief. You will be assessed on Outcome 4 by being asked to produce a portfolio of written work to show that you can identify the required media content and carry out the analysis and planning stages involved in recording audio and video content which is suitable for your multimedia application or web site. You will need to produce the portfolio in accordance with the specifications set out in a given brief in order to achieve a pass in Outcome 4.

Higher National Unit Specification

General information for centres

Unit title: Professional and Legal Issues for Web and Multimedia Developers

Unit code: DF6A 35

Unit purpose: This Unit is designed to provide candidates with an extensive understanding of the context within which they will work as a professional in the fields of Web Development and Multimedia Computing. The Unit should provide candidates with a broad knowledge of the legal aspects, standards and guidelines of professional development environments. This Unit is primarily intended for candidates who propose to follow a career, or are following a career, as Web developers or Multimedia professionals and who require an understanding of the professional responsibilities of such employment.

On completion of this Unit the candidate should be able to:

- 1 Describe the legislation that applies to Web and Multimedia development.
- 2 Demonstrate an awareness of current and evolving standards and guidelines in Web Development and Multimedia Computing.
- 3 Explain the meaning and importance of intellectual property for developers.

Credit value: 1 HN Credit at SCQF level 8: (8 SCQF credit points at SCQF level 8*)

**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.*

Recommended prior knowledge and skills: Access to this Unit will be at the discretion of the Centre. However, it is recommended that candidates should have previous experience of studying computing at Higher National level. Although differing programmes of study will be sufficient to prepare candidates for this Unit it is recommended that they should have completed the HN Unit DF63 34 Multimedia Computing: Interface Design and Authoring. Candidates should have an understanding of interactive program design gained either through prior study or through work experience. This may be evidenced by the possession of relevant National Units, HN units or experience.

Core skills: There may be opportunities to gather evidence towards core skills in this Unit, although there is no automatic certification of core skills or core skills components.

General information for centres (cont)

Context for delivery: If this Unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes. Candidates should be encouraged to carry out their own research of current and evolving standards and guidelines.

Assessment: This Unit is assessed by one extended report of around 1,200 words covering the knowledge and/or skills for all Outcomes. It is recommended that an extended case study or appropriate workplace situation should be used as the basis for generating evidence for the report. If a case study is used it is recommended that candidates be provided with it very early on in the delivery of the Unit in order to familiarise themselves with the information. If a workplace situation is used the assessor should ensure that there are sufficient opportunities available for the candidate to complete all the evidence requirements for the report and that they are confident in the authenticity of the candidates submission.

Higher National Unit specification: statement of standards

Unit title: Professional and Legal Issues for Web and Multimedia Developers

Unit code: DF6A 35

The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Please refer to *Evidence requirements for the Unit* after the Outcomes.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Describe the legislation that applies to Web and Multimedia development.

Knowledge and/or skills

- Data protection
- Computer misuse
- Copyright, design and patents applicable to coding and content
- Consumer protection and those provisions relating to liability
- Health and safety at work

Outcome 2

Demonstrate an awareness of current and evolving standards and guidelines in Web Development and Multimedia Computing.

Knowledge and/or skills

- Differences between standards and legislation
- The advantages of adhering to standards
- Usability issues
- Strengths and weaknesses of employing guidelines

Outcome 3

Explain the meaning and importance of intellectual property for developers.

Knowledge and/or skills

- The concept of intellectual property
- Software, documentation and designs as intellectual property
- The mechanisms available to protect intellectual property

Higher National Unit specification: statement of standards (cont)

Unit title: Professional and Legal Issues for Web and Multimedia Developers

- The main legislation and directives governing intellectual property

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can in a report of at least 1,200 words:

- Provide an accurate and clear explanation of at least three pieces of legislation that apply to Web Development and Multimedia Computing
- Explain the importance of intellectual property in the industry by:
 - Providing a brief explanation of what is meant by intellectual property
 - Providing at least three reasons why software, documentation and designs can be regarded as intellectual property
 - Describing at least two mechanisms available to protect intellectual property
 - Describing at least two main acts and two directives governing intellectual property
- Demonstrate an awareness of standards and guidelines in the industry by:
 - Distinguishing between standards, legislation and guidelines
 - Describing at least two standards that apply to the industry
 - Explaining clearly how standards are applied to usability
 - Identifying at least two Strengths and two weaknesses of utilising guidelines

Candidates will need to gain a minimum of 60% of the available marks in order to obtain a pass in this unit.

Assessment guidelines

It is recommended that the candidates' knowledge and/or skills could be demonstrated by analysis of an appropriate extended case study or workplace situation that provides the opportunity to cover all three items in the evidence requirements shown above.

Case Study

If an extended case study is used it should be given to candidates as soon as possible after the start of the Unit to allow time for the assimilation of information by candidates. Lecturers should feel free to answer questions or clarify any misunderstandings relating to the case study that candidates may have. Lecturers should encourage discussion of the case study in relation to the main areas of study, ie legislation, standards and intellectual property, throughout the Unit.

Higher National Unit specification: statement of standards (cont)

Unit title: Professional and Legal Issues for Web and Multimedia Developers

Workplace

Where candidates have the opportunity to generate the evidence with reference to their own workplace rather than a case study they may do so. They will need to check with their assessor that their workplace will provide sufficient opportunity to discuss the main areas of study.

Candidates should be provided with every opportunity to work with others throughout the course of this Unit.

Administrative Information

Unit code:	DF6A 35
Unit title:	Professional and Legal Issues for Web and Multimedia Developers
Superclass category:	EC
Date of publication:	December 2003
Version:	01
Source:	SQA

© Scottish Qualifications Authority 2003

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. The cost for each Unit specification is £2.50. (A handling charge of £1.95 will apply to all orders for priced items.)

Higher National Unit specification: support notes

Unit title: Professional and Legal Issues for Web and Multimedia Developers

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 for this Unit

This Unit is primarily intended to provide candidates with the knowledge they will require in order to function effectively in professional web development and multimedia computing. In the modern professional environment it is necessary that professionals in this area can understand and interpret the business world in which they operate. Hence, the Unit concentrates on legal obligations, standards and intellectual property.

Although the Unit is expressed in generic terms, wherever possible it should be related to organisations, institutions, companies and situations which are familiar to candidates.

There are three main areas of study:

- The legislation that has been established to apply to the computing profession (Data Protection Acts 1984 and 1998, Computer Misuse Act 1990, Copyright, Design and Patents Act, Consumer Protection Act 1987 (those provisions relating to liability), Health and Safety at Work Act 1974
- The standards and guidelines that are currently in use and those that are evolving particularly where they apply to usability. Candidates should be aware of the differences between guidelines, standards and legislation. The content and progress of ISO 9241 and other international standards; EEC regulations; conformance with standards; product specific guidelines and those recommended by software vendors.
- Intellectual property, computer software, documentation and designs as intellectual property, the mechanisms and legislation that have been established to protect intellectual property

Guidance on the delivery and assessment for this Unit

This Unit is likely to form part of a group award, which is primarily designed to provide candidates with technical or professional knowledge and skills related to the occupational area of Web Development and Multimedia Computing. However, study of this Unit is also appropriate for other candidates who have prior knowledge of developing interactive applications and who wish to develop their understanding of professional issues. For instance, someone in a professional role who wishes to gain more knowledge of usability standards that might affect their work.

Higher National Unit specification: support notes (cont)

Unit title: Professional and Legal Issues for Web and Multimedia Developers

This Unit is likely to form part of a group award, which is primarily designed to prepare candidates for employment in a Web Development or Multimedia Computing role. This Unit requires the candidate to be able to analyse professional issues and hence it is expected that it will be delivered in the second year of full-time HND Multimedia Computing and Web Development programmes. Where possible during the delivery, links should be drawn with other relevant areas of the course, eg Design, authoring and web implementation.

The use of candidate-centred, resource-based methodologies should be as extensive as possible to promote independent study. Visits to local industry or visits by guest speakers could be used to encourage the candidate to see the role of the professional and appreciate the application of the theory learnt in this course to industry.

This Unit is assessed by one report of at least 1,200 words that covers the knowledge and skills of all three Outcomes. It is recommended that the assessment be based on an appropriate extended case study or suitable workplace situation.

The Unit should be delivered in a way that enables candidates to appreciate its relevance to the occupational area of Web/Multimedia computing/IT.

These are books that would prove useful for both the teaching and learning of this Unit:

- Bainbridge, D Introduction to Computer Law, (4th ed) Pitman, 2000, ISBN 0-582-42334-1
- The Human-Computer Interface, Stephen Hill ISBN 1-85805-119-3

Open learning

If this Unit is delivered by open or distance learning methods, additional planning and resources may be required for candidate support, assessment and quality assurance. A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes.

For further information and advice, please see *Assessment and Quality Assurance of Open and Distance Learning* (SQA, February 2001 – publication code A1030).

Special needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

General information for candidates

Unit title: Professional and Legal Issues for Web and Multimedia Developers

This Unit is designed to enable you to recognise the main issues affecting professionals working as Web or Multimedia Developers. In order to function effectively the professional needs to be able to understand the working environment as well as having the technical knowledge to perform the tasks of their own profession.

This Unit will enable you to gain an appreciation of a number of areas of concern to organisations that will affect you in the performance of your own job as a Web Development or Multimedia professional. You will be expected to apply much of the theory of professional issues to workplace or case study situations. You should be provided with the opportunity to gain knowledge of a number of different working environments.

There are three Outcomes in this Unit and upon completion you should be able to:

1. Describe the legislation that applies to Web and Multimedia development.
2. Demonstrate an awareness of current and evolving standards and guidelines in Web Development and Multimedia Computing.
3. Explain the meaning and importance of intellectual property for developers.

In Outcome 1 you will learn about the legislation appropriate to the Web or Multimedia developer. The particular pieces of legislation that you will study are the Data Protection Acts 1984 and 1998, the Computer Misuse Act 1990, the Copyright, Design and Patents Act, the Consumer Protection Act 1987 (those provisions relating to liability) and the Health and Safety at Work Act 1974.

In Outcome 2 you will learn about current and evolving standards and guidelines eg ISO 9241. You will also learn about vendor specific guidelines and about usability issues.

In Outcome 3 you will learn about the meaning and importance of intellectual property. You will need to recognise why software, documentation and designs can be considered to be intellectual property. You will also need to be conversant with the mechanisms available to protect intellectual property and about the main acts and appropriate European directives.

Your work for all three Outcomes will be assessed by the completion of one report of at least 1200 words. You will need to gain a minimum of 60% of the available marks in order to obtain a pass in this unit.

