



Higher National Unit specification

General information

Unit title: Designing and Developing an Interactive Product
(SCQF level 8)

Unit code: HF3D 35

Superclass: CB

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Version: 02

Unit purpose

The purpose of this Unit is to allow learners to further develop their knowledge and skills in a variety of key areas through the development of an interactive product. Learners will be expected to design and develop a product to a given brief and deliver a functioning product that has been fully tested and packaged for a chosen platform.

The Unit is suitable for learners who have completed their HNC in Digital Design and Web Development and will build on knowledge from a number of key areas such as interface design, user-centred development methodologies and software development practices. It will offer learners the opportunity to put many of these skills into practice within the context of a complex project.

The Unit covers a number of key areas in the development of an interactive product including analysis of requirements, producing a design specification document, project management, user-centred approaches to development, best practices in software development, testing methodologies and evaluation strategies.

On completion of the Unit learners will have gained a higher level of technical expertise using their chosen development tools and a deeper understanding of the development process for an interactive product.

Higher National Unit specification: General information (cont)

Unit title: Designing and Developing an Interactive Product
(SCQF level 8)

Outcomes

On successful completion of the Unit the learner should be able to:

- 1 Plan and design an interactive product.
- 2 Create an interactive product using appropriate development tools.
- 3 Test an interactive product.
- 4 Evaluate an interactive product.

Credit points and level

2 Higher National Unit credits at SCQF level 8: (16 SCQF credit points at SCQF level 8)

Recommended entry to the Unit

Access to this Unit is at the discretion of the centre however, it is recommended that the learner should have completed or be in the process of completing the following Units or have proof of a similar level of experience:

F1VV 34 *User Interface Design*
HF55 34 *User Interface Design*
H182 34 *Systems Development: User Centered Design*
H173 34 *Developing Software: Introduction*

Core Skills

Achievement of this Unit gives automatic certification of the following:

Complete Core Skill Problem Solving at SCQF level 6

Core Skill component None

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

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 Assessment Support Pack (ASP) for this Unit provides assessment and marking guidelines that exemplify the national standard for achievement. It is a valid, reliable and practicable assessment. Centres wishing to develop their own assessments should refer to the ASP to ensure a comparable standard. A list of existing ASPs is available to download from SQA's website (<http://www.sqa.org.uk/sqa/46233.2769.html>).

Higher National Unit specification: General information (cont)

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Equality and inclusion

This Unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website www.sqa.org.uk/assessmentarrangements.

Higher National Unit specification: Statement of standards

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

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. Learners 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

Plan and design an interactive product.

Knowledge and/or Skills

- ◆ Requirements Analysis
- ◆ Development methodology
- ◆ Project plan
- ◆ Design specification
- ◆ Testing Methods
- ◆ evaluation criteria

Outcome 2

Create an interactive product using appropriate development tools.

Knowledge and/or Skills

- ◆ Development tools and language(s)
- ◆ Develop an interactive product
- ◆ Good practices in asset management and coding
- ◆ Deploy an interactive product

Outcome 3

Test an interactive product.

Knowledge and/or Skills

- ◆ Testing strategy
- ◆ Multiple testing methods
- ◆ Test data recording
- ◆ End-user testing

Higher National Unit specification: Statement of standards (cont)

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Outcome 4

Evaluate an interactive product.

Knowledge and/or Skills

- ◆ Testing results analysis and end-user feedback
- ◆ Evaluation criteria
- ◆ Reflection on effectiveness of the project
- ◆ Recommendations for future work

Evidence Requirements for this Unit

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills across all Outcomes.

The evidence for this Unit may be written or oral or a combination of these. Evidence may be captured, stored and presented in a range of media (including audio and video) and formats (analogue and digital). Particular consideration should be given to digital formats and the use of multimedia.

Evidence is required of practical competence must encompass **all of the Knowledge and Skills statements in Outcomes 1, 2, 3 and 4.**

All Outcomes for this Unit will be assessed in one holistic assessment. The candidate will be required to plan and design, create, test and evaluate an interactive product based on a given brief. The topic can be decided by the centre or the candidate, but it should be of sufficient depth and technical complexity to make it suitable as a SCQF level 8 project.

