

Standards Unit

Improving teaching and learning in Information
and Communication Technology

Mia's Sandwich Shop

Contents

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Teacher and trainer guidance

Introduction

Mia's Sandwich Shop aims to introduce learners to some of the practical issues in database design. It is not a standalone activity. Many of the concepts that are introduced in this activity will need to be re-visited several times over several weeks before learners have fully grasped them. Mia's Sandwich Shop will form just one part of a scheme of work about the use and design of databases.

Teachers and trainers will need to decide how to follow up the activity. Mia's Sandwich Shop can be used as a springboard into a range of topics, including relational databases, normalisation, systems analysis, Data Flow Diagrams and data modelling. Ideas for continuation and extension activities can be found in Section 4.

Mia's Sandwich Shop uses active learning techniques, including simulation, experiential learning and group discussion. It enables learners to generalise from a concrete example. These approaches can be applied widely to the teaching of ICT theory, making theory sessions more enjoyable for both teachers and learners.

There are two PowerPoint presentations on the Teacher resources CD-ROM that are intended as a guide and can be used during the session or used for reference purposes. The presentation called 'Introducing relational databases' gives an example of a relational database for Mia's Sandwich Shop.



See the box in your pack entitled From Chaos to Database for an introduction to why we need databases.



See the interactive version of Mia's Sandwich Shop on the Interactive resources CD-ROM, where the same case study is used to introduce systems analysis.



See the Understanding Normalisation pack where data from Mia's Sandwich Shop is used for a normalisation activity.

Learning objectives

The objectives are for the learners:

- to experience the frustrations that arise from poorly designed systems
- to identify the exact nature of the data handling problems in Mia's business
- to identify some key issues in database design.

Learner profiles

Learners will need prior understanding of basic concepts in organising and using data. They are likely to be studying at Level 2 or above. The activity also provides opportunities for the embedding of Key Skills, especially communication and working with others.



See Section 5 on embedding Key Skills in this activity

Resources



For all stages:

- a room set up so that learners can work in groups of three, four or five.

For stage 1:

- Mia's Sandwich Shop - an introduction PowerPoint slides - numbers 1-5 (optional)
- DVD - with video clip of Mia.

For stage 2:

- DVD - with short video clips illustrating the roles of each of the employees and customers
- a What do people do? worksheet for each learner
- a completed version of the above worksheet for each learner.

For stage 3 each group needs:

- partially completed order sheet
- order pad for order clerk
- 3 x customer order cards for customers
- delivery note pad for sandwich maker
- menu card for order clerk
- product cards for sandwich maker

- paper clips for sandwich maker
- in and out 'trays' for the sandwich maker
- optional - learners can use their mobile phones - switched off, of course.

For stage 4:

- a What are the problems? worksheet for each learner
- Slides - numbers 9 (optional).

For stage 5:

- teacher and trainer prompt sheet
- Slides - numbers 10-13 (optional).

Background to Mia's Sandwich Shop case study

This simulation activity has been designed to give learners first-hand experience of trying to work with an inefficient system.

Mia runs a lunchtime sandwich delivery service to customers who phone in orders from their offices or workshops. Mia's business started as a small, one person enterprise, but it has expanded rapidly. She now has a number of employees, who are trying to work as a team to provide a good service to their customers. But as the business has grown, the employees are making an increasing number of mistakes with the orders they send out.

The learners work in groups to simulate the operation of the shop. They take on the roles of the employees or customers. This activity has been designed to give learners first-hand experience of working with an inefficient system.

Instructions



Stage 1

Introduce the activity

In this activity the teacher or trainer is mainly in a facilitator role. Learners need clear instructions on how to run the simulation, but the teacher or trainer will need to avoid 'telling' during the rest of the session.

1. Show slides 1-5 (optional) to explain the purpose of the activity and set the scene.
2. Play the video clip of Mia explaining her business.

Stage 2

Learners analyse the roles in the case study

1. Display slide 6 (optional). Explain to the learners that they need to understand what the various people do, because they will shortly be asked to simulate how the business runs. There is no need to refer to the activity as a role-play. Acting skills are not required.
2. Hand out a copy of the What do people do? worksheet to each learner. Invite the learners to answer the questions on the worksheet

If appropriate for the level of the group, the information above can be used to introduce the concept of systems analysis and Data Flow Diagrams.

for each role whilst they are watching the video clips.