Higher National Unit Specification

General information for centres

Unit title: Internet: Web Technology and Security

Unit code: DF61 35

Unit purpose: This Unit is designed to provide candidates with an understanding of current Web technologies, factors affecting of Web applications development and an awareness of fundamental security and protection issues.

On completion of the Unit the candidate should be able to:

1. Describe World Wide Web technology.
2. Identify current uses of Web applications and implications on Web development.
3. Describe Web related security issues.

Credit value: 2 HN Credits at SCQF level 8: (16 SCQF credit points at SCQF level 8*)

**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.*

Recommended prior knowledge and skills: Access to this Unit is at the discretion of the centre. Experience of web development and scripting would be advantageous.

Core skills: There may be opportunities to gather evidence towards core skills in this Unit, although there is no automatic certification of core skills or core skills components.

Context for delivery: If this Unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes.

Assessment: This Unit is predominately theory based. It is recommended that a holistic approach be taken to generating assessment evidence and that the Unit be assessed by a report containing in the region of 2000-2500 words covering a sample of the knowledge and skills from all three Outcomes. The sample should not be less than 60% of the evidence requirements for each of the three Outcomes. Candidates are required to gain a minimum of 60% of the available marks within the sample in order to achieve a pass in this Unit. If a case study is used then it is recommended that candidates be provided with it very early on in the delivery of the Unit in order to familiarise themselves with the information.

Higher National Unit specification: statement of standards

Unit title: Internet: Web Technology and Security

Unit code: DF61 35

The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Please refer to *Knowledge and/or skills for the Unit and Evidence requirements for the Unit* after the Outcomes.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Describe World Wide Web technology

Knowledge and/or skills

- ◆ Functionality of the Web
- ◆ Client-side technology
- ◆ Server-side technology
- ◆ Internet, Intranet, Extranet and Virtual Private Networks

Outcome 2

Identify current uses of Web applications and implications on Web development

Knowledge and/or skills

- ◆ Types of Web application
- ◆ Web applications development technologies and languages
- ◆ Factors affecting the development of Web applications
- ◆ Implications for Web development

Outcome 3

Describe Web related security issues

Knowledge and/or skills

- ◆ Security
- ◆ Vulnerabilities
- ◆ Protection: hardware and software
- ◆ Encryption

Higher National Unit specification: statement of standards (cont)

Unit title: Internet: Web Technology and Security

Evidence requirements

Candidates will need evidence to demonstrate their skills and/or knowledge by showing that they can in relation to Outcome 1:

- ◆ Define the terms Internet and World Wide Web
- ◆ Describe the origins of the Internet and its evolution:
 - Discussion should include at least: ARPANet, TCP/IP, TCP, UDP, IP, IP address, packets, datagrams, packet switching, node, host, NSFNet and MILNET, Internet domains and DNS, Internet Society (ISOC), Internet Corporation of Assigned Names and Numbers (ICANN), the Internet Engineering Task Force (IETF) and subcommittees, commercial backbone providers, Internet Service Providers (ISP), common usage of the Internet, the communications revolution and discussion as to whether the purpose of the Internet is the same today as originally envisaged.
- ◆ Describe the evolution, functionality and structure of the World Wide Web:
 - Discussion should include at least: visionaries, pioneers, Tim Berners Lee, hypertext and hyperlinks, HTTP, HTML, URL, URI, web server, web browser (including NCSA Mosaic and Netscape) and the World Wide Web Consortium
- ◆ Describe the web client/server architecture:
 - Use of HTTP in the transfer of hypertext web documents
 - Client-side web technologies:
 - Discussion should include at least: web browser, GET request, mark-up and client-side scripting languages, applets and cookies
 - Server-side web technologies:
 - Web server: purpose, server software, common server responses
 - CGI, alternatives to CGI, database connectivity, cookie
- ◆ Discuss usage and limitations of the World Wide Web (e.g. issues with redundant links)
- ◆ Describe the terms Intranet, Extranet and Virtual Private Network

Candidates will need evidence to demonstrate their skills and/or knowledge by showing that they can in relation to Outcome 2:

- ◆ Differentiate between static and dynamic web application technologies:
 - Discussion should include at least: Mark-up, extensible, scripting and programming languages, database driven content and use of SQL, general content maintenance;
- ◆ Identify usage of database driven dynamic Web application technologies;
- ◆ Describe factors affecting the development of Web applications:
 - Browser and platform compatibility issues, bandwidth, plug-ins, push, pull, wireless and mobile technologies;
- ◆ Describe current and foreseen implications of technology on Web development and wider technology areas

Higher National Unit specification: statement of standards (cont)

Unit title: Internet: Web Technology and Security

Candidates will need evidence to demonstrate their skills and/or knowledge by showing that they can in relation to Outcome 3:

- ◆ Identify Web security threats
- ◆ Describe fundamental Web security issues
- ◆ Describe client side security issues
- ◆ Describe server side security issues
- ◆ Describe the role of a proxy server, firewall, bastion host, router and network address translation (NAT) in the context of security
- ◆ Describe methods of data encryption and cryptography
 - HTTPS, Transport Layer Security (TLS) and Secure Socket Layer (SSL), cyphertext, Public Key Infrastructure (PKI), digital certificates, signatures, public and private key encryption, key strength, security for Virtual Private Networks

This Unit will be assessed by a report in the region of 2000-2500 words covering a sample of the knowledge and skills for all three Outcomes. The sample should not be less than 60% of the evidence requirements for each of the three Outcomes. Candidates must gain 60% of the available marks within the sample in order to achieve a pass in this Unit.

Assessment guidelines for the Unit

It is recommended that this Unit be assessed holistically using a case study as the basis for generating evidence for the report. Further details of this approach are given in the support notes. Candidates may typically produce around 750 words in their response to each outcome.

If a case study is used then it is recommended that candidates be provided with it very early on in the delivery of the Unit in order to familiarise themselves with the information.

Administrative Information

Unit code:	DF61 35
Unit title:	Internet: Web Technology and Security
Superclass category:	CB
Date of publication:	December 2003
Version:	01
Source:	SQA

© Scottish Qualifications Authority 2003

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. The cost for each Unit specification is £2.50. (A handling charge of £1.95 will apply to all orders for priced items.)

Higher National Unit specification: support notes

Unit title: Internet: Web Technology and Security

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 for this Unit

This Unit is designed for delivery within an appropriate HND framework at SCQF level 8. The Unit could be delivered in the first or second year of the group award. The Unit could be delivered in conjunction with a practical advanced Web technology unit.

Outcome 1 aims to provide the candidate with an understanding of how the Internet and World Wide Web have evolved, what the World Wide Web is and a general insight to how the World Wide Web functions.

Internet related discussion might include: ARPANet - its purpose, design and key figures, bodies and institutions. Protocols and technologies - TCP/IP, TCP, UDP, IP, IP address, packets, datagrams, packet switching, node, host. NSFNet and MILNET. Internet domains and DNS. Internet related bodies - Internet Society (ISOC), Internet Assigned Numbers Authority (IANA) as absorbed by the Internet Corporation of Assigned Names and Numbers (ICANN), the Internet Engineering Task Force (IETF) and subcommittees, commercial backbone providers, Internet Service Providers (ISP), common usage of the Internet, the communications revolution (to perhaps include: social, cultural, moral and economic issues) and discussion as to whether the purpose of the Internet is the same today as originally envisaged.

At this level, the candidate would be expected to be able to make clear distinctions and appropriate correlations between the Internet and World Wide Web. Discussion on WWW related issues should perhaps focus more on evolution, functionality, inherent structure and the concept of linking non-linear documents and files. The history of the web and its concepts are likely to be examined. Areas most likely to be covered include visionaries/pioneers such as Vannevar Bush, Ted Nelson and Doug Engelbart, the Internet as an enabling technology, leading to discussion on Tim Berners Lee and CERN. Terminology such as hypertext, hyperlink, HTTP and HTTPS, HTML, URL, URI, web server, web browser (including discussion on NCSA Mosaic and Netscape) should be in context. Discussion is likely to cover the World Wide Web Consortium (W3C) and perhaps an insight to likely future developments. It would be advantageous for the candidate to be aware of problematic shortcomings of the Web – such as redundant hyperlinks.

Higher National Unit specification: support notes (cont)

Unit title: Internet: Web Technology and Security

It is important that candidates gain an understanding of client-side web technologies to include at least: the web browser, mark-up, scripting, programming languages, cookie and how documents are requested from a web server. Similarly, web server technologies should be covered to include at least: the web server: purpose, server software, common server responses (e.g. common HTTP error responses/status code definitions such as: 401 – Unauthorised, 404 – Not Found), server-side scripting languages such as CGL, ASP, JSP, PHP, etc – uses and dangers, database connectivity, SQL and cookies.

Outcome 1 ends by examining the purposes and uses of intranets, extranets, virtual private networks and the concept of tunnelling. Scope for discussion is extensive and is by no means limited by the suggestions given above.

Outcome 2 investigates web application technologies currently in use. The Outcome begins by examining both client and server-side Web application technologies. At the time of writing Web application technologies widely used included SGML subsets such as HTML, DHTML and XHTML; XML, PERL, PHP, ASP, JSP, Servlet, Java, C#, Python, JavaScript, VBScript, .NET technologies and SQL. In addition, plug-in technologies such as the Java Virtual Machine, Flash, Shockwave, and SMIL enabled browsers/plugin-ins; QuickTime and ActiveX are in common use. Server-side relational databases, ODBC and Structured Query Language are likely to be covered within this Outcome. Outcome 2 progresses to encourage the candidate to identify categories of dynamic Web applications. This may include, but is not limited to: e-commerce solutions (B2C, B2B), online transaction processing, banking, portals such as MSN, search engines such as Google and Altavista, online auction sites such as e-bay, dynamic news content such as news.bbc.co.uk, content providers, etc.

Key factors affecting the development of Web applications are also examined. Issues include bandwidth (narrowband, broadband), browser, plug-in and cross platform compatibility. It would be appropriate to investigate ‘Push’ and ‘Pull’ technologies. It would also be appropriate to examine the uses of ‘cookies’. Additional factors affecting the development of Web applications and foreseen implications are investigated within Outcome 2. At the time of writing, significant factors include security issues, the roll out of web enabled digital interactive television services, WAP, 3G, Bluetooth and other mobile/wireless technologies.

Outcome 3 focuses on Web related security issues by providing the candidate with the opportunity to gain a critical understanding of the fundamental security issues inherent within the nature of the World Wide Web and, in a wider sense, the Internet in general.

