National Unit specification

General information

Unit title: Computing: Applications Development (SCQF level 6)

Unit code: H6S9 46

Superclass: CB

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Unit purpose

The purpose of this Unit is to enable learners to develop skills in applications development. Learners will learn how to design and create applications using their chosen development environment, before developing an application. In the process they will develop their programming, problem solving and computational thinking skills, as well as a knowledge and understanding of design concepts. Learners will also develop knowledge and understanding of the different methodologies and approaches for testing and evaluation as they test their application and critically evaluate the process, their application and their own performance.

The Unit is suitable for learners studying any computing subject and will be especially useful for those studying software design, game design, multimedia or web design.

This Unit is a mandatory Unit within the National Certificate in Computing with Digital Media at SCQF level 6.

Outcomes

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

1 Create a design document for the development of an application.
2 Create an application using a suitable development environment.
3 Test an application.
4 Evaluate an application, the development process and personal performance.

National Unit specification: General information (cont)

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Credit points and level

1 National Unit credit at SCQF level 6: (6 SCQF credit points at SCQF level 6).

Recommended entry to the Unit

Entry is at the discretion of the centre and learners doing this Unit do not need prior knowledge or experience of application development. However, it would be beneficial for learners to have some previous experience in applications development, which could be gained if learners had achieved any of the following Units (this is not an extensive list and other Units may also be helpful):

H6S9 11 *Computing: Applications Development*
H2P5 11 *Programming for Mobile Devices*
F917 11 *Computer Games: Development*
H223 75 *Software Design and Development*

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

There are also opportunities to develop aspects of Core Skills which are highlighted in the Support Notes of the Unit Specifications for this Course.

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)**.

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**.

National Unit specification: Statement of standards

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

Outcome 1

Create a design document for the development of an application.

Performance Criteria

(a) Propose a suitable application for development.
(b) Identify and justify the resources required, including the development environment, for developing the application.
(c) Create appropriate design instructions and diagrams.
(d) Create an action plan with key tasks and milestones identified, including timescales.

Outcome 2

Create an application using a suitable development environment.

Performance Criteria

(a) Create an application using the chosen development environment, which is based on the design document.
(b) Maintain a concise record of the development process.

Outcome 3

Test an application.

Performance Criteria

(a) Carry out testing using an appropriate test strategy.
(b) Rectify errors identified and track any changes.
(c) Demonstrate the application.

Outcome 4

Evaluate an application, the development process and personal performance.

Performance Criteria

(a) Identify strengths and areas for improvement in the design document.
(b) Identify strengths and areas for improvement in the development process.
(c) Identify strengths and areas for improvement in the application produced.
(d) Identify action points to improve the process of future applications development.
(e) Critically evaluate personal performance throughout the whole process.

National Unit specification: Statement of standards (cont)

Unit title: Computing: Applications Development (SCQF level 6)

Evidence Requirements for this Unit

Evidence is required to demonstrate that learners have achieved all Outcomes and Performance Criteria. Assessors should use their professional judgement, subject knowledge and experience, and understanding of their learners to determine the most appropriate ways to generate evidence and the conditions and contexts in which they are used.

It is envisaged that there will be a single assessment for each Outcome, as each Outcome forms a distinct stage in the process of creating an application. However, Outcomes 2 and 3 could be combined into a single assessment instrument, which would instruct them to create and test an application. This would make sense if learners were being advised to use white box testing, where they may test individual parts of the application as the development progresses.

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.

The evidence for all Outcomes should be generated under open-book conditions. Whether this need be under supervised or unsupervised conditions is at the discretion of the assessor and the centre; however evidence should be produced under controlled conditions whenever possible and where appropriate.

Each learner should submit the following for assessment:

Outcome 1

Design document, which should be realistic, clearly structured and include the following:

- Proposal giving a brief outline of the application the learner proposes to create, which must include application name, application type, application purpose (what it will do) and the target audience.
- List of resources required including physical hardware, software and electronic media. It must also include a justification of said resources. It must include the development environment selected. It should be noted that the development environment must include some form of structured programming and at a minimum should contain variables, selection based on logical conditions, loops and functions.
- Action plan detailing key tasks and milestones with realistic timescales attached to them.
- Design diagrams and written designs.