The candidate will need to carry out the following activities in each stage:

Planning (Outcome 1)

- ◆ Conduct an analysis of a given brief and determine the requirements
- ◆ Produce a project plan using an appropriate development methodology
- ◆ Produce a design specification that is clear, concise and meets the requirements of the project
- ◆ Create a test strategy and determine appropriate testing methods.
- ◆ Define the evaluation criteria the project will be evaluated on

Higher National Unit specification: Statement of standards (cont)

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Developing (Outcome 2)

- ◆ Use appropriate development tool(s) and language(s) to create the interactive product
- ◆ During development of the interactive product the candidate must demonstrate all of the following:
 - hand coding of original scripts or use of a visual scripting environment to create custom behaviours/logic
 - appropriate use of variables and/or arrays
 - correct implementation of control structures
 - correct use of arithmetic and/or logical operators
 - suitable file/asset naming conventions
 - internal comments for code/scripts
- ◆ Prepare and deploy the solution correctly on the chosen platform

Testing (Outcome 3)

- ◆ Produce an appropriate testing strategy and detailed test plans
- ◆ Carry out and document testing of the interactive product
- ◆ Carry out end user testing using appropriate techniques and collect feedback

Evaluation (Outcome 4)

- ◆ Evaluate the end-product, including:
 - analyse testing results and end-user feedback and reflect on the information gathered
 - recommendations for and improvements that could be made to the end-product
 - justification and reasons for the recommendations
- ◆ Carry out a self-evaluation. The self-evaluation must reflect on all aspects of the process of carrying out the project and include:
 - effectiveness of the chosen approach and tools/languages used
 - analysis of effectiveness of all stages of the problem solving strategy
 - analysis of time management during the project
 - conclusions and recommendations that could be made when carrying out similar projects in the future

This assessment can be carried out on an individual or team basis. Where a team approach is used, it is expected that the amount of candidate evidence produced is equivalent to the amount of evidence produced per candidate for an individual project. Candidates would have to evidence that they have actively participated in group decisions.

The type of interactive product chosen should easily allow for each team member to evidence their quality of knowledge and skills for all the Evidence Requirements and ultimately produce a relevant and meaningful product.

Evidence covering all Outcomes can be produced over an extended period of time under open-book conditions. Assessors must ensure the authenticity of candidates' work especially where evidence has been produced unsupervised.

The Guidelines on Approaches to Assessment (see the Support Notes section of this specification) provides specific examples of instruments of assessment.



Higher National Unit Support Notes

Unit title: Designing and Developing an Interactive Product
(SCQF level 8)

Unit Support Notes are offered as guidance and 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

The purpose of this Unit is to give learners an opportunity to further develop their project management, design and development skills. It is a mandatory Unit within the HND Digital Development Group Award and can also be taught standalone. It is designed to build upon a number of mandatory Units from HNC Digital Design and Web Development including *xxxx xx User Interface Design*, *H182 34 Systems Development: User Centered Design* and *H173 34 Developing Software: Introduction*.

This Unit can be integrated with the *xxxx xx Developing Digital Media for an Interactive Product* Unit and *xxxx xx Human Computer Interface*, both core Units on the HND Digital Design and Development Group Award. Integration with the *Developing Digital Media for an Interactive Product* will give learners the opportunity to examine the technical and legal implications of developing media assets for an interactive product and allow them to develop interface elements and digital content. Integration with *xxxx xx Human Computer Interface* allows scope for analysis, design and evaluation of the interactive product. This approach will result in a more complete and realistic approach to creating the product.

The Unit has been written in a generic sense in order that centres can ask learners to create an interactive product from the wide range of products available. Examples of possible development projects include:

- ◆ An interactive multimedia application
- ◆ Website
- ◆ Mobile app
- ◆ A computer game
- ◆ Interactive TV application/product
- ◆ Virtual reality product

It is expected that the quality work produced should be at a higher level from the work produced at SCQF level 7 and should at the very least demonstrate the technical skills covered in Outcome 2. The emphasis should not be on the size of the product, more so the quality and level of complexity.