Higher National Unit specification: support notes (cont)

Unit title: Internet: Web Technology and Security

Areas such as threats (viruses and worms, hacking, smurf attacks such as Denial of Service, Distributed Denial-Of-Service) and vulnerabilities (security holes, client information leakage, weak keys, brute force attacks, site integrity, IP spoofing, ActiveX, server-side script, permissions and invocation, JavaScript, cookies, Java, perhaps with reference to the sandbox model for Java applets, disabling applets and cookies, etc). Investigation of paramount security concepts such as authenticating users and machines, authorisation and file permissions, prevention, intrusion detection (active, passive), reaction, integrity, confidentiality (including site privacy policy), accountability auditing and damage limitation are likely be covered as part of Outcome 3. Measures for the protection of data should be examined. This should examine the role of a proxy server, ports, firewall, bastion host, router, DMZ, NAT, use of log files, tunnelling and security related tunnelling protocols - IPSec, L2TP, PPTP. Methods of data security and encryption – such as HTTPS using SSL, TLS and the use of a session ID. Basic cryptography issues, cyphertext, hashing, Public Key Infrastructure (PKI), public (asymmetric) and private (symmetric) encryption keys, key strength, message digest, digital signatures, digital certificates (including conformance to X.509), certifying authorities (CA), Certificate Practice Statement issued by a CA that documents the policies and procedures of the CA for creating, managing, publishing, using, and revoking certificates, Certificate Revocation List (CRL) and Registration Authority (RA). Scope exists to investigate further into areas such email PGP, IDEA 128-bit symmetric encryption key, Passphrase and may extend to areas such as Kerberos. All security related discussion should be kept in context.

Guidance on the delivery and assessment of this Unit

It is recommended that a holistic approach be taken to generating assessment evidence and that the Unit be assessed by one extended report of 2000-2500 words covering a sample of the knowledge and skills for all three Outcomes. In producing the report, candidates may typically be expected to produce around 750 words in meeting the assessed criteria for each of the three outcomes. The report may be the result of a set of questions requiring extended responses. The sample should not be less than 60% of the total evidence requirements for each of the three Outcomes. It is strongly recommended that a case study is used as the basis for generating evidence for the report. If a case study is used then it is recommended that candidates be provided with it very early on in the delivery of the Unit in order to familiarise themselves with the information.

Candidates must gain 60% of the available marks from the sample in order to achieve a pass in this Unit.

If an holistic approach is taken and a case study is used then it is strongly recommended that a new set of questions, based on the same case study, should be available, in order to facilitate any requirement for remediation.

Higher National Unit specification: support notes (cont)

Unit title: Internet: Web Technology and Security

Open learning

If this Unit is delivered by open or distance learning methods, additional planning and resources may be required for candidate support, assessment and quality assurance. A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes. For further information and advice, please see *Assessment and Quality Assurance for Open and Distance Learning* (SQA, February 2001 – publication code A1030).

Special needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

General information for candidates

Unit title: Internet: Web Technology and Security

This Unit is designed to enable you to gain a comprehensive knowledge and understanding of dynamic Web application technologies and security issues associated with the World Wide Web, Web application technologies and methods of data protection.

On completion of this Unit you should be able to:

1. Describe World Wide Web technology
2. Identify current uses of Web applications and implications on Web development
3. Describe Web security issues

This Unit is theory based. There may however be opportunities to gain practical experience of Web technologies and of enforcing data protection measures. The focus of this Unit is on the Web technologies driving current dynamic Web applications.

In Outcome 1 you will learn about the common protocols associated with the World Wide Web and about the technology residing at the client-side and the server-side. Furthermore, you will learn about the uses of intranets, extranets, virtual private networks and wireless technologies.

Outcome 2 focuses on current Web applications and associated technologies. You will begin by examining a range of Web applications, from online banking and e-commerce to portals and search engines. There will be opportunities for you to examine techniques for result optimisation and influencing result placement within search engines. The range of technologies to be explored is exhaustive. It is most likely that a subset of technologies will be explored. At the time of writing, Web application technologies included HTML, DHTML, XML, ASP, PHP, JSP and Java. Plug-in, push and pull technologies and cookies will also be covered. The latter stages of this outcome focus on emerging issues affecting the development of Web applications. At the time of writing this includes bandwidth, cross-platform issues, security issues and emerging technologies such as interactive Web enabled television and 3G mobile networks.

Outcome 3 focuses on web security and data protection. The outcome examines fundamental security issues associated with the inherent nature of the World Wide Web and those specific to client-side and server-side technologies. You will develop a critical understanding of security threats and the measures that can be taken to help counteract such threats. You will examine technologies for data encryption and those associated with preventing the compromise of data such as firewalls and proxy servers.

The assessment for this Unit requires you to produce a report of 2000-2500 words covering the knowledge and skills for all three Outcomes. You will be provided with a case study very early on in the delivery of the Unit and you will use this as the basis for generating the evidence required for the report. You will need to obtain 60% of the available marks in order to achieve a pass in this Unit.

Higher National Unit Specification

General information for centres

Unit title: Multimedia Computing: Interface Design and Authoring

Unit code: DF63 34

Unit purpose: This Unit is designed to introduce candidates to the fundamentals of multimedia design and authoring. The aim of the Unit is to develop candidates' knowledge and skills in analysing the requirements for a proposed multimedia application, designing the application, gathering and manipulating appropriate multimedia elements and assembling these elements to produce an interactive multimedia application on an appropriate medium. Current terminology is introduced as appropriate. This unit is primarily intended for students studying Multimedia or related subjects.

On completion of the Unit the candidate should be able to:

1. Analyse client requirements for a proposed application.
2. Select a suitable interface design, colour scheme and typography for a proposed application.
3. Produce and evaluate a prototype of the application.
4. Author an interactive application to the agreed design.
5. Publish the completed application

Credit value: 3 HN Credits at SCQF level 7 (24 SCQF credit points at SCQF level 7*)

**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.*

Recommended prior knowledge and skills: Access to this unit will be at the discretion of the centre. However, it would be advantageous if candidates had an awareness of the different formats of digital and analogue media elements, and how to acquire them. This may be evidenced by previous study of graphics, video and audio packages. This may also be evidenced by the possession of relevant National Units, HN units or experience. It is recommended that the candidate should have achieved the HN Units *DF66 34 Multimedia Computing: Audio and Video 1* and *DF69 34 Multimedia Computing: Screen Based Graphics* prior to commencement of this unit.

Core skills: There may be opportunities to gather evidence towards core skills in this Unit, although there is no automatic certification of core skills or core skills components.

General information for centres (cont)

Context for delivery: If this Unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes.

Assessment: A single theme runs throughout the unit in that students should work through the planning, design, development, production and publishing of a single multimedia application.

Assessment for Outcome 1 is by means of a report of approximately 500 words on the client requirements for a multimedia application. Assessment for Outcomes 2 & 3 involves the production of the design created in Outcome 2, by, for example, the use of storyboards, and in the production of an evaluation strategy. In Outcome 4 the final application, which must show good use of navigation links and the provision a robust user interface, is created. Finally, in outcome 5 the application is published on a suitable medium such as a CD, DVD or the Web

The completed application should have a minimum of 12 screens. Candidates should be encouraged to concentrate on developing fully tested screens rather than simply producing screens that duplicate already assessed techniques and styles.

Higher National Unit specification: statement of standards

Unit title: Multimedia Computing: Interface Design and Authoring

Unit code: DF63 34

The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Analyse client requirements for a proposed application.

Knowledge and/or skills

- ◆ Content and purpose of the application
- ◆ Target user group and design implications
- ◆ Hardware and software requirements
- ◆ Distribution medium

Evidence requirements

Candidates must demonstrate their knowledge and skills by producing a report of approximately 500 words about the client requirements covering all of the knowledge and/or skills areas above. This report must include all of the following elements:

- ◆ The content and purpose of the application including the subject or topic, the sources of the materials and any copyright restrictions
- ◆ The target user group including details such as age, social group, literacy levels, physical needs, interests, and the implications these have on the content of the application and the hardware required such as size of screens and various types of input/output devices
- ◆ The hardware and software requirements including the different requirements for authoring and delivery systems
- ◆ The distribution medium for the completed application.

Equal weighting should be given to each of the knowledge and/or skills areas above.

The report must be completed under supervised, open book conditions.

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Interface Design and Authoring

Outcome 2

Select a suitable interface design, colour scheme and typography for a proposed application

Knowledge and/or skills

- ◆ Interface design, screen layout
- ◆ Typography
- ◆ Human perception
- ◆ Colour properties

Evidence requirements

Evidence requirements for this outcome are incorporated into Outcome 3

Assessment guidelines

Integrated with outcome 3; please see assessment guidelines for Outcome 3

Outcome 3

Produce and evaluate a prototype of the application

Knowledge and/or skills

- ◆ Development life cycle
- ◆ Methods for displaying design concepts including paper based and screen based methods
- ◆ Iterative design
- ◆ Design evaluation methods
- ◆ Navigation methods

Evidence requirements

Candidates will produce prototype files and a report or screen-based presentation that includes:

- ◆ An interface design with appropriate use of graphics and text. The text used should be of appropriate colour, typeface, size and orientation. When using graphics, consideration should be given to colour, contrast, positioning of the graphic and the balance of the page.
- ◆ Storyboards or a suitable alternative design methodology for the application
- ◆ An evaluation strategy
- ◆ Evaluation results
- ◆ Updated storyboards (or a suitable alternative design methodology) to reflect the development of the application.
- ◆ A navigation chart or structure

Higher National Unit specification: statement of standards (cont)

- ◆ A working prototype
- ◆ The interface and design of the application should be tested and changes made to reflect the changes required.

Assessment for Outcomes 2 and 3 must be completed under supervised, open book conditions.

Assessment guidelines

A single assessment can be used to cover Outcomes 2 and 3. Candidates should produce storyboards or use a suitable alternative design methodology to show the design/layout of the screens for the application.

Candidates may work on the assessment on an individual basis or as part of a group. If group work is used then care must be taken to ensure the authenticity of individual candidates work.

If, at the end of outcome 3, candidates have not by this stage produced a suitable working design, then they could be given an appropriate design by the assessor and asked to author an application conforming to this design. Candidates could then be re-mediated on the design outcomes and asked to produce an appropriate design.

Outcome 4

Author an interactive application to the agreed design

Knowledge and/or skills

- ◆ Authoring software
- ◆ Incorporation of media elements
- ◆ Navigation
- ◆ Interaction
- ◆ On-going testing

Evidence requirements

Candidates can use any appropriate authoring software to produce a working application. They will need evidence to demonstrate their knowledge and/or skills by showing that they can produce:

- ◆ A well-structured robust application conforming to the original design with good use of appropriate navigational techniques. Use should be made of interactions such as buttons, hotspots, hot objects and hyperlinks. Evidence will be obtained by observation checklist.
- ◆ A test strategy to ensure that the application works as intended, and that all the links work. This may be evidenced by a screen or paper-based report.

