Unit Reference Number	J/601/6617
Title	Database design
Unit Level	Level 3
Guided Learning Hours	60
Unit Credit Value	10
SSAs	6.1 ICT Practitioners

Learning Outcome (LO) The learner will:		Pass The assessment criteria are the pass requirements for this unit. The learner can:		Merit To achieve a merit the evidence must show that, in addition to the pass criteria, the learner is able to:		Distinction To achieve a distinction the evidence must show that, in addition to the pas and merit criteria, the learner is able to:	
1	Understand the features of relational databases	P1	explain the features of a relational database				
2	Be able to design, create and populate a relational database	P2	design a relational database for a specified user need	M1	justify choices made in the design of the relational database		
		P3	create and populate a database				
		P4	create features in data entry forms to ensure validity and integrity of data	M2	create a user input form to enter data records	D1	create a start-up menu/navigation for users
3	Be able to test a relational database	P5	perform queries using multiple tables and multiple criteria	M3	create complex output documentation using tables and queries		
		P6	include an advanced feature in a database design				
		P7	test a relational database	M4	carry out improvements to the relational database following user feedback	D2	evaluate the relational database including improvements made

Aim Of The Unit
This unit will provide learners with the skills required to enable them to create a relational database. Learners will design a relational database to meet a specified user's needs and then create the database from their designs. They will use and create a range of features within their database such as queries, forms, reports and a user interface/navigation menu. Finally learners will understand how to test their relational database, carry out improvements based on feedback and finally evaluate the design.

Teaching Content

LO1: Understand the features of relational databases
 	
• features
    o objects, (e.g. tables, queries, forms, reports)
    o naming conventions
    o primary and foreign keys
    o relationships, (e.g. one to one, one to many, many to many)
    o data types
    o field properties, (e.g. field name, field size, format, input mask, default value, validation rule, lists).
 	
LO2: Be able to design, create and populate a relational database
 	
• user needs
    o functional requirements
        ▪ what the user wants the system to do
    o non-functional requirements
        ▪ performance constraints
            • response time
            • availability of system
            • growth capacity
            • record retention
        ▪ development constraints
            • cost
            • time
            • resources.

- o design objectives
  - ▪ ease of use.
- design documentation
  - o entity relationship diagram
  - o data dictionary
  - o designs for objects
  - o attributes.
- choices made in the design, (e.g. table names, table structure, relationship type, formatting choices)
- create database, (e.g. tables, relationship, content)
- forms, (e.g. forms to add data into tables, a main input form with a sub-form,)
- user interface, (e.g. switchboard or startup/navigation menu,)
- form features
  - o buttons
  - o images
  - o house-style
  - o validity and integrity of data
    - ▪ input masks
    - ▪ default value
    - ▪ validation rule
    - ▪ lists.

LO3: Be able to test a relational database
- queries
  - o complex queries
    - ▪ multiple criteria
    - ▪ multiple tables
    - ▪ criteria, (e.g. >, <, >=, <=, or, not, and, between)
  - o simple queries
    - ▪ single criterion
    - ▪ single table
    - ▪ criteria, (=, actual text)
  - o naming convention for queries – must relate to the purpose of the query.
- output documentation

- o reports, (e.g. on table data, on query data, groupings, totals).
- advanced features
    - o adding images, (e.g. logo)
    - o using a house style on all objects
    - o buttons
    - o macros
    - o customising tool bars and menus.
- test plan
    - o input of data
    - o validations
    - o layout easy to follow
    - o legibility
    - o easy to use
    - o meets user requirements.
- Improvements, (e.g. improvements to layout, house style, query criteria etc).
- evaluate
    - o meets user and/or client requirements
    - o user friendly
    - o justification of features used
    - o future improvements.

Delivery Guidance

LO1: Understand the features of relational databases

Learners should be taught about what a database is; an example of a database could be used to aid learners understanding. The learners should be taught about tables, queries, forms and reports and what each of these objects do. Working in pairs learners could be provided with a list of data types and they could identify the kinds of data that would require that data type and identify appropriate field names. Learners should be taught about the different kinds of relationships between tables and how this creates primary and foreign keys and their purpose. Learners would need to be taught about the different kinds of field properties as well as the various validation tools. Learners could use the previous list of field names that they created relating to the different data types and now allocate field sizes, format as well as any validations. These would need to be checked in class to ascertain that they have understood the different aspects.

LO2: Be able to design, create and populate a relational database

Learners will need to be taught about how to create a data dictionary as part of their design documentation as well as understanding what it is and what it is used for; this could be done by the group being given a scenario and then working in small groups identifying the field names etc in order to complete a data dictionary. The learners could be provided with a template for this task. Once the learners have created their data dictionary they could then be shown how to create an Entity Relationship (ER) Diagram by drawing one out by hand. Then using this information they could be shown how to use appropriate software in order to create an ER Diagram to show the relationship of the tables (www.gliffy.com can be used to create an ER Diagram). Example designs could be shown to the learners to help them understand what is required on a design for a form and user interface.

Using some of the design documentation created, learners could be asked to identify the features used in the designs and discuss whether they feel they are correct and appropriate for the client.

Learners will need to be taught how to create a database, create tables, use validation tools, add relationships, create forms and sub-forms as well as a switchboard (for the creation of start-up menu/navigation for users). This could be done by using demonstrations and activities, for example a demonstration of how to create a database and a table could be done and then the learners would then create a database and table for themselves using a given scenario. Demonstrations and activities could be used for each of the parts that they need to be taught.