Higher National Unit Support Notes (cont)

Unit title: Designing and Developing an Interactive Product

Outcome 1

Learners should be aware of the different processes and techniques involved with conducting an analysis exercise for a given brief and be familiar with the production of a set of requirements for a project. Emphasis should be placed on the importance of a well-defined set of requirements, the distinction between functional and non-functional requirements and how these will guide and shape the entire project. It may be worth examining problems arising from a poorly executed analysis phase such as function creep, incorrect assumptions about the product and the end product not being fit for purpose.

It would also be advisable to cover a variety of development methods (eg Rapid Application Development (RAD), iterative, prototyping, waterfall models) and discuss the types of projects they are suited for, advantages and disadvantages of each. The use and benefits of prototyping and iterative lifecycles should also be discussed with the learners as these provide valuable methods of gathering user feedback early within the development lifecycle. This will enable learners to make a justified decision for the method they decide to use in the assessment.

Emphasis should be placed on the importance of creating clear design specifications so that other members of the team and clients can comprehend them. They should be exposed to suitable design tools such as navigation maps, storyboards, wireframes, colour swatches. The approach taken to the design specification should be appropriate to the type of interactive product being developed, for example for a web application it would be appropriate to use wireframes, navigation charts and colour swatches whereas if the learner were designing a game they could use a game design document (GDD).

Learners should also be made aware of the importance of defining a clear test strategy and consider which other testing methodologies are relevant to the type of interactive product they are creating (for example web applications would require cross browser testing whereas mobile apps would benefit from testing across various devices). Also the importance of establishing a clear evaluation criteria should be emphasised at the design stage as these can be used help to measure the success of the project.

Outcome 2

The exact development tools and/or languages used will be dependent on the type of project being created, however it is recommended that learners evaluate a number of possible options before deciding on a specific technology to work with and assess the suitability of each for the project. It is expected that learners will focus on a specific development environment/programming language to create their interactive product (most likely with the guidance of the deliverer of the Unit) and further develop their own technical skills in the creation of interactive products.

As this Unit is designed to build upon and reinforce earlier underpinning knowledge it is preferable that learners are exposed to appropriate technologies and approaches as part of their HNC Digital Design and Web Development. Where this is not possible or the Unit is being taken as a standalone centres are advised to ensure learners have sufficient prior knowledge to be able to complete the Unit.

Higher National Unit Support Notes (cont)

Unit title: Designing and Developing an Interactive Product

When developing their projects the importance of clearly structured projects, properly named assets and well written code should be emphasised to the students. It is worth emphasising the importance of naming conventions, code formatting and the use of comments in this respect and why these are important to software developers.

Outcome 3

Learners should be made familiar with a variety of testing methodologies and how these relate to the type of interactive product they have chosen to create. In Outcome 3 they would be expected to produce a test plan which covers the chosen testing methodologies discussed in Outcome 1. The importance of creating a clear and detailed test plan should be discussed as a means of capturing test data.

A variety of end-user testing approaches could be discussed from user observations, focus groups or questionnaires. Learners should be made aware of the advantages and disadvantages of the different techniques and the importance of end-user when creating the tools for gathering end-user data. This ensures learners will be able to make informed choices when deciding upon the methods used for gathering end-user data.

It may be appropriate to discuss in detail the difference between testing and evaluation. Testing is seen as a data gathering exercise which then allows the developer to properly reflect on the project and evaluate the interactive product they have produced.

Outcome 4

It is useful to discuss the relevance of the evaluation stage in relation to the overall project with the learners and how a well conducted evaluation can help shape future projects or further iterations of the current project. It is also useful to discuss how evaluation and reflection can be a continuous process throughout the project lifecycle and doesn't have to be seen as something which only takes place at the very end of a project.

The importance of gathering sufficiently detailed data should be also be emphasised to the learners as this will impact on their ability to undertake a detailed evaluation of their project. Learners will be expected to examine and summarise the feedback received from testing and evaluation, and draw conclusions from this. Most important is the feedback from the end users as this gives a different perspective on the effectiveness of the interactive product.

Learners will also be expected to reflect on their own performance throughout the Unit in the form of a self-evaluation. The importance of this exercise should be emphasised and any recommendations based on this process of self-evaluation should be clearly documented.