Outcome 2

- Electronic copy of the final application created
- Concise record of the development process in the creation of the application

National Unit specification: Statement of standards (cont)

Unit title: Computing: Applications Development (SCQF level 6)

Outcome 3

- Testing evidence
- Log of any errors rectified as a result of the testing stage
- Demonstration of the working application to the assessor

Outcome 4

- Evaluation report, which should include sections covering all of the five Performance Criteria from Outcome 4 including evaluations of the design stage, creation/development stage, the final application, points for improving the whole development process in the future and self-evaluation.

National Unit Support Notes

Unit title: Computing: Applications Development (SCQF level 6)

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 40 hours.

Guidance on the content and context for this Unit

This Unit is a mandatory Unit within the NC in Computing with Digital Media at SCQF level 6.

It is intended to give learners the opportunity to develop skills, knowledge and understanding in planning, design, implementation, testing and evaluation, by developing an application, from the planning/design stage, through the development (creation and testing) stage to the final evaluation stage. It is important that learners understand the importance of the planning and design stage in the application development process and how crucial it is to the Outcome. The knowledge and skills developed in this Unit may be used in H6S7 12 *Computing: Project* (SCQF level 6).

The Unit gives opportunities for development of a simple mobile app, game app, business app, web app or any other type of appropriate application. Learners are expected to learn some basic programming skills and be exposed to basic programming constructs, such as variables, selection based on logical conditions, loops and functions. As such, the development environment the learners are exposed to must be capable of the previously stated programming constructs. This does not rule out platforms such as Scratch™ or App Inventor™ which are mostly drag and drop, but still contain these basic programming constructs within their environments. TouchDevelop™ is another environment that requires little typing, but would still meet the requirements.

The type of applications learners will create and the development environment they will use are at the discretion of the centre and will vary depending on the resources available to the centre and, if delivered as part of the NC in Computing Award, it may reflect the particular emphasis individual centres have placed on the award. It is recommended that centres produce a project brief for the learners before they begin the process, stating the development environment or environments available to them and giving details of the types of applications which would be suitable for them to develop. It is up to centres as to how prescriptive the brief should be in terms of what they can create and the development environments they can make use of. It is anticipated that the majority of centres will recommend a single development environment for learners to use.

It is also important that they look at different methods of testing, whether it be white box or black box testing or something else altogether. Testing can be carried out throughout the development process or it could be left until the application has been fully created.

Evaluation is also important, as a lot of the evaluation they do will be self-evaluation since this is an individual project. Critically analysing their own performance is something learners must learn to do.

National Unit Support Notes (cont)

Unit title: Computing: Applications Development (SCQF level 6)

Success in this Unit, could lead learners to consider applying to do HNC/HND Computer Games Development or HND in Computing: Software Development.

Guidance on approaches to delivery of this Unit

Delivery

Although the learners should complete the design stage of Outcome 1 before attempting to create an application for Outcome 2, it is recommended that learners learn everything they need to know for Outcomes 1 and 2 before attempting the assessments for them. This is because they need to understand the capabilities of their chosen development environment before they can realistically plan and design the application they want to make.

For **Outcome 1** learners should learn how to plan and design an application. They should be exposed to action plans, Gantt charts and any other suitable method for planning out the development process that the assessor thinks suitable. They should look at different methods for designing the application, such as concept art, storyboards, level design, flowcharts, etc.

For **Outcome 2** learners should spend the majority of their time learning how to create applications in their chosen development environment and how to program in it making use of variables, selection based on logical conditions, loops and functions.

For **Outcome 3** learners should learn about various different methodologies and approaches to testing, that they might want to consider.

For **Outcome 4** learners need to be able to critically evaluate themselves and the process. They may require exercises to help develop skills in critical analysis before attempting this.

