**Cambridge ICT Starters
On Track**

Scheme of Work

4292
Databases for a Purpose
Stage 1 Module

UNIVERSITY *of* CAMBRIDGE
International Examinations

Introduction

In this module, students use the knowledge and skills developed during Next Steps module 'Exploring Databases' and apply it to designing and implementing their own database. In doing this, they will need to consider how databases are used in the real world, and consider the features of a good database. The aim is to allow students to demonstrate that they can consider what features are needed to make a useful database. This includes consideration of how the database will be used, who can enter information and who can access it. Although it is not specifically assessed in this module, students should be aware that real databases may use many other means of data entry, e.g. barcode scanners. They should be able to give examples and talk about the advantages of different methods.

What is Assessed in This Module?

Students will demonstrate how to:

- identify a purpose for a database
- design, create and develop a database for a specific purpose
- utilise different field types
- test database
- demonstrate an awareness of data security
- transfer data between applications

To Start This Module You Will Need

- database software, such as Microsoft Access, the database from AppleWorks or a commercial database such as FileMaker Pro. There are also database packages designed for use in schools, which would be suitable
- samples of questionnaires and real-life data collection forms
- simple database examples (ideally made for the software that the students will be using)
- reference materials or data for students to use in building their own databases
- a range of pen and paper or physical databases e.g. a filing cabinet, card index system, telephone book, atlas, personal address book, class contact telephone list, class list, recipe book

Underpinning Knowledge

Before commencing this module it is recommended that students:

- are able to enter data into a prepared database
- understand that databases are information stores
- have some basic search and sort skills
- can use word processor software

Complements and extends Next Steps Module 'Exploring Databases'

General Principles and Procedures

The following are further suggestions and considerations:

- some professional database software (like MS Access) will have many more features, and a more complicated user interface than the students are required to use for this module, so care should be taken to limit the functionality so that the Learning Objectives can be achieved without students becoming confused by tools and options which are not necessary. For example, it is not a requirement of this module that students can produce a database with multiple tables or be able to create queries or reports from within the database software

- it will be helpful to introduce the module by getting students to think about the different databases they have already encountered, or might do soon as adult citizens and consumers. For example, membership of a club, health records, customer surveys. All these involve the collection of data on individuals and its entry into a database. Perhaps they have wanted to buy a particular item and have searched through catalogues, either in book form or online; perhaps their family has been trying to select a holiday, or book a train journey or tickets for a concert – these activities all involve the use of databases
- students would benefit from viewing and using sample databases in this module which are meaningful to their own experiences or from other subject areas rather than using complex, business or professional databases
- students should be thinking about how to collect data efficiently and accurately and will benefit from using a data collection form - the form does not have to be created within the database software and can be created in, for example, a word processor or even by hand
- when designing their database it is important for students to try to identify all the questions they will want to answer and so identify the full range of fields before they open the database application. (For example, in most databases surname and first name are two separate fields; addresses are easier to sort for mailing lists, e.g. on a membership /customer database, if each line of the address has a separate field, and so on)

Scheme of Work

Learning Objectives	Classroom Ideas	Resources	Notes
Session Plan One			

• recognise the purpose of a database in the real world
• identify the advantages of computer databases
• understand basic data security issues
	• student research:
	• what is a database? using books and internet, search to provide definitions for database and other key terms, like record and field
	• who uses a databases and why? Students build up a wall chart to display the different organisations that use databases and the types of databases they use. Use a brainstorming technique (see Notes)
	• provide a range of pen and paper or physical databases for students to explore (see Resources) to answer questions:
	  - what are the limitations of these databases?
		• a range of pen and paper or physical databases e.g. a filing cabinet, card index system, telephone book, atlas, personal address book, class contact telephone list, class list, recipe book	• a brainstorming technique:
			  - a way of building up a list of different organisations that use databases and the types of databases they use
			• students could work in pairs for four minutes, then pairs compare their lists for three minutes and add new organisations. Paired pairs compare their lists for two minutes and then one group reads their list aloud to the class and any unmentioned organisations are added
			• use a database if...
			  - there is a large amount of information that would become unmanageable in spreadsheet form
			  - you want to maintain records for ongoing use
			  - the information is subject to many changes
			  - you want to generate reports based on the information