Higher National Unit Support Notes (cont)

Unit title: Designing and Developing an Interactive Product

Guidance on approaches to delivery of this Unit

One approach to consider is the examination of other interactive products related to those that the learners are to develop. A basic examination of the type of interactivity each product uses should be conducted and a discussion on how these could be used to create new products should help generate ideas. It is recommended that learners be provided with the project brief at a very early stage so they can begin forming their own ideas about the type of interactive application they wish to create. It is recommended that the person delivering the Unit works with the students on the initial ideas stage and helps to manage the expectations of what is realistically achievable.

When discussing development methodologies and project plans it can be useful to emphasise how these can be used to help learners manage their own time and workload and identify possible issues relating to time management before they arise.

A process of peer review is also useful at this early stage and learners should be encouraged to present their initial ideas to their peers to gain feedback. This process can hopefully help to identify early problems in the basic concepts or design of their app. It can also be a good way of helping learners more clearly formulate their ideas and often provokes constructive discussion which can lead to further refinements of the original concept.

As the Unit requires the development of a learners technical abilities this aspect should also be covered from a very early stage. Often learners will not know what is and isn't possible until they have a grounding in the chosen development tools/programming language. As such it may take a number of iterations before the students arrive at a final design for their interactive product. It can also be a useful exercise to assess what tools and technologies are available for the project as this will give learners an overview of the current trends in the development of an interactive product (for example if learners are developing a computer game you may wish to look at what Game Engines are available and the strengths and weaknesses of each).

Although not essential a development diary or blog maintained throughout the Unit would be useful here to provoke discussion. Learners should be encouraged to focus on positive aspects of the experience as well as issues they may have faced. This is a useful exercise which can contribute to the evaluation of their project and provides a useful way to review a learner's progress through the Unit.

The Unit covers multiple national occupational standards from the *Interactive Media and Computer Games National Occupational Standards* published by Creative Skillset and the *IT Professional Standards* published by Tech Partnership.

At the time of writing these can be found at the following URLs:

Interactive Media and Computer Games National Occupational Standards -
http://standards.creativeskillset.org/assets/0000/0876/Full_Suite_IMCG_Approved_Feb_2013.pdf

IT Professional Standards -
<https://www.thetechpartnership.com/standards-and-quality/it-professional-standards/>

Higher National Unit Support Notes (cont)

Unit title: Designing and Developing an Interactive Product

Guidance on approaches to assessment of this Unit

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to candidates.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

The Unit has been designed so that a single large project will meet all of the expected learning Outcomes. Candidates are expected to produce an end product as well as supporting documentation and it is advised that candidates are encouraged to create supporting documentation to a standard that they would be happy to present to a real world client.

Candidates should be provided with a brief which they can then analyse to produce a set of goals and objectives, functional and non-functional requirements. Ideally candidates will have prior knowledge of this process from H182 34 *Systems Development: User Centred Design* and will build upon this to conduct a full analysis of the project. It is recommended that specific technical requirements are included within the original brief which would require a certain level of technical ability to implement (for example a system to track a user's progress through an app could be a requirement which would require the user to create and retrieve a user profile). It may also be useful for the person delivering the Unit to role play the client and respond to questions arising from the brief.

Once candidates have conducted a full analysis of the brief they would be expected to produce a project plan. Although it is not a requirement to produce a Gantt chart this may be advisable. At the very least candidates should produce a clearly documented breakdown of each stage of the project showing timescales, milestones and deliverables.

Many development environments use visual scripting tools — use of these is acceptable where sufficiently complex programs can be created to meet the Evidence Requirements stated above.

It is expected that when creating their projects candidates include comments within their code to explain the workings of their program. Where this is not possible (for example if a visual scripting environment does not allow this) a separate technical document should be provided to cover this. Candidates should also be encouraged to follow proper naming conventions for variables, objects and media assets within their projects and have a proper file/project structure in place where this is applicable. Once a project has been completed the end product should be properly packaged and deployed to a chosen platform ready for testing.

Where a team approach is used, it is recommended that it consists of three to four members. Team decisions could be made for certain stages in the project, eg analysis, aspects of the design, testing methods. Candidates could be encouraged to implement Knowledge and Skills gained from H178 34 *Team Working in Computing*. Team collaboration can be used to help solve any scripting/coding problems; however, candidates must only apply these if they understand the code. This could be evidenced in their comments.