Assessment will be evidenced by production of the application and of a test strategy. Reference can be made to notes etc.

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Interface Design and Authoring

Assessment must be completed under supervised, open book conditions.

Assessment guidelines

This outcome requires candidates to complete the multimedia application that they have developed in the previous outcomes. Candidates may work on the assessment on an individual basis or as part of a group. If group work is used then care must be taken to ensure the authenticity of individual candidates work

Outcome 5

Publishing the completed application

Knowledge and/or skills

- ◆ Acceptance testing
- ◆ User evaluation
- ◆ Packaging of application for distribution
- ◆ Documentation

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can:

- ◆ Document the results of testing and evaluation
- ◆ Publish to an appropriate medium which may be a CD/DVD, the World Wide Web or other medium
- ◆ Provide user instructions and technical advice on how to run the application effectively. The user instructions can be in either an electronic format or in a printed format.

Candidates are required to publish the completed application created in the previous outcomes on an appropriate medium.

Assessment must be completed under supervised, open book conditions.

Assessment guidelines

Candidates may work on the assessment on an individual basis or as part of a group. If group work is used then care must be taken to ensure the authenticity of individual candidates work

Administrative Information

Unit code:	DF63 34
Unit title:	Multimedia Computing: Interface Design and Authoring
Superclass category:	CE
Date of publication:	November 2003
Source:	SQA

© Scottish Qualifications Authority 2004

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority Sales Section on 0141 242 2168.. The cost for each Unit specification is £2.50.

Higher National Unit specification: support notes

Unit title: Multimedia Computing: Interface Design and Authoring

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 120 hours.

Guidance on the content and context for this Unit

This unit will introduce candidates to the basics of planning and designing a multimedia application, gathering appropriate media components, producing an application for a target audience and publishing the application on a suitable medium. The medium could be CD/DVD or the Web or other suitable medium.

Emphasis should be placed equally on the design of the application and its implementation.

Candidates should learn about the different types of target groups, the different kinds of applications, and the implications these have for the software and hardware requirements. For example, different kinds of input and output devices may be required for some people who are visually impaired. The difference between authoring systems and delivery systems should be explained along with the different hardware requirements for these systems such as monitors, processor speed, storage devices, etc.

Stress should be placed on the importance of the development life cycle and the iterative nature of the development process. Evaluation techniques and the issue of test strategies should also be explained.

The final application should be published on an appropriate medium which may be CD or DVD or the Web or other suitable medium. The candidate should produce user instructions and technical advice on how to run the application. This could be done, for example, by using paper documentation or as an insert in a jewel case for a CD or DVD, or as a help file on computer or on the Web.

Guidance on the delivery and assessment of this Unit

Throughout this unit candidates are involved in the planning and design of a single application, gathering diverse multimedia components and the final production of the application for a suitable medium.

Candidates could complete the unit on an individual basis or as part of a group. However if the latter method is chosen, it is important that the assessor ensures that each individual candidate has made sufficient input to achieve the outcomes.

The assessor should ensure that remediation is available for each outcome.

Higher National Unit specification: support notes (cont)

Unit title: Multimedia Computing: Interface Design and Authoring

If, at the end of outcome 3, candidates have not by this stage produced a suitable working design, then they could be given one by the assessor and asked to author an application conforming to this design. Candidates could then be re-mediated on the design outcomes and asked to produce an appropriate design.

Assessment for Outcome 1 is by means of a report on the client requirements for the application. Assessment is open book.

Outcomes 2 and 3 are concerned with producing the design/specification. Assessment is by production of evidence of design, e.g. storyboards and an evaluation strategy. Assessment is open book

Outcome 4 involves producing the final application. Assessment will be concerned with the method of producing the application. Assessment is open book

Outcome 5 involves publishing the application on an appropriate medium. Assessment will be concerned with the method of publishing the application. Assessment is open book

Open learning

If this Unit is delivered by open or distance learning methods, additional planning and resources may be required for candidate support, assessment and quality assurance. A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes. For further information and advice, please see *Assessment and Quality Assurance for Open and Distance Learning* (SQA, February 2001 – publication code A1030).

Special needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

General information for candidates

Unit title: Multimedia Computing: Interface Design and Authoring

This Unit is designed to introduce you to the fundamentals of multimedia design and authoring. In this Unit you should gain the knowledge and skills needed to:

- ◆ Analyse the requirements of a multimedia application,
- ◆ Design the application,
- ◆ Gather and manipulate appropriate multimedia elements, e.g. text, graphics, video, sound
- ◆ Assemble these elements to produce an interactive multimedia application on an appropriate medium for a target audience.

You should learn about the different types of target groups, the different kinds of applications, and the implications these have for software and hardware requirements. For example, different kinds of input and output devices may be required for some people who are visually impaired. You should also learn about the difference between authoring systems and delivery systems along with the different hardware requirements for these systems such as monitors, processor speed, storage devices and so forth.

The importance of the development life cycle and the iterative nature of the development process will be important features of this Unit. You should also learn about various evaluation techniques and how to design and implement test strategies.

You should find out how to build an interactive application and how to publish it on an appropriate medium such as CD, DVD or the Web. You should also learn about the production of user instructions and how to provide technical advice on running an interactive application.

Assessment for Outcome 1 is by means of a report on the client requirements for a multimedia application. In Outcomes 2 and 3 you have to produce and develop the design/specification for a multimedia application. Assessment for Outcomes 2 & 3 will involve you in the production of the design created in Outcome 2, by, for example, the use of storyboards, and in the production of an evaluation strategy. In outcome 4 you have to produce the final application which shows good use of navigation links and provides a robust user interface. Finally, in outcome 5 you have to publish your application on a suitable medium such as a CD, DVD or the Web

Higher National Unit Specification

General information for centres

Unit title: Multimedia Computing: Advanced Authoring

Unit code: DF6N 35

Unit purpose: This Unit is designed to provide candidates with the knowledge and skills to enable them to create multimedia applications for distribution on an appropriate medium using the features of advanced authoring software tools.

On completion of the Unit the candidate should be able to:

- ◆ Produce, implement and publish a multimedia application for distribution on an appropriate medium.

Credit value: 2 HN Credits at SCQF level 8: (16 SCQF credit points at SCQF level 8*)

**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.*

Recommended prior knowledge and skills: Access to this Unit will be at the discretion of the Centre. However, it is recommended that candidates have some prior knowledge and skills in authoring a multimedia application and fundamental programming skills. It is strongly recommended that candidate be in possession of the HN Units *DF63 34 Multimedia Computing: Interface Design and Authoring* and *DF6C 34 Software Development: Introduction* or other relevant HN Units or appropriate experience.

Core skills: There may be opportunities to gather evidence towards core skills in this Unit, although there is no automatic certification of core skills or core skills components.

Context for delivery: If this Unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes.

General information for centres (cont)

Assessment: There is one assessment for this unit, in which candidates will each produce, test, implement and publish a non-trivial multimedia application for distribution on an appropriate medium. The evidence generated will take the form of a completed multimedia application delivered on an appropriate medium and an assessors' checklist. Assessment must be carried out in supervised conditions sufficient to ensure confidence in the authenticity of candidates' submissions.

Higher National Unit specification: statement of standards

Unit title: Multimedia Computing: Advanced Authoring

Unit code: DF6N 35

The sections of the unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Please refer to Knowledge and/or skills for the unit and evidence requirements for the unit after the unit outcome.

Where evidence for outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Unit Outcome

Produce, implement and publish a multimedia application for distribution on an appropriate medium.

Knowledge and/or skills

- ◆ Creating a multimedia application to a specified given design
- ◆ Importing and manipulating media elements
- ◆ Setting object properties
- ◆ Setting window properties
- ◆ Creating motion and applying to objects
- ◆ Use of transition effects
- ◆ Incorporating graphic primitives
- ◆ Creating menus appropriate to the application
- ◆ Incorporating keyboard and mouse events
- ◆ Use of variables, expressions and parameters
- ◆ Use of control structures for sequence, selection and iteration
- ◆ Error trapping and displaying error messages
- ◆ Validating user input
- ◆ Formatting data for output
- ◆ Manipulating data files
- ◆ Utilising data types
- ◆ Preparing an application for distribution
- ◆ Optimising files for best performance
- ◆ Publishing an application to a suitable medium
- ◆ Production of a user guide.

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Advanced Authoring

Evidence requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can, to a given design specification, produce, test, implement and publish a multimedia application for distribution on appropriate medium. The completed application must contain evidence of:

- ◆ A minimum of 5 screens/windows incorporating appropriate media elements including: text, image, graphics, animation, audio, video and effects in relevant file formats suitable to the application and suitable for distribution across relevant platforms.
- ◆ Motion effects applied to at least two media elements.
- ◆ Settings applied to Screens/Windows including at least: sizing, positioning, background and foreground colours.
- ◆ Menu operations, e.g. popup, pull down, navigation of the program, a minimum of 3 of the following operations: open, close, file save, print and exit.
- ◆ Variables, arrays and data types, at least one example of each of:
 - Global and local variables
 - Array
- ◆ Control structures and nested structures, at least one example of each of: sequence, selection and iteration and at least two examples of nested structures.
- ◆ Operators, at least one example of each of:
 - Logic, arithmetic and comparison
- ◆ Event handlers: At least one example of:
 - Mouse events:
 - e.g. mouse-up, mouse-over
 - Keyboard events:
 - e.g. key-press
- ◆ Methods, at least one example of:
 - Definition, use, global (*same action applied to different objects*)
- ◆ Functions, at least one example of:
 - Definition and use of custom function or use of pre-defined function
 - Help (e.g. use of F1 function key to access a minimal help system)

Higher National Unit specification: statement of standards (cont)

Unit title: Multimedia Computing: Advanced Authoring

- ◆ The management of data in the application to include at least:
 - Read from file: at least one from: text file or database
 - Write to file: At least one from: text file or database
 - At least one example of each of data input validation and feedback
 - At least one example of error handling/trapping
 - Candidates must submit the input/output file on disk and provide a hard copy of the contents of the input/output file before and after the program run to show that the program allows appropriate manipulation of the data. Candidates must also submit hard copies of screen dumps carried out during the application run, that demonstrate the effects of data manipulation.

- ◆ The control of digital media using the authoring tools scripting language for at least two different situations as appropriate, for example:
 - Volume for two simultaneous sound sources, such as a music loop playing at the same time as a voice – where the volume of the loop will reduce during the voice over, then return to normal when the application detects that the voiceover had terminated.
 - Additional video playback controls.

 - A User Guide that must include instructions on how to start, run/use the application, the minimum requirements for running the application and a troubleshooting guide.

 - All media must be optimised for best performance across relevant platforms.