Learning Objectives	Classroom Ideas	Resources	Notes
Session Plan One Continued			
	• make a class list of all the identified deficiencies and beside each (or in another column) convert the deficiency into an advantage if a computer database was used instead e.g. - details change frequently – edits easily made; - cannot find file – keyword searches simple; - bulky to store – compactly stored on a computer file • student task: internet search on data security, to answer questions: - why would anyone need to password protect a database? - what prevents a company which has your personal details in its database giving your personal information to someone else? - how can information stored in databases be protected?		• students at this level need to know more about the concepts and general issues surrounding data security rather than going into the detail of any particular legislation/s. • some data security solutions: - password entry to database – different permission levels - hiding aspects of databases built into the design, preventing components from being seen - access - cannot use database if you do not have access account to the computer network - database stored in secure facility

Learning Objectives	Classroom Ideas	Resources	Notes
Session Plan Two			

• revise using a database to find information
 	
• understand the purpose of a database
 	
• transfer data to other applications
 	
• understand the structure of a database
 	
• create a data collection sheet
 	
• understand different ways of capturing data
	• student tasks: use the example database to answer the search questions
	
	• teacher demonstration: how to transfer data to other applications to produce reports and charts
	
	• student task: transfer data to create a report (in Word) or graph (in excel) on some aspect of the data
	
	• student discussion: who would be the users of this database? and what would they use it for?
	
	• student tasks:
	
	  - identify the structure of the database e.g. What a record contains, the fields, field types used and why
	
	  - create a data collection sheet
	
	• students discuss: which data collection sheets would be the most efficient to use and why?
		• example computer database e.g. club membership list which:
		
		  - contains data with a range of field types: numeric, text and options
		
		  - is large enough to revise searching and sorting
		
		• questions for the prepared database which enable the students to revise searching a database for information
			• using examples created in the database software that the students will later use will help familiarise the students with the database interface
			
			• using simple flat file or single table databases will help prevent students becoming confused by complexity
			
			• students are more likely to learn and appreciate the benefit of transferring data if they can see a purpose for it e.g. a question that can be answered better by using a graph or a need to present a report based on some data in the database
			
			• it would be beneficial to mention/show/introduce students to other methods of data collection e.g. bar code scanners, OMR, forms, questionnaires, sensors, surveys

Learning Objectives	Classroom Ideas	Resources	Notes
Session Plan Three			
• create a database • enter data • test database • transfer data to other applications • use data to create report • use data to create a chart	• allow students some time exploring the database software • students follow the given design instructions to create their own version of the database • students check the database and then the enter data • students use set search questions to test their data has been entered correctly and to produce reports or charts	• database software • prepared design and instructions for a simple database including field names and types and data to enter • search questions - some requiring students to create a chart or report	• some skills to cover when introducing students to creating a database: - creating different field types - creating and editing records - using directional keys (tab, shift tab, home, end, up, down arrows) to move around records • students could use one of the many Internet tutorials offered for different databases

Learning Objectives	Classroom Ideas	Resources	Notes
Session Plan Four			

• design a database
 	
• understand what needs to be included in a database design
 	
• create a data collection sheet
	• student tasks: use pen and paper to design a database:
	
	  - what information is going to go in the database?
	
	  - who is going to use the database?
	
	  - what will they use the database for?
	
	  - what information will a single record hold?
	
	  - what fields are required (with suggested names)?
	
	  - what field types would be best for each field?
	