Higher National Unit Support Notes (cont)

Unit title: Designing and Developing an Interactive Product

The decision as to whether the interactive product lends itself to a team project is at the discretion of the Centre. The type of interactive product chosen should easily allow for each team member to evidence their quality of knowledge and skills for all the Evidence Requirements, and ultimately produce a relevant and meaningful product.

Opportunities for e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at www.sqa.org.uk/e-assessment.

Opportunities for developing Core and other essential skills

The Unit provides opportunities to develop some of the following Core Skills:

- ◆ *Information and Communication Technology (ICT)* (SCQF level 6)
- ◆ *Problem Solving* (SCQF level 6)
- ◆ *Working with Others* (SCQF level 6)
- ◆ *Numeracy* (SCQF level 5)

Several of the Core Skill components in *Information and Communication Technology (ICT)* may be addressed in this Unit. Learners will be expected to make use of software authoring environments and programming languages. They would also likely make use of a variety of software products during the planning stage to create design specifications, story boards, and navigation diagrams as well as to conduct research.

Several of the Core Skill components in *Problem Solving* may be addressed in this Unit. During the planning stages Learners are required to develop a plan, identify resources and ensure they have access to the resources they need. During the evaluation stage they will be asked to evaluate the effectiveness of the strategies they used, identify and gather appropriate evidence, draw conclusions and make recommendations based on self-evaluation and external feedback.

Several of the Core Skill components in *Working with Others* may be addressed in this Unit if a centre decides to use group projects as a means of assessment. Working on a larger project learners could be realistically expected to analyse their own and others roles within the project, organise themselves to effectively contribute to the team, exchange information with others in their team, work cooperatively and use interpersonal skills. Although reviewing co-operative contribution is not a requirement for the Unit it could be easily built in to the evaluative aspect of Outcome 4 where learners are asked to evaluate their own effectiveness when working on the project.

Higher National Unit Support Notes (cont)

Unit title: Designing and Developing an Interactive Product

Several of the Core Skill components in *Numeracy* may be addressed in the Unit. Learners will be expected to use numerical skills to solve real-life problems involving measurement when perform calculations for responsive design and breakpoints involving percentages and interface layout using ratios. Learners will also be expected to interpret graphical data and situations involving probability to solve real-life problems involving measurement, for example, creation of surveys for gathering evaluative data which could be presented graphically, then analysed and summarised.

This Unit has the Core Skill of Problem Solving embedded in it, so when learners achieve this Unit their Core Skills profile will be updated to show that they have achieved Problem Solving at SCQF level 6.

History of changes to Unit

Version	Description of change	Date
02	Core Skill Problem Solving at SCQF level 6 embedded.	19/08/2016

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General information for learners

Unit title: Designing and Developing an Interactive Product

This section will help you decide whether this is the Unit for you by explaining what the Unit is about, what you should know or be able to do before you start, what you will need to do during the Unit and opportunities for further learning and employment.

This Unit is designed to give you the opportunity to further develop your technical and project management skills within the context of an extended project. You will be asked to create an interactive product from a given brief and deliver this product on a chosen platform. You will be expected to oversee the development of the product through all stages of the project lifecycle from analysis, design, implementation, testing and evaluation.

On completion of the Unit you should be able to:

- 1 Plan and design an interactive product.
- 2 Create an interactive product using appropriate development tools.
- 3 Test an interactive product.
- 4 Evaluate an interactive product.

The Unit builds upon a number of mandatory Units from the HNC Digital Design and Web Development course and you will be expected to draw upon knowledge of interface design, user-centred development methodologies and software development practices. You will be given the opportunity to put these skills into practice on a substantial complex project.

The assessment for the Unit will take the form of an extended project. You will be expected to create a working end product packaged and deployed to a chosen platform and supporting documentation.

On completion of the Unit you will have gained a higher level of technical expertise using your chosen development tools and a deeper understanding of the development process for an interactive product.

This Unit has the Core Skill of Problem Solving embedded in it, so when you achieve this Unit your Core Skills profile will be updated to show that you have achieved Problem Solving at SCQF level 6.