Candidates must prepare the multimedia application by creating an executable file, which can run independently of the software used in its creation. The executable file and relevant media elements should be stored on a suitable medium, prepared and ready for distribution on for example, CD or DVD or Web, or other suitable medium as appropriate.

The evidence required for this Unit is the multimedia application submitted on the chosen medium and a completed assessors' checklist.

Assessment must be carried out in supervised conditions sufficient to ensure confidence in the authenticity of candidates' submissions.

Assessment Guidelines

Given that different authoring paradigms/authoring metaphors and hence different software may be used then Centres should ensure that the evidence gathered is to a similar standard as that outlined above, as appropriate to the authoring paradigm/authoring metaphor used and in relation to the capabilities of the particular software employed by them.

Administrative Information

Unit code:	DF6N 35
Unit title:	Multimedia Computing: Advanced Authoring
Superclass category:	CE
Date of publication:	March 2004
Version	1
Source:	SQA

© Scottish Qualifications Authority 2004

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Unit specification can be purchased from the Scottish Qualifications Authority. The cost for each Unit specification is £2.50 (minimum order £5.00).

Higher National Unit specification: support notes

Unit title: Multimedia Computing: Advanced Authoring

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

SQA allocates a notional design length to a unit based on time estimated for achievement of the stated standards by a candidate whose starting point is described in the access statement of the specification. While the exact time allocated to this unit is at the discretion of the centre, the notional design length is 80 hours. This could be allocated as indicated in the table below.

Study Hours	Assessment Hours
60	20

Guidance on the content and context for this Unit

If this Unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes.

This Unit is designed to enable candidates to use advanced authoring features to produce multimedia applications for distribution on appropriate media. The emphasis of this Unit should be on the teaching and learning of advanced authoring techniques as it is assumed that the candidates will have prior knowledge and skills in how to prepare such documentation as storyboards, charts and specifications.

At the time of writing the *authoring paradigm/metaphor*, that is recommended for this Unit is the **Cast/Score/Scripting Paradigm**, which uses a music score as its primary authoring metaphor; the synchronous elements are shown in various horizontal tracks with simultaneity shown via the vertical columns. The power of this metaphor lies in the ability to script the behaviour of each of the cast members.

At the time of writing Macromedia Director, which is used in the creation of many commercial multimedia applications, employs the Cast/Score/Scripting paradigm. These programs are best suited for animation-intensive or synchronized media applications; they are easily extensible to handle other functions (such as hypertext) via XOBJS, XCMDs, and DLLs.

Centres are, of course, free to use the authoring paradigm/metaphor of their choice, but should ensure that the software used is capable of producing the requisite evidence. Other authoring paradigms/metaphors that may possibly be used to conduct this Unit might include:

Higher National Unit specification: support notes

Unit title: Multimedia Computing: Advanced Authoring

The **Scripting Paradigm**, which is the authoring method closest in form to traditional programming. The paradigm is that of a programming language, which specifies (by filename) multimedia elements, sequencing, hotspots, synchronization, etc. A powerful, object-oriented scripting language is usually the centrepiece of such a system; in-program editing of elements (still graphics, video, audio, etc.) tends to be minimal or non-existent.

Scripting languages do vary however, so centres should check how much the language is object-based or object-oriented. The scripting paradigm tends to be longer in development time (it takes longer to code an individual interaction), but generally more powerful interactivity is possible. Since most Scripting languages are interpreted, instead of compiled, the runtime speed gains over other authoring methods are minimal. The media handling can vary widely; check out your system with your contributing package formats carefully.

Apple's HyperTalk for HyperCard, Assymetrix's OpenScript for ToolBook and the Lingo scripting language of Macromedia Director are examples of multimedia scripting languages.

The **Iconic/Flow Control Paradigm** tends to be the speediest (in development time) authoring style; it is best suited for rapid prototyping and short-development time projects. Many of these tools are also optimized for developing Computer-Based Training (CBT). The core of the paradigm is the Icon Palette, containing the possible functions/interactions of a program, and the Flow Line, which shows the actual links between the icons. These programs tend to be the slowest runtimes, because each interaction carries with it all of its possible permutations; the higher end packages, such as Authorware or IconAuthor, are extremely powerful and suffer least from runtime speed problems.

The **Frame Paradigm** is similar to the Iconic/Flow Control paradigm in that it usually incorporates an icon palette; however, the links drawn between icons are conceptual and do not always represent the actual flow of the program. This is a very fast development system, but requires a good auto-debugging function, as it is visually un-debugable. The best of these have bundled compiled-language scripting, such as Quest (whose scripting language is C) or Apple Media Kit.

The **Card/Scripting Paradigm** provides a great deal of power (via the incorporated scripting language) but suffers from the index-card structure. It is excellently suited for Hypertext applications, and supremely suited for navigation intensive (e.g. Cyan's "MYST" game) applications. Such programs are easily extensible via XCMDs and DLLs; they are widely used for shareware applications. The best applications allow all objects (including individual graphic elements) to be scripted; many entertainment applications are prototyped in a card/scripting system prior to compiled-language coding.

The **Hierarchical Object Paradigm** uses an object metaphor (like OOP), which is visually represented by embedded objects and iconic properties. Although the learning curve is non-trivial, the visual representation of objects can make very complicated constructions possible.

Higher National Unit specification: support notes (cont'd)

Unit title: Multimedia Computing: Advanced Authoring

The **Hypermedia Linkage Paradigm** is similar to the Frame paradigm in that it shows conceptual links between elements; however, it lacks the Frame paradigm's visual linkage metaphor.

The **Tagging Paradigm** uses tags in text files (for instance, SGML/HTML, SMIL (Synchronised Media Integration Language), VRML, 3DML and WinHelp) to link pages, provide interactivity and integrate multimedia elements.

Guidance on the delivery and assessment of this Unit

This Unit has been designed in such a way that it can be assessed holistically as a multimedia project. The emphasis of the Unit should be placed upon candidates gaining the appropriate knowledge and skills to include complex content into an authoring package. It is assumed that candidates will have prior knowledge of basic elements that, although they may not be included within the scope of this Unit, should nevertheless be considered for inclusion within the Unit Outcome. For example, this might include elements such as:

- ☞ Graphic primitives, such as lines, boxes and circles should be included.
- ☞ Objects, including at least: buttons, check boxes, text boxes and scroll bars
- ☞ Lists and nested lists (Director)
- ☞ Animation and motion features

File type selection and optimisation of media elements for best performance and distribution across platforms (Web, CD, PC and Apple Mac) should also be considered and included within the range of the Unit Outcome. At the time of writing, the recommended software for the Unit is Macromedia Director. However, if this is not available, the authoring can be carried out using any suitable commercially available authoring software. (See Guidance on Content and Context)

A library of media elements should be made available to candidates. However, candidates may want to supplement this with their own media, in which case they should gain approval from their lecturer/assessor.

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can create a multimedia application using the advanced authoring features of an appropriate software package. Candidates should also learn how to prepare the completed application for distribution on relevant media. This can be demonstrated by the creation of an executable file, which can run independently of the software used in its creation. The executable file and relevant media elements should be used to create an installable program and stored on suitable media, e.g. CD, DVD, etc. To accompany the storage media, a user guide should be created in which full instructions will be given on the following:

Higher National Unit specification: support notes (cont'd)

Unit title: Multimedia Computing: Advanced Authoring

- 👉 How to install the application,
- 👉 How to run/use the application,
- 👉 Minimum hardware/software recommended for its efficient running
- 👉 Troubleshooting guide in which any problems that may arise in its running are answered.

Assessment should be carried out in supervised conditions sufficient to ensure confidence in the authenticity of candidates' submissions.

Open learning

If this Unit is delivered by open or distance learning methods, additional planning and resources may be required for candidate support, assessment and quality assurance. A combination of new and traditional authentication tools may have to be devised for assessment and re-assessment purposes. For further information and advice, please see *Assessment and Quality Assurance for Open and Distance Learning* (SQA, February 2001 — publication code A1030).

Special needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

General information for candidates

Unit title: Multimedia Computing: Advanced Authoring

This Unit is designed to provide you with the knowledge and skills to enable you to create multimedia applications for distribution on an appropriate medium using the features of advanced authoring software tools. You should learn how to:

- ◆ Create a multimedia application to a specified given design
- ◆ Import and manipulate appropriate media elements
- ◆ Set object properties
- ◆ Set window properties
- ◆ Create motion and apply motion to objects
- ◆ Use transition effects
- ◆ Incorporate graphic primitives such as lines, boxes and circles
- ◆ Create menus appropriate to the application
- ◆ Incorporate keyboard and mouse events
- ◆ Use variables, expressions and parameters
- ◆ Use control structures for sequence, selection and iteration
- ◆ Error trap and display error messages
- ◆ Validate user input
- ◆ Format data for output
- ◆ Manipulate data files
- ◆ Utilise data types
- ◆ Prepare an application for distribution
- ◆ Optimise files for best performance
- ◆ Publish an application to a suitable medium and consider cross platform compatibility
- Produce a user guide for your multimedia application

There is one Unit assessment which will take the form of a substantial non-trivial interactive multimedia application in which you will be required to produce, implement and publish a multimedia application for distribution on an appropriate medium. You must prepare the multimedia application by creating an executable file, which can run independently of the software used in its creation. The executable file and the relevant media elements should be used to create an installable program and stored on a suitable medium, e.g. CD or DVD or Web, etc. The evidence required for this Unit is the multimedia application submitted on the chosen medium and a completed assessors' checklist, both of which demonstrate that you have met the evidence requirements of the Unit

The assessment will be carried out over an extended period (probably over a number of weeks) in supervised conditions.

On completion of the Unit you should be able to create a multimedia application, which uses text, images, graphics, audio, video, animation and demonstrates the use of advanced authoring features.

Higher National Group Award Graded Unit Specification

General Information for Centres

This Group Award Graded Unit has been validated as part of the HNC Multimedia Computing: Web Development: Graded Unit 1. Centres are required to develop the assessment instrument in accordance with this validated specification. Centres wishing to use another type of Group Award Graded Unit or assessment instrument are required to submit proposals detailing the justification for change for validation.

Group Award Graded Unit Title: Multimedia Computing: Web Development: Graded Unit 1

Group Award Graded Unit Code: DF6E 34

Type of Group Award Graded Unit: Project

Assessment Instrument: Practical Assignment

Credit value: 1 HN Credit at SCQF level 7: (8 SCQF credit points at SCQF level 7)

*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.

