SQA Advanced Unit specification

General information

Unit title: Web Development: Producing a Data Driven Website (SCQF level 8)

Unit code: HT0L 48

Superclass: CB

Publication date: August 2017

Source: Scottish Qualifications Authority

Version: 01

Unit purpose

This unit is designed to enable learners to develop knowledge and skills to meet a client brief to develop a prototype database driven website.

Outcomes

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

1 implement and test a prototype relational database from a client brief
2 design, implement and test a web interface with a data driven search facility

Credit points and level

1 SQA Credit at SCQF level 8: (8 SCQF credit points at SCQF level 8)

Recommended entry to the unit

It is recommended that the learner should have prior knowledge of database design. This may have been gained through successful completion of SQA Advanced Unit HP2G 47 *Database Design Fundamentals*.

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.

It is recommended that this unit be delivered in conjunction with, prior to or following, an associated unit such as *Database Design Fundamentals*. An appropriate approach to integrated delivery of the two units should be considered and this will probably take the form of a common case study or brief to be used for both units either through the analysis and design of a prototype database required by the aforementioned unit — followed by the implementation required by this unit alongside/subsequently or through completion of this unit prior to the delivery of *Database Design Fundamentals*.

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**.

SQA Advanced Unit specification: Statement of standards

Unit title: Web Development: Producing a Data Driven Website (SCQF level 8)

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

Implement and test a prototype relational database from a client brief.

Knowledge and/or Skills

- Analyse client brief
- Implement a prototype relational database from a data dictionary
- Structured Query Language (SQL)
- Test database functionality and revise as necessary

Outcome 2

Design, implement and test a web interface with a data driven search facility.

Knowledge and/or Skills

- Create a design specification
- Implement a web interface to the agreed design specification
- Establish a database connection for search purposes
- Implement basic cyber security measures
- Test the functionality of the website and revise where necessary

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.

The evidence requirements for this unit will only take one form — evidence of practical competence (practical abilities) for all the outcomes.

For **Outcome 1** candidates will need to provide evidence to demonstrate that they can correctly analyse a client brief, implement and test a relational database, including:

- producing a requirements document/specification that includes an analysis of the client brief, requirements and objectives
- creating a database structure using a data dictionary, and insert appropriate sample content to meet client/testing requirement
- utilising SQL to create and run a range of test queries
- producing a completed test plan showing evidence of problem solving and error correction

For **Outcome 2** candidates will need to provide evidence to demonstrate that they can design, implement and test a web interface with a data driven search facility, including:

- producing a design specification based on the requirements document produced for Outcome 1
- implementing a web interface to meet agreed design specification
- connecting the web interface to a server side database using an appropriate scripting language
- implementing basic cyber security measures when connecting to and searching a database
- testing logging and rectifying where necessary the web interface search and results features

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.

SQA Advanced Unit: Support Notes

Unit title: Web Development: Producing a Data Driven Website (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 40 hours.

Guidance on the content and context for this unit

This unit is intended to give learners the knowledge and skills to undertake a defined project which involves implementing a software solution to meet a given brief. It is anticipated that the unit would be delivered late in the first year or early in the second year of the programme as an introduction to developing an operational data driven prototype website. It is recommended that the database is created using a command line interface and learners hand code their solution using current and appropriate techniques and technologies such as SQL/PHP. Technologies and resources may differ and these are at the discretion of the centre. It would be appropriate however to introduce relevant current techniques and technologies

It is recommended that this unit be delivered in conjunction with, prior to or following, an associated unit such as HP2G 47 *Database Design Fundamentals.* An appropriate approach to integrated delivery of the two units should be considered and this will probably take the form of a common case study or brief to be used for both units either through the analysis and design of a prototype database required by the aforementioned unit followed by the implementation required by this unit or through completion of this unit prior to the delivery of HP2G 47 *Database Design Fundamentals.*

If delivered on a stand-alone basis, it would be advantageous if the learner were to be given a data dictionary relating to a relational database comprising no more than five tables, normalised to third normal form (3NF).

On completion of the unit, the learner should have developed and documented a software solution for the given problem. The solution need not be fully functional, but should be sufficient. The solution should be tested using a test plan and appropriate testing and remediation evidence generated.

Guidance on approaches to delivery of this unit

The purpose of this unit is to develop the learners' skills so that they can plan, design, develop and test a functional and dynamic website within the 40 hours of the unit.

In the delivery, learners should have access to propriety web development software, basic text editor for writing source code, internet access for reference, registering and uploading websites. Learners will also have access to an appropriate web server which supports the chosen technologies. For example install Apache web server stack to support PHP/SQL or secure an online web server environment which allows for the support and development of dynamic, server side websites.

During the holistic project that covers the assessment for Outcomes 1 and 2 the learner must plan, design, develop and test in the correct order.