Below is a rough guide to how the 40 hours should be split up based on teaching, learning and assessment for each Outcome.

Outcome 1 — 10 hours
Outcome 2 — 18 hours
Outcome 3 — 6 hours
Outcome 4 — 6 hours

Centres will need to consider resource/facility/staff issues when timetabling this Unit and this may require well-defined briefs that provide the learner with realistic opportunities for success.

National Unit Support Notes (cont)

Unit title: Computing: Applications Development (SCQF level 6)

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 learners. Assessment evidence is required at all stages and Outcomes. It must be documented and recorded electronically or in written/printed form, however it is encouraged to look at alternate approaches such as web blog, video blog, pod casts and even social media. Alternate approaches making use of modern technology is encouraged.

The amount of control will vary from context to context. For example, evidence could be generated through the use of web blog, written over an extended period of time at varying locations, which would not permit such controlled conditions. However, in every case, the conditions of assessment must be controlled to some extent. Where the amount of control is low, the amount of authentication should rise. It is not acceptable to produce evidence in lightly controlled conditions with little authentication.

Authentication may take various forms including, but not limited to, oral questioning and plagiarism checks. Some forms of evidence generation (such as video recordings) have intrinsic authentication and would require no further means of verification. Where evidence is not generated under closely controlled conditions (for example, out of class) then a statement of authenticity should be provided by the learner to verify the work as their own, and also state any necessary sources and permissions.

It is important that Outcomes are completed sequentially as each Outcome builds on the previous one, so that each stage is complete before moving onto the next. This does not mean that learners cannot go back and revise their action plan; however it is also not necessary to do so as they could deal with issues like not keeping to their original plans, in the evaluation stage.

All four Outcomes are interrelated and centres should produce a brief for the learners which cover all. The brief should outline the choices of development environments available to learners and provide a choice of the types of applications that would be suitable for them to develop, as well as guidance on the complexity required within the application. This must be set realistically, taking into account that this is a single credit, 40 hour Unit. It is up to centres as to how prescriptive the brief should be in terms of what learners can create and the development environments they can make use of. It may be that centres ask learners to produce a particular type of application which reflects the particular emphasis individual centres have placed within optional Units of the NC in Computing with Digital Media (assuming the Unit is being taken as part of Group Award).

National Unit Support Notes (cont)

Unit title: Computing: Applications Development (SCQF level 6)

Guidance on approaches to assessment of this Unit

Outcome 1

Learners should be given assessment instructions telling them what they need to do for Outcome 1. As well as this (or as part of the instructions) should be the brief telling them the type of application they are to create and the choices of development environments they can choose from. Assessors may want to give out the assessments for all four Outcomes at the beginning of the Unit, as learners really need to know everything that they have to do, so that they can successfully plan out the project. It could even be that a single assessment covering all three Outcomes is used, with different parts to it for the different Outcomes.

It is recommended that learners create and then present their proposals to the assessor, so that the assessor can approve its suitability, before moving on to the rest of the assessment. It is recommended that the proposal be in the form of a written (typed) report containing no less than 300 words or a verbal and/or visual presentation lasting at least three minutes. There is no reason why the proposal could not be an oral presentation or take the form of a video instead of a written report, with the learner talking about their idea instead of writing about it.

Design diagrams and/or written designs not need to be extensive, considering that this is a single credit Unit with limited time. A couple of diagrams of how the application would look, with annotations explaining it, would be sufficient.

Learners may want to make use of project planning software to create their action plan. To ensure that learners' plans and designs are structured and achievable, it is recommended that they successfully complete Outcome 1 before being allowed to progress to Outcome 2.

Outcome 2

This Outcome will most likely be the most time consuming and it is recommended that the assessment for it should be clear and concise in specifying exactly what the assessor expects of the learners in terms of the application they are to create. The programming constructs that the learners must use should be clearly stated and, depending on the type of application they are creating, the assessor could specify the minimum amount of pages (screens) they should have in their application. This very much depends on the approach being taken as some single page applications can be more complicated than applications with a dozen pages.