Purpose: This Group Award Graded Unit is designed to provide evidence that the candidate has achieved the following principal aims of the HNC Multimedia Computing: Web Development award:

- ◆ To development the candidate's knowledge and skills in planning, analysing, implementing, testing and evaluating
- ◆ To develop study and research skills
- ◆ To prepare candidates for employment in a Multimedia or Web-related post as a junior Multimedia developer or Web developer
- ◆ To develop a range of contemporary vocational skills, ie technical and team working skills relating to the use and support of Multimedia and Web systems appropriate to employment at elementary development levels.

Recommended Prior Knowledge and Skills: It is recommended that the candidate should have completed or be in the process of completing the following Units relating to the above specific aims prior to undertaking this Group Award Graded Unit:

- ◆ DF63 34: Multimedia Computing: Interface Design and Authoring
- ◆ DF69 34: Multimedia Computing: Screen Based Graphics
- ◆ DF60 35: Internet: Web Development

Since this contains the core skills of Problem Solving* and Working with Others*, the candidate should also have some underpinning knowledge of the skills associated with Problem Solving and the processes involved in working as a team member in order for her/him to demonstrate these skills and function effectively at Higher level.

*Audited but subject to confirmation.

General Information for Centres (cont)

Core Skills: The Core Skills of Problem Solving and Working with Others are embedded in this Graded Unit specification. There may also be opportunities to enhance other core skills (such as Numeracy or Communication) but there is no automatic certification of these core skills or core skills components.

Assessment: This Group Award Graded Unit will be assessed by the use of a Practical Assignment. Since the core skills of Working with Others and Problem Solving are embedded in this Unit, it is strongly recommended that you follow the assessment guidelines given. If you wish to use a different assessment model you should seek prior moderation of the assessment instrument(s) you intend to use to ensure that the core skills are still covered. Please note, candidates must achieve all of the minimum evidence specified for each Project Stage in order to pass the Unit and achieve the core skills.

The “fleshed-out” Practical Assignment should provide the candidate with the opportunity to produce evidence that demonstrates she/he has met the aims of the Group Award that this Group Award Graded Unit covers.

An exemplar instrument of assessment and marking guidelines have been produced to provide examples of the kind of evidence required to demonstrate achievement of the aims of the group award covered by this Graded Unit and to indicate the national standard of achievement required at SCQF level 7.

Administrative Information

Graded Unit Code: DF6E 34

Graded Unit Title: Multimedia Computing: Web Development: Graded Unit 1

Date of publication: March 2004

Source: SQA

Special Needs: This Group Award Graded Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative assessment arrangements. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (December 2001, AA0645/3).

© Scottish Qualifications Authority 2004

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Group Award Graded Unit specification if sourced by the Scottish Qualifications Authority can be purchased from the Scottish Qualifications Authority. The cost for each specification is £2.50 plus a handling charge of £1.95 per order.

Higher National Group Award Graded Unit Specification: Instructions for designing the assessment task and assessing candidates

Group Award Graded Unit Title: Multimedia Computing: Web
Development: Graded Unit 1

Conditions of Assessment

The candidate should be given a date for completion of the Practical Assignment. However, the instructions for the assessment task should be distributed to allow the candidate sufficient time to assimilate the details and carry out the assessment task. During the time between the distribution of the assessment task instructions and the completion date, assessors may answer questions, provide clarification, guidance and reasonable assistance. The assessment task should be marked as soon as possible after the completion date. The final grading given should reflect the quality of the candidate's evidence at the time of the completion date. Reassessment of this Group Award Graded Unit should be based on a significantly different assessment task.

At this level, although candidates are working collaboratively in a group, they should work independently, ie without undue assistance from the assessor. It is up to Centres to take reasonable steps to ensure that the project is the work of the candidate and that each candidate has contributed equally and fairly to the work of the group. For example, Centres may wish to informally question candidates at various stages on their knowledge and understanding of the project on which they have embarked. Centres should ensure that where research etc, is carried out in other establishments or under the supervision of others that the candidate does not receive undue assistance.

Instructions for designing the assessment task

The assessment task is a project which requires the candidate, working in a team of 3-4 people, to produce an original piece of software. The project undertaken by the candidate must be a complex task which involves:

- ◆ variables which are complex or unfamiliar
- ◆ relationships which need to be clarified
- ◆ a context which may be familiar or unfamiliar to the candidate

The assessment task must require the candidate to:

- ◆ analyse the task, identify issues raised and decide on a course of action for undertaking the project
- ◆ identify resources and interpret relevant information from a range of sources
- ◆ plan and organise work and carry it through to completion
- ◆ demonstrate the skills necessary to design applications in accordance with a recognised and appropriate methodology and produce an appropriate test strategy
- ◆ reflect on what has been done, analysing and comparing possible alternative solutions where appropriate and draw conclusions for the future
- ◆ demonstrate the skills of working in a group to design, implement and test a computerised solution to a problem
- ◆ produce evidence of meeting the aims which this Group Award Graded Unit has been designed to cover

Higher National Group Award Graded Unit Specification: Instructions for designing the assessment task and assessing candidates (cont)

The candidate will also be required to:

- ◆ analyse the activity by identifying the tasks, roles and goals involved
- ◆ take account of the size and expertise of the team members
- ◆ negotiate her/his own role and responsibilities with other members of the team, taking into account her/his own strengths and weaknesses as well as those of the other team members
- ◆ work co-operatively with the other members of the team
- ◆ evaluate own and others' contribution to the work of the team

Guidance on grading candidates

Candidates who meet the minimum Evidence Requirements will have their achievement graded as C – competent, or A – highly competent or B somewhere between A and C. The grade related criteria to be used to judge candidate performance for this Graded Unit is specified in the following table.

Grade A	Grade C
<p>Is a seamless, coherent piece of work which:</p> <ul style="list-style-type: none"> • Has sufficient evidence for the three essential component phases of the project, is produced to a high standard and is quite clearly inter-related • Demonstrates an accurate, innovative and insightful interpretation of the project brief • Is highly focussed and relevant to the tasks and specifications contained in the project brief • Is clear, well structured and technically appropriate to the project brief • Uses appropriate language and is of a high standard in terms of level, accuracy and specialist technical content • Effectively and efficiently consolidates and integrates the required skills and knowledge 	<p>Is a co-ordinated piece of work which:</p> <ul style="list-style-type: none"> • Has sufficient evidence for the three essential component phases of the project and is produced to an adequate standard • Demonstrates an acceptable and relevant interpretation of the project brief • Is focussed and relevant to the tasks identified within the project brief • Has a satisfactory structure • Uses language considered adequate in terms of level, accuracy and technical content • consolidates and integrates the required skills and knowledge but may lack some continuity and consistency

Higher National Group Award Graded Unit specification: Instructions for designing the assessment task and assessing candidates (cont)

Evidence Requirements

The project consists of three stages: planning; developing; and evaluating. The following table specifies the minimum evidence required to pass each stage.

Note: The candidate must achieve **all of the minimum evidence** specified below for each stage of the project in order to pass the Group Award Graded Unit.

Project Stage	Minimum Evidence Requirements
Stage 1 — Planning	<ol style="list-style-type: none"> 1. A clear and accurate analysis of the project which identifies the factors influencing the project, and especially how these inter-relate 2. A developmental approach to deal with the project. Candidates may <ol style="list-style-type: none"> a. Select or adapt an accepted model for the project b. Develop or design a new approach to the project 3. A justification for the candidate's selection, adaptation or new development for their approach coached in terms of: <ol style="list-style-type: none"> a. Resources available b. Time available c. Comparisons with other possible and usable approaches 4. A project development plan allowing the project to proceed based on the analysis(es) undertaken 5. An investigation into possible alternative solution(s). Candidates are expected to critically evaluate existing solutions, if they exist 6. A project plan and schedule are required for the development work, produced using appropriate project management software and/or paper based documentation (eg Gantt charts). <p>Evidence of Problem Solving</p> <ol style="list-style-type: none"> 1. Evidence of analysing what is involved in the project, ie identification of the factors influencing the project and how they relate to one another 2. Evidence of developing an approach to deal with the project, ie the candidate may select a new approach to the project or modify an existing approach 3. Justification for selecting this approach, eg resources and time available, comparison with other possible approaches 4. Evidence of developing a plan to carry out the project based on the analysis undertaken 5. Identification of the resources required to carry out the project, eg sources of information, procedures to be followed, people, equipment and other physical resources; resources should be wide ranging and some should be unfamiliar to the candidate 6. Evidence of obtaining these resources – the candidate may need to do some searching

**Higher National Group Award Graded Unit specification:
Instructions for designing the assessment task and assessing
candidates (cont)**

Project Stage	Minimum Evidence Requirements
Stage 1 — Planning (cont)	<p>Evidence of Working with Others</p> <ol style="list-style-type: none"> 1. Identification of the possible components of the task and the selection of the essential components in negotiation with others 2. Evidence of negotiating and agreeing the nature and scope of the goal taking account of the size and expertise of the team 3. Evidence of collaboration on procedures to undertake the task 4. Evidence of negotiation and agreement on task responsibilities within the team, taking account of own and other strengths 5. Evidence of negotiation of the roles and rules for the management of the team 6. Evidence of negotiation of working methods, taking account of available resources 7. Evidence of co-operative working by: <ul style="list-style-type: none"> • anticipating the needs of others • keeping others informed of progress and difficulties, and implications of these • contributing to group decisions <p><i>The candidate must achieve all of the minimum evidence specified above in order to pass the Planning stage</i></p>

**Higher National Group Award Graded Unit specification:
Instructions for designing the assessment task and assessing
candidates (cont)**

Project Stage	Minimum Evidence Requirements
Stage 2 — Developing	<p>1. Design techniques such as:</p> <ol style="list-style-type: none"> a. Navigational maps b. Storyboards c. Structure charts d. Pseudo code e. Logical flow charts f. others <p>as appropriate, to allow for the production of design documentation for the project.</p> <p>2. Interaction between project elements should be specified.</p> <p>3. A catalogue of multimedia assets/resources used within the project should be provided.</p> <p>4. Scripts, if used, complete with internal documentation, should be included.</p> <p>5. The completed end product.</p> <p>6. A suitable and appropriate test strategy.</p> <p>7. A list of errors/defects found during testing plus their correction.</p> <p>8. Evidence that the product has been sufficiently tested, to assure reasonably low defect levels, by the provision of a formal testing document.</p> <p>Evidence of the candidate carrying out the project, meeting the requirements of the plan and managing the project. This project should be undertaken by a group and will involve the design, coding and testing of a computerised solution to a problem, based on the use of a selected programming language of a specified type.</p> <p>This evidence should comprise:</p> <ul style="list-style-type: none"> • Tested code for a significant subsection of a computer program developed in accordance with the selected language and environment. • A report documenting the underpinning processes including fulfilling the roles and responsibilities allocated. <p><i>The candidate must achieve all of the minimum evidence specified above in order to pass the Developing stage</i></p>