	• sharing opportunity: students discuss design ideas and refine their designs accordingly (so that each student has a workable design by the end of this session)
	
	• student tasks: decide how you will capture your data in the useful/correct format and create a data collection sheet/form
		• simple idea for a database for which data would be readily available e.g.
		
		  - students own CD collection
		
		  - favourite books
		
		  - class/club membership
		
		  - historical events
			• make sure the database design will store all the data in the manner you need - it is easier to make changes to the design before creating it
			
			• encourage students to think of capturing the data so that data is in the correct format for easy entry
			
			• key database rules:
			
			  - never create a field that can be calculated from another field e.g. Data of birth and Age
			
			  - never create a field that repeats the same data for all records e.g. Country when everyone lives there.
			
			  - never enter two records exactly the same e.g. create a new field called quantity
			
			• database ideas offered should make it possible for students to utilise different field types naturally

Learning Objectives	Classroom Ideas	Resources	Notes
Session Plan Five			

• work systematically
 	
• devise a method for producing a working database
	• teacher introduces criteria for success in this module: e.g. evidence for working though the 6 phases of development:
	
	  - design
	  - create
	  - test database
	  - collect data
	  - enter data
	  - test data
	
	• class discuss for each phase the following:
	
	  - what do I need to produce/do in this phase?
	
	  - what do I need to provide to prove that I have done this stage well?
	
	• record discoveries on a class chart, listing what needs to be done in each phase
		• chart for devising a method	• drawing attention to the phases required for success in the module Learning Objectives: Design, Create, Test, Collect, Enter and Test Data should help students to focus on having distinct outcomes for each phase
			
			• students' final database creations will benefit from working systematically through each phase
			
			• creating a staged method for the whole class to adopt will encourage students to develop good routines which will help them when producing independent work

Learning Objectives	Classroom Ideas	Resources	Notes
Session Plan Six			

• use 'class method' (devised in previous session)
 	
• create a database
 	
• test the database
 	
• collect data
 	
• enter data
 	
• test data
 	
• understand the purpose of the database
	• students use the 'class method' they devised in previous session to create their database designed in session four
	
	• sharing opportunity: student's user test and evaluate other students work (or present their own to the group). Students look for ways their database could have been improved either as a result of criticisms or as a result of seeing other databases
	
	• students write a short summary about their database to include:
	
	  - who might use their database
	
	  - what they would use it for
	
	  - what they did to test that it was working correctly
	
	• students practise by following the same process to create other simple databases
		• students own database designs from session four
		
		• database software
			• establishing good practice and encouraging students to see potential in even very simple database construction will help them develop skills which can be later applied to producing more complex databases
			
			• allowing time for discussions at the end of sessions will allow students to reflect on new things learned and give them an opportunity to clarify areas of difficulty

Assessment Ideas

To show how the Assessment Idea fully incorporates the Learning Objectives tested, the Assessment Idea is cross-referenced with the Learning Objective table below.

Assessment Idea

A possible Assessment Activity might be to design and construct a membership database for a new sports club. This would allow students to use their own experience in a sports club to be able to create a database with a suitable range of different fields.

Design a database for the sports club, explaining what fields you will need, the field names and field types. (2, 3) Create a simple data collection sheet which could be used for your database. (2) Write a short explanation of what the database will be used for and who will use it. (1) Create the database and test your database. Enter at least 5 records of data. Write a short comment of how you tested your database. (4) Transfer data from your database into a Word document to create a members list and print this. (6) Answer the following question: If your database was to be used for a real club – what suggestions could you make to the club management to make sure that the data is kept safe, and secure? (5)

	Stage 1 Module – Databases for a Purpose
1	Identify a purpose for a database
2	Design, create and develop a database for a specific purpose
3	Utilise different field types
4	Test database
5	Demonstrate an awareness of data security
6	Transfer data between applications

Teachers should retain the following evidence for moderation:

- copy of assignment text
- students design and answers to questions
- printout of members list document
- printout or screen grab of database showing evidence of different field types being used