LO3: Be able to test a relational database

Learners will need to be taught how to create simple and complex queries using a range of criteria as well as using multiple tables. This could be done by demonstrating some of the criteria and then the learners undertaking some activities to ensure they attempt each of the different criteria identified in the teaching content section. It is also a good idea to encourage the learners to use appropriate filenames whilst creating their queries.

Using the tables and queries that the learners have created, they then need to be shown how to create a report (output documentation). Again this can be done by a demonstration and then the learners trying it themselves. The learners need to be able to create reports from tables as well as queries. A demonstration on how to create reports using groupings and adding totals to reports could also be given. Again reminding the learners of the relevance of filenames when creating reports.

Learners should be shown how to modify each of their forms, the user interface and reports so that they could have a house style (eg a consistent appearance to them all). A demonstration on some of the techniques would be required and then the learners could attempt to improve their forms etc by trial and error, moving on to planned modifications.

Learners need to be able to create a macro and add this to a button; this could be done by a demonstration and then the learner could try creating a macro and button themselves. They also need to be taught other advanced features e.g. creating buttons, using house styles, adding images

Learners will need to be taught the concepts of testing and how to create and complete a test plan. This can be done by providing the learners with a blank sample test plan which the learners could complete as they work through each of their practice activities. Learners should be encouraged to identify the parts of the database that they feel should be tested and how they could be tested.

Learners could be taught how to create a questionnaire that could be used to obtain feedback from clients or users to help them improve their relational database. Working in pairs they could identify suitable questions that could be included in a questionnaire and then feed their questions back to the group.

Using the example databases that the learners have created during their practice work, the learners should be encouraged to look at these as a group and evaluate them. A selection of the example databases could be shown to the group and they could discuss whether they feel they are fit for purpose, whether they are easy to use and understand, whether they felt the colour scheme and formatting was appropriate and finally what improvements they would make.

Suggested Assessment Scenarios And Task Plus Guidance On Assessing The Suggested Tasks

Assessment Criterion P1

The assessment criterion P1 could be evidenced by the use of a detailed report or presentation supported by tutor observation and/or recorded evidence. The learner should explain the features of a relational database; they must cover the full list in the teaching content section. Learners could also provide examples in the form of screen prints from their practice activities to support their explanations.

Assessment Criteria P2, M1

The assessment criterion P2 should be evidenced by the creation of the design documentation. The design documentation must follow the guidance in the teaching content under the heading of design documentation.

The merit criterion M1 could be evidenced by the use of a report or presentation supported by tutor observation and/or recorded evidence. Learners should justify each of their design choices for the relational database.

Assessment Criterion P3

For P3, learners must create and populate a database. The evidence could be linked to their design of a relational database for P2. The database created must be relational and must be purposeful. The evidence will be the actual relational database. The design should be included if the design is not a follow on from P2.

Assessment Criteria P4, M2, D1

For P4, learners must create features in data entry forms to ensure validity and integrity of data. Learners should include features as outlined in the teaching content under the heading form features. The evidence will be the electronic database with the created data entry forms.

For merit criterion M2, learners are required to create a use input form to enter data records. This could be an extension of P4. The evidence will be the electronic database containing the data entry form created by the learner.

For distinction criterion D1, the learner must create a start-up menu/navigation for users. The evidence will be the electronic database containing a working start-up menu/navigation screen for users.

Assessment Criteria P5, M3

P5 requires learners to perform queries using multiple tables and multiple criteria. Learners must perform a range (at least three) of purposeful queries following the guidelines in the teaching content under the heading queries. The evidence will be the electronic database with the queries, supported by printouts or screen shots after they have been performed.

For merit criterion M3, learners must create complex output documentation using tables and queries.   This could be an extension of P5; here learners create reports based on their results of their queries. The evidence will be printouts of the actual reports created and the electronic database showing the output documentation design.

Assessment Criterion P6

For P6, learners must include an advanced feature in a database design. This could be an extension from other assessment criteria already met e.g. creation of start-up menu/navigation. The evidence will be the electronic database with the advanced feature incorporated in the design.

Assessment Criteria P7, M4, D2

For P7, learners must test a relational database. They could provide evidence of testing the database that they have created and populated. The evidence will include the completed test plan (after testing).

For merit criterion M4, learners must carry out improvements to the relational database following user feedback. The feedback could be provided for learners or they could collect it themselves. The evidence will be a copy of the feedback they have used and the electronic database showing the improvements carried out.

For distinction criterion D2, learners are required to evaluate the relational database including improvements made. Learners should carry out an evaluation based on the teaching content under the heading evaluate. The evidence could be presented in the form of a presentation, report or audio/video discussion.

Suggested Scenarios:

- A database to be used to store information about stock received in and sold by a company.
- A database to be used by the school or college library to show the books out on loan and who has them.
- A database to be used by a local charity shop to record stock received and sold.

Resources:

You will need the following software:

- Learners will need access to office software as they will need to use at least word processing and database software.
- Learners may require access to software appropriate to create an ER Diagram, this could be done on the website provided above or they could even create it in drawing software. Some learners may prefer to hand draw these and this is also acceptable.
- Learners will also need access to the internet.

Mapping Within The Qualification To The Other Units

Unit 2: Information systems
Unit 9: Project planning with IT
Unit 25: Data analysis and design