**Higher National Group Award Graded Unit specification:
Instructions for designing the assessment task and assessing
candidates (cont)**

Project Stage	Minimum Evidence Requirements
Stage 3 — Evaluating	<p>An evaluation of the effectiveness of the approach/strategy taken which includes all stages of the activity, ie analysis of the activity, the planning and organisation of the activity and the outcome of the activity.</p> <ol style="list-style-type: none"> 1. Evidence that effective evaluation of the approach/strategy adopted has been undertaken for all stages of the project, including: <ul style="list-style-type: none"> • Project analysis • Project organisation • Project outcome 2. The evaluation should include the following elements <ul style="list-style-type: none"> • The criteria used to base the evaluation • The identification and gathering of appropriate evidence such as: <ol style="list-style-type: none"> i. Use of qualitative or quantitative methods ii. Comparisons with other systems and/or products iii. Impact studies iv. Product testing v. Market research 3. An evaluation of the effectiveness of the problem solving activity, explaining the relevance of the evidence. This should be related to the original project analysis. 4. A list of alternative approaches considered. 5. A list of any modifications to the chosen approach during the course of the project. 6. justified relevant recommendations for the future appropriate to the project. <p>Evidence of Problem Solving: The evaluation should include:</p> <ol style="list-style-type: none"> 1. identification of the criteria on which to base the evaluation. <ul style="list-style-type: none"> • identification and gathering of appropriate evidence, eg use of qualitative/quantitative methods, comparisons with other systems/products, • impact studies, product testing or market research. 2. evaluation of the effectiveness of the problem solving activity, explaining the relevance of the evidence — the evaluation should be related to the original analysis of the project. 3. reference to any modifications to the approach during the course of the activity or to alternative approaches considered. 4. conclusions as to how the process of carrying out the project could be improved, with evidence to support the conclusions drawn. 5. recommendations for the future which are relevant to the problem and justify the recommendations.

**Higher National Group Award Graded Unit specification:
Instructions for designing the assessment task and assessing
candidates (cont)**

Project Stage	Minimum Evidence Requirements
Stage 3 — Evaluating (cont)	<p>Evidence of Working with Others</p> <ol style="list-style-type: none"> 1. Evidence of: <ul style="list-style-type: none"> • contribution to the task analysis and planning. • effectiveness of the contribution to the negotiation of goals, roles and responsibilities • evaluation of strengths and weaknesses of own contribution to the team activity. • justification of this evaluation by referring to information gathered. • conclusions about how effectively the team as a whole collaborated. 2. Suggesting a strategy for enhancing own contribution to effective team work. <p><i>The candidate must achieve all of the minimum evidence specified above in order to pass the Evaluating stage.</i></p>

Higher National Group Award Graded Unit Specification

General Information for Centres

This Group Award Graded Unit has been validated as part of the HND Multimedia Computing: Web Development award. Centres are required to develop the assessment instrument in accordance with this validated specification. Centres wishing to use another type of Group Award Graded Unit or assessment instrument are required to submit proposals detailing the justification for change for validation.

Group Award Graded Unit Title: Multimedia Computing: Web Development: Graded Unit 2

Group Award Graded Unit Code: DF6F 35

Type of Group Award Graded Unit: Project

Assessment Instrument: Practical Assignment

Credit value: 2 HN Credits at SCQF level 8: (16 SCQF credit points at SCQF level 8)

*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.

Purpose: This Group Award Graded Unit is designed to provide evidence that the candidate has achieved the following principal aims of the HND Multimedia Computing: Web Development award:

- ◆ To prepare candidates for employment as a Multimedia Computing/Web-related post at technician or professional level in an applications development role
- ◆ To develop a range of specialist technical applications development skills and knowledge in developing applications using coding and proprietary packages
- ◆ To prepare candidates for progression to further study in Multimedia Computing: Web Development or a related discipline.

Recommended Prior Knowledge and Skills: It is recommended that the candidate should have completed or be in the process of completing the following Units relating to the above specific aims prior to undertaking this Group Award Graded Unit:

- ◆ DF6D 35: Human Computer Interface
- ◆ DF6C 34: Software Development: Introduction
- ◆ D76J 35: Project Management

and at least one of:

- ◆ D76P 35: Software Development: Developing for the WWW
- ◆ DF6P 35: Client Side Web Scripting
- ◆ D77C 35: Systems Development: Relational Database Systems

General Information for Centres (cont)

Core Skills: There is no automatic certification of Core Skills or a Core Skill component as part of this Graded Unit. However, there may be opportunities to develop the Core Skill of Problem Solving and Working with Others.

Assessment: This Group Award Graded Unit will be assessed by the use of a Practical Assignment. The “fleshed-out” Practical Assignment should provide the candidate with the opportunity to produce evidence that demonstrates she/he has met the aims of the Group Award that this Group Award Graded Unit covers.

Administrative Information

Graded Unit Code: DF6F 35

Graded Unit Title: Multimedia Computing: Web Development: Graded Unit 2

Date of publication: March 2004

Source: SQA

Special Needs: This Group Award Graded Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative assessment arrangements. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (December 2001, AA0645/3).

© Scottish Qualifications Authority 2004

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Group Award Graded Unit specification if sourced by the Scottish Qualifications Authority can be purchased from the Scottish Qualifications Authority. The cost for each specification is £2.50 plus a handling charge of £1.95 per order.

Higher National Group Award Graded Unit Specification: Instructions for designing the assessment task and assessing candidates

Group Award Graded Unit Title: Multimedia Computing: Web
Development: Graded Unit 2

Conditions of Assessment

The candidate should be given a date for completion of the (*insert assessment instrument*). However, the instructions for the assessment task should be distributed to allow the candidate sufficient time to assimilate the details and carry out the assessment task. During the time between the distribution of the assessment task instructions and the completion date, assessors may answer questions, provide clarification, guidance and reasonable assistance. The assessment task should be marked as soon as possible after the completion date. The final grading given should reflect the quality of the candidate's evidence at the time of the completion date. Reassessment of this Group Award Graded Unit should be based on a significantly different assessment task.

At this level, candidates should work independently. It is up to Centres to take reasonable steps to ensure that the project is the work of the candidate. For example, Centres may wish to informally question candidates at various stages on their knowledge and understanding of the project on which they have embarked. Centres should ensure that where research etc, is carried out in other establishments or under the supervision of others that the candidate does not receive undue assistance.

Instructions for designing the assessment task

The assessment task is a project. The project undertaken by the candidate must be a complex task which involves:

- ◆ variables which are complex or unfamiliar
- ◆ relationships which need to be clarified
- ◆ a context which may be familiar or unfamiliar to the candidate

The assessment task must require the candidate to:

- ◆ analyse the task and decide on a course of action for undertaking the project
- ◆ plan and organise work and carry it through to completion
- ◆ reflect on what has been done and draw conclusions for the future
- ◆ produce evidence of meeting the aims which this Group Award Graded Unit has been designed to cover

The candidate will be required to demonstrate knowledge and/or skills in designing Web applications using acceptable methods and tools.

Higher National Group Award Graded Unit specification: Instructions for designing the assessment task and assessing candidates (cont)

Guidance on grading candidates

Candidates who meet the minimum Evidence Requirements will have their achievement graded as C – competent, or A – highly competent or B somewhere between A and C. The grade related criteria to be used to judge candidate performance for this Graded Unit is specified in the following table.

Grade A	Grade C
<p>Is a seamless, coherent piece of work which:</p> <ul style="list-style-type: none"> • Has sufficient evidence for the three essential components of the project, is produced to a high standard and demonstrates clear interrelation of the components • Demonstrates an accurate, innovative, insightful interpretation of the project, establishing organisational and individual factors influencing project development • Is highly focussed, relevant to project brief tasks and specifications and clearly addresses client requirements • Is clear, well structured, technically appropriate to the project brief and demonstrates appropriate software development and utilisation skills • Uses appropriate language, is of a high standard in terms of level, accuracy, specialist technical content and demonstrates problem solving, synthesis and solution evaluation • Effectively and efficiently consolidates and integrates required skills and knowledge 	<p>Is a co-ordinated piece of work which:</p> <ul style="list-style-type: none"> • Has sufficient evidence for the three essential components of the project and is produced to an adequate standard • Demonstrates a relevant and acceptable interpretation of the project brief • Is focussed and demonstrates relevance to the project brief tasks • Has a satisfactory and acceptable structure • The language used is adequate in terms of level, technical content and accuracy • Demonstrates consolidation and integration of the required skills and knowledge but lacks continuity, consistency and depth of vision

Higher National Group Award Graded Unit specification: Instructions for designing the assessment task and assessing candidates (cont)

Evidence Requirements

The project consists of three stages: planning; developing; and evaluating. The following table specifies the minimum evidence required to pass each stage.

Note: The candidate must achieve **all of the minimum evidence** specified below for each stage of the project in order to pass the Group Award Graded Unit.

Project Stage	Minimum Evidence Requirements
Stage 1 — Planning	<p>Evidence of analysing what is involved in the project i.e. identification of the factors influencing the project and how they relate to one another, organisational, individual or other factors influencing or informing project development</p> <p>Evidence of developing an approach to deal with the project, i.e. the candidate may select a new approach to the project or modify an existing approach</p> <p>Justification for selecting this approach, e.g. resources and time available, comparison with other possible approaches, software development and/or utilisation, how client requirements are addressed</p> <p>Evidence of developing a plan to carry out the project based on the analysis undertaken which demonstrates an awareness of in-project planning and scheduling</p> <p>Identification of the resources required in carrying out the project, e.g. sources of information, procedures to be followed, people, equipment and other physical resources. Resources should be wide ranging and some should be unfamiliar to the candidate. These resources should include some or all of course notes, recommended textbooks, interviews, performance observation, record(s) of developmental activities undertaken, questionnaires and existing organisational records.</p> <p>Evidence of obtaining these resources – the candidate may need to do some searching</p> <p><i>The candidate must achieve all of the minimum evidence specified above in order to pass the Planning stage.</i></p>

**Higher National Group Award Graded Unit specification:
Instructions for designing the assessment task and assessing
candidates (cont)**

Project Stage	Minimum Evidence Requirements
Stage 2 — Developing	<p>Evidence of the candidate carrying out the project, meeting the requirements of the plan and managing the project. This project will involve the designing, implementing and testing of a computerised solution to a problem, based on the use of a selected coding environment, or the use of proprietary software appropriate to the designed solution.</p> <p>Evidence arising from this project should include:</p> <ul style="list-style-type: none"> • A project plan and a schedule for project development work produced using acceptable project management tools • Implementation evidence along with a report of around 10 pages documenting the underpinning processes and containing details of: <ul style="list-style-type: none"> • System requirements • System design • HCI design and implementation • Implementation documentation including prints of scripts and/or programs and /or database design documentation • System testing • Usability evaluation • Addressing of client requirements where appropriate <p><i>The candidate must achieve all of the minimum evidence specified above in order to pass the Developing stage</i></p>
Stage 3 — Evaluating	<p>An evaluation of the effectiveness of the approach/strategy taken, which includes all stages of the activity, i.e. analysis of the activity, the planning and organisation of the activity and the outcome of the activity.</p> <p>The evaluation should include:</p> <ul style="list-style-type: none"> • Identification of the criteria on which to base the evaluation • Identification and gathering of appropriate evidence, e.g. use of qualitative/quantitative methods, comparisons with other systems/products, impact studies, product testing or market research • Evaluation of the effectiveness of the problem solving activity, explaining the relevance of the evidence — the evaluation should be related to the original analysis of the project • Reference to any modifications to the approach during the course of the activity or to alternative approaches considered • Conclusions as to how the process of carrying out the project could be improved, with evidence to support the conclusions drawn • Recommendations for the future which are relevant to the problem and justify the recommendations <p><i>The candidate must achieve all of the minimum evidence specified above in order to pass the Evaluating stage.</i></p>

Higher National Group Award Graded Unit Specification

General Information for Centres

This Group Award Graded Unit has been validated as part of the HND Multimedia Computing: Graded Unit 2. Centres are required to develop the assessment instrument in accordance with this validated specification. Centres wishing to use another type of Group Award Graded Unit or assessment instrument are required to submit proposals detailing the justification for change for validation.