A suggested delivery sequence to this unit would be the following:

Outcome 1 should be taught and assessed first so the learner has the underpinning knowledge required for the remainder of the unit. Outcome 1 will provide opportunities for the learner to plan, develop and test a relational database.

Outcome 2 should be delivered when the learner has shown sufficient understanding and testing of a relational database. Outcome 2 will provide opportunities for the learner to design, develop, test and remediate a web interface with a data driven search facility.

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 candidates experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

Evidence is required that candidates have achieved all outcomes.

Written and/or oral recorded, performance and product evidence is required which demonstrates that the candidate has achieved the requirements of all of the outcomes to show that the candidate has appropriate knowledge and understanding of the content of this unit.

This unit should be assessed by the assessment tasks detailed as follows:

Outcome 1 is an open-book assessment and should take the form of a practical assessment carried out under supervised conditions and is designed to demonstrate the candidate's knowledge and/or skills in implementing and testing a prototype relational database from a client brief.

Outcome 2 is an open-book assessment and should take the form of a practical assessment carried out under supervised conditions and is designed to demonstrate the candidate's knowledge and/or skills in designing, implementing and testing a web interface with a data driven search facility.

It is recommended that the assessments for Outcomes 1 and 2 be integrated into one holistic assessment based on the same client brief.

Outcomes 1 and 2 could be assessed by means of a project. The project should be given to the candidate in the form of a client brief or case study from which the candidate produces a requirements document, design documentation including navigation or site map and storyboards or wireframe subsequently producing the solution. The unit only requires a maximum of two web pages (one to search and one to display results) so production of a detailed design is not so relevant — a wireframe would be sufficient here.

The client brief should include a data dictionary setting out the database implementation requirements.

The client brief should be sufficient enough to allow the candidate to implement and test a prototype relational database and design, implement and test a web interface with a data driven search facility achieving all of the evidence requirements of Outcomes 1 and 2.

Assessment will be open-book and should be completed individually. Assessors must assure themselves of the authenticity of each candidate's submission.

Outcome 2 requires minimal web pages for production, so a detailed design specification is not relevant. It is acceptable for the candidate to produce wireframes to represent the web interface. It should be noted that the candidate is being primarily assessed on appropriate web language competencies.

This Outcome requires the use of a scripting language to connect to the database. The connection cannot be established using an IDE prebuilt option.

The developer must consider protecting the database and its data by identifying obvious security concerns in the design. Simple approaches such as relocating important files outside the document root folder to prevent the creation of a URL string, sanitisation of data, escaping of data, adding quotes around all values in SQL statements, and using the current version of the server side language.

If possible then protecting folders by reconfiguring server configuration files could be explored and implemented. Candidates and tutor should seek out further appropriate developments in basic cyber security and implement where relevant. It is not a requirement to introduce all of the cyber security techniques mentioned. Basic cyber security measures may vary depending on the environment, technologies and language used. A form field should be used to collect search criteria from users.

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

There are opportunities to develop the Core Skill of Communication at SCQF level 6 in this unit, although there is no automatic certification of Core Skills or Core Skills components.

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

Version	Description of change	Date

SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of SQA Advanced Qualifications.

For further information, please call SQA's Customer Contact Centre on 44 (0) 141 500 5030 or 0345 279 1000. Alternatively, complete our Centre Feedback Form.

SQA Advanced Unit: General information for learners

Unit title: Web Development: Producing a Data Driven Website (SCQF level 8)

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 provide experience in analysing and meeting a client brief to design and implement a functional data driven website. It should provide you with the knowledge and skills required to establish requirements, choose appropriate software and deliver a suitable solution within a given timeframe.

This unit requires you to analyse a client brief requesting the implementation of a simple data driven website. The ability to interpret information and obtain additional details if necessary is important before considering the relational database implementation process. Having created the structure of a relational database using appropriate software you will populate this database with sufficient sample data for testing purposes. You will use SQL to run a range of sample queries to test database functionality and revise as necessary.

This unit also develops and reinforces knowledge and skills in designing an appropriate web interface.

In addition you will learn how to create a search and results facility using the database that you created. You will produce a design specification comprising storyboards, wireframes etc. with planned navigation, layout, screen layout and a functional testing plan.

Next you will implement your web interface design which includes enabling a connection to the database and producing a search and results facility. You will use a web-based language to connect to a database and produce search queries. You will get the opportunity to access data from the database based on server side scripting and SQL. You would be expected to hand code all scripts. You will also need to consider protecting the database and its data by identifying obvious security concerns in the design and implement basic cyber security measures.

Finally you will use the test plan to check the entire website's features work correctly and where necessary create a log of errors and steps taken to rectify them.

There are opportunities to develop the Core Skill of *Communication* at SCQF level 6 in this unit, although there is no automatic certification of Core Skills or Core Skills components.

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.