It is not expected that an application must do everything that was initially set out in the design document. However a sufficient level of complexity in the application should be demonstrated for a Unit at SCQF level 6. This judgement is at the discretion of the assessor. It is important to note that some programming (coding) must take place and, as indicated in Outcome 1, evidence of some form of structured programming is required, including evidence of variables, selection based on logical conditions, loops and functions. Ideally all of these programming constructs will be evidenced, but at a minimum, at least three are recommended.

National Unit Support Notes (cont)

Unit title: Computing: Applications Development (SCQF level 6)

The record of the development process may be a written/typed log, but alternative approaches such as a blog or audio/video recording would be acceptable and should be encouraged.

Outcome 3

Testing evidence could, for instance, take the form of a written test plan or log. It could also be an audio recording of the tests carried out or even a video. Whatever method is selected learners must record all tests and the Outcomes of those tests.

It is not expected that an application must be totally bug free, but learners should demonstrate that they have properly tested and identified errors and made an acceptable attempt to rectify these errors.

Before learners progress to the evaluation stage in Outcome 4 they should demonstrate their working application to the assessor and the assessor should approve that it meets the minimum requirements. The assessor should also view the testing evidence and approve that the application has been successfully tested before evaluation commences.

Outcome 4

The assessment for Outcome 4 should clearly state the five criteria which learners are to critically evaluate, and should match the five Performance Criteria for Outcome 4. The evaluation report should take the form of a report, which could be written or typed and submitted on paper or electronically, but it could also take the form of a video or audio blog.

It should include issues to do with time management, development environment and general approaches to the whole process. It is important that the learners compare the original design document with the application they created and identify areas where they fell short (if any exist) or indeed mention areas where they improved upon the original design. Once again this could be a written/typed report, but it could also be a video blog or any other acceptable approach agreed upon with the assessor. The evaluation may be in the form of a written (typed) report containing no less than 300 words or a verbal and/or visual presentation lasting at least three minutes.

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.

National Unit Support Notes (cont)

Unit title: Computing: Applications Development (SCQF level 6)

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

This Unit will provide opportunities for learners to develop Core Skills in *Problem Solving* and *Information and Communication Technology (ICT).*

The Unit will also provide opportunities for learners to develop skills in planning, decision making, implementation, time management, testing and evaluation. Enterprise, employability and citizenship could also be incorporated depending on the nature of the brief for the creation of the application and the level of realism, for example there may be a real client who they are producing the application for.

This Unit has the Core Skill of Problem Solving embedded in it, so when candidates 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

General information for learners

Unit title: Computing: Applications Development (SCQF level 6)

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.

The purpose of this Unit is to allow you to develop skills in applications development. You will learn how to design and create applications using your chosen development environment, before actually developing an application. In the process you will develop your programming, problem solving and computational thinking skills, as well as a knowledge and understanding of design concepts. You will learn about the different methods and approaches for testing and evaluation as you will be required to test your application and evaluate it as well as critically evaluating your own performance.

The Unit is suitable if you are studying any computing subject and will be especially useful for software design, game design, multimedia or web design. It will provide opportunities to develop skills in planning, decision making, implementation, time management, testing and evaluation.

This Unit will provide opportunities for you to develop Core Skills in *Problem Solving* and *Information and Communication Technology.*

This Unit is a mandatory Unit within the National Certificate in Computing with Digital Media at SCQF level 6, but can also be taken as a free-standing Unit.

You will be provided with a brief by your assessor which will provide guidance to the type of application you are to create, the level of complexity expected and the choices of development environment.

In Outcome 1 you will be expected to propose a suitable application for development. You will need to identify and justify the resources you require to develop the application. You will also need to create an action plan with key tasks and milestones identified with realistic timescales and create appropriate design diagrams and/or written designs for your proposed application.

In Outcome 2 you will need to create an application using your chosen development environment.

In Outcome 3 you will test your application, rectify any errors identified and then demonstrate your application.

In Outcome 4 you will be required to critically evaluate the whole process, your own performance throughout it as well as the actual application you produced.