Group Award Graded Unit Title: Multimedia Computing: Graded Unit 2

Group Award Graded Unit Code: DF6G 35

Type of Group Award Graded Unit: Project

Assessment Instrument: Practical Assignment

Credit value: 2 HN Credits at SCQF level 8: (16 SCQF credit points at SCQF level 8)

*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.

Purpose: This Group Award Graded Unit is designed to provide evidence that the candidate has achieved the following principal aims of the HND Multimedia Computing:award:

- ◆ To prepare candidates for employment as a multimedia computing or related post at technician or professional level in an applications development role
- ◆ To develop a range of specialist technical applications development skills and knowledge in developing applications using coding and proprietary packages
- ◆ To prepare candidates for progression to further study in Multimedia Computing or a related discipline

Recommended Prior Knowledge and Skills: It is recommended that the candidate should have completed or be in the process of completing the following Units relating to the above specific aims prior to undertaking this Group Award Graded Unit:

- ◆ DF6D 35: Human Computer Interface
- ◆ DF6C 34: Software Development: Introduction
- ◆ D76J 35: Project Management

and at least one of:

- ◆ DF6N 35: Multimedia Computing: Advanced Authoring
- ◆ D77C 35: Systems Development: Relational Database Systems

General Information for Centres (cont)

Core Skills: There is no automatic certification of Core Skills or a Core Skill component as part of this Graded Unit. However, there may be opportunities to develop the Core Skill of Problem Solving and Working with Others.

Assessment: This Group Award Graded Unit will be assessed by the use of Practical Assignment. The “fleshed-out” Practical Assignment should provide the candidate with the opportunity to produce evidence that demonstrates she/he has met the aims of the Group Award that this Group Award Graded Unit covers.

Administrative Information

Graded Unit Code:	DF6G 35
Graded Unit Title:	Multimedia Computing: Graded Unit 2
Date of publication:	March 2004
Source:	SQA

Special Needs: This Group Award Graded Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering special alternative assessment arrangements. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (December 2001, AA0645/3).

© Scottish Qualifications Authority 2004

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Additional copies of this Group Award Graded Unit specification if sourced by the Scottish Qualifications Authority can be purchased from the Scottish Qualifications Authority. The cost for each specification is £2.50 plus a handling charge of £1.95 per order.

Higher National Group Award Graded Unit Specification: Instructions for designing the assessment task and assessing candidates

Group Award Graded Unit Title: Multimedia Computing: Graded Unit 2

Conditions of Assessment

The candidate should be given a date for completion of the (*insert assessment instrument*). However, the instructions for the assessment task should be distributed to allow the candidate sufficient time to assimilate the details and carry out the assessment task. During the time between the distribution of the assessment task instructions and the completion date, assessors may answer questions, provide clarification, guidance and reasonable assistance. The assessment task should be marked as soon as possible after the completion date. The final grading given should reflect the quality of the candidate's evidence at the time of the completion date. Reassessment of this Group Award Graded Unit should be based on a significantly different assessment task.

At this level, candidates should work independently. It is up to Centres to take reasonable steps to ensure that the project is the work of the candidate. For example, Centres may wish to informally question candidates at various stages on their knowledge and understanding of the project on which they have embarked. Centres should ensure that where research etc, is carried out in other establishments or under the supervision of others that the candidate does not receive undue assistance.

Instructions for designing the assessment task

The assessment task is a project. The project undertaken by the candidate must be a complex task which involves:

- ◆ variables which are complex or unfamiliar
- ◆ relationships which need to be clarified
- ◆ a context which may be familiar or unfamiliar to the candidate

The assessment task must require the candidate to:

- ◆ analyse the task and decide on a course of action for undertaking the project
- ◆ plan and organise work and carry it through to completion
- ◆ reflect on what has been done and draw conclusions for the future
- ◆ produce evidence of meeting the aims which this Group Award Graded Unit has been designed to cover

The candidate will be required to demonstrate knowledge and/or skills in designing multimedia applications using acceptable methods and tools.

Higher National Group Award Graded Unit Specification: Instructions for designing the assessment task and assessing candidates (cont)

Guidance on grading candidates

Candidates who meet the minimum Evidence Requirements will have their achievement graded as C – competent, or A – highly competent or B somewhere between A and C. The grade related criteria to be used to judge candidate performance for this Graded Unit is specified in the following table.

Grade A	Grade C
<p>Is a seamless, coherent piece of work which:</p> <ul style="list-style-type: none"> • Has sufficient evidence for the three essential components of the project, is produced to a high standard and demonstrates clear interrelation of the components • Demonstrates an accurate, innovative, insightful interpretation of the project, dealing with organisational and individual factors influencing project development • Is highly focussed, relevant to project brief tasks and specifications and clearly addresses client requirements • Is clear, well structured, technically appropriate to the project brief and demonstrates appropriate software development and utilisation skills • Uses appropriate language, is of a high standard in terms of level, accuracy, specialist technical content and demonstrates problem solving, synthesis and solution evaluation • Effectively and efficiently consolidates and integrates the required skills and knowledge 	<p>Is a co-ordinated piece of work which:</p> <ul style="list-style-type: none"> • Has sufficient evidence for the three essential component phases of the project and is produced to a adequate standard • Demonstrates a relevant and acceptable interpretation of the project brief • Is focussed and relevant to the tasks identified within the project brief • Has a satisfactory and acceptable structure • Uses language considered adequate in terms of level, accuracy and technical content • Consolidates and integrates the required skills and knowledge but may lack some continuity, consistency and depth of vision

Higher National Group Award Graded Unit Specification: Instructions for designing the assessment task and assessing candidates (cont)

Evidence Requirements

The project consists of three stages: planning; developing; and evaluating. The following table specifies the minimum evidence required to pass each stage.

Note: The candidate must achieve **all of the minimum evidence** specified below for each stage of the project in order to pass the Group Award Graded Unit.

Project Stage	Minimum Evidence Requirements
Stage 1 — Planning	<p>Evidence of analysing what is involved in the project i.e. identification of the factors influencing the project and how they relate to one another, organisational, individual or other factors influencing or informing project development</p> <p>Evidence of developing an approach to deal with the project, i.e. the candidate may select a new approach to the project or modify an existing approach</p> <p>Justification for selecting this approach, e.g. resources and time available, comparison with other possible approaches, software development and/or utilisation, how client requirements are addressed</p> <p>Evidence of developing a plan to carry out the project based on the analysis undertaken which demonstrates an awareness of in-project planning and scheduling</p> <p>Identification of the resources required in carrying out the project, e.g. sources of information, procedures to be followed, people, equipment and other physical resources. Resources should be wide ranging and some should be unfamiliar to the candidate. These resources should include some or all of course notes, recommended textbooks, interviews, performance observation, record(s) of developmental activities undertaken, questionnaires and existing organisational records</p> <p>Evidence of obtaining these resources – the candidate may need to do some searching</p> <p><i>The candidate must achieve all of the minimum evidence specified above in order to pass the Planning stage.</i></p>

**Higher National Group Award Graded Unit Specification:
Instructions for designing the assessment task and assessing
candidates (cont)**

Project Stage	Minimum Evidence Requirements
Stage 2 — Developing	<p>Evidence of the candidate carrying out the project, meeting the requirements of the plan and managing the project. This project will involve the designing, implementing and testing of a computerised solution to a problem, based on the use of a selected coding environment, or the use of proprietary software appropriate to the designed solution.</p> <p>Evidence arising from this project should include:</p> <ul style="list-style-type: none"> • A project plan and a schedule for project development work produced using acceptable project management tools • Implementation evidence along with a report of around 10 pages documenting the underpinning processes and containing details of: <ul style="list-style-type: none"> • System requirements • System design • HCI design and implementation • Implementation, including prints of scripts and/or programs and/or database design documentation • Multimedia product, presented on a suitable medium, if appropriate • System testing • Usability evaluation • Addressing of client requirements where appropriate <p><i>The candidate must achieve all of the minimum evidence specified above in order to pass the Developing stage</i></p>

**Higher National Group Award Graded Unit Specification:
Instructions for designing the assessment task and assessing
candidates (cont)**

Project Stage	Minimum Evidence Requirements
Stage 3 — Evaluating	<p>An evaluation of the effectiveness of the approach/strategy taken which includes all stages of the activity, i.e. analysis of the activity, the planning and organisation of the activity and the outcome of the activity.</p> <p>The evaluation should include:</p> <ul style="list-style-type: none"> • Identification of the criteria on which to base the evaluation • Identification and gathering of appropriate evidence, e.g. use of qualitative/quantitative methods, comparisons with other systems/products, impact studies, product testing or market research • Evaluation of the effectiveness of the problem solving activity, explaining the relevance of the evidence — the evaluation should be related to the original analysis of the project • Reference to any modifications to the approach during the course of the activity or to alternative approaches considered • Conclusions as to how the process of carrying out the project, or the product itself, could be improved, with evidence to support the conclusions drawn • Recommendations for the future which are relevant to the problem and/or the product, and a justification for these recommendations <p><i>The candidate must achieve all of the minimum evidence specified above in order to pass the Evaluating stage.</i></p>