3. Show the video clips of the employees and customers.
4. Invite learners to give feedback on their answers and check that they understand what everyone does, especially in terms of the information that they give and receive.
5. Hand out a copy of the completed answer worksheet to each learner.

Differentiation: For less confident learners, you might want to re-design the worksheet as a checklist, so that they can simply tick the tasks that apply to each role. With more confident learners it may be appropriate to extend the activity at this point, using the case study to introduce the concept of systems analysis and Data Flow Diagrams.



The interactive version of Mia's Sandwich Shop on the Interactive resources CD-ROM could be used for this extension activity.

This activity can be run with smaller groups of 3 or 4 learners but this means that one of the learners will have to take on the role of 2 or 3 of the customers.

Stage 3

Run the simulation

1. Emphasise that the purpose of running the simulation is to enable them to experience the problems with the current system.
2. Divide the class into groups of five, allocating each learner within a group to one of these five roles:
 - a. customer 1
 - b. customer 2
 - c. customer 3
 - d. order clerk
 - e. sandwich maker.

Note: this activity can be run with smaller groups of three or four learners but this means that one of the learners will have to take on the role of two or three of the customers.

3. Distribute the resources for this activity as follows:
 - a. for each customer – one of the customer order cards
 - b. for the order clerk – the blank order pad and the menu card
 - c. for the sandwich maker - the partially completed order sheet, the delivery note



pad, the product cards, the paper clips for sandwich and the in and out 'trays'.

4. Run through with the whole class how the activity will work.

The **sandwich maker** should:

- start by writing a delivery note for the first order on the partially completed order sheet
- attach the relevant product cards for the sandwiches ordered to the delivery note with a paper clip
- place the delivery note into the out 'tray' for later collection by the delivery driver
- repeat this process for the remaining orders on the partially completed order sheet
- write across the order sheet 'PROCESSED' and place the order form into the out 'tray'
- look in the in 'tray' for further orders placed there by the order clerk and process these as before.

Each **customer** in turn (i.e. Customers 1, 2, and 3), through a simulated phone call, should:

- give the details of the first order to the order clerk as written on the customer card
- call back with changes to their orders as indicated on their respective customer cards.

The **order clerk** should:

- record the order as given by each customer on the order pad, which will require him/her to look up the product code and price on the menu card
- repeat this process for each customer
- place the order form in the sandwich maker's in 'tray'.

This stage of the activity should finish when the order clerk has processed the changed address from customer 3.

Stage 4

Small group work

Learners remain in their small groups.

Give each learner a copy of the What are the problems? worksheet.

Invite learners to answer the five questions and then draw up a list of the problems. Consider asking learners to produce their list in a form that the whole class can see, by using flip charts or electronic methods.

Differentiation: Less confident learners may need extra help to identify the problems. You may ask them to look at three key areas:

redundant/repeated data, human error and inflexibility.



In section 3 you will find a prompt sheet that identifies the problems with Mia's current system.

Stage 5

Plenary

Start the plenary by asking learners to give feedback on the five questions on the What are the problems? worksheet. Invite each group in turn to lead on answering one of the questions. Ask the other groups if they agree or have anything to add. Make sure that all groups contribute.

Then invite each group to feed back their list of problems. Learners may find it helpful to then see the problems collated under three headings:

redundant or repeated data
human error
inflexibility.

Slides 10–13 can be introduced at this point, or you may prefer to use only the material provided by the learners.

End the plenary by re-visiting the learning objectives and evaluating the session.

A short guide to using the interactive resource

The interactive activity is included on the Interactive resources CD-ROM. It forms an important part of the simulation activity where blended learning is used to introduce the people who work at the sandwich shop. The interactive also gives opportunities for extension activities using active learning and group work.

Meet the people

All the people who play a part in the Mia's Sandwich Shop activity are introduced in turn:

Mia, the owner of the shop describes the problems in her growing business.

Andy, of Bryant's Printers is a customer and takes learners through the process of ordering sandwiches.

Adele, the order clerk, describes the ordering process.

Mike, the sandwich maker describes his job.

The driver describes his average day.

Alongside each character, except Mia, three questions are displayed which can be used to start and stimulate discussion. This discussion can take place in small groups or can be led by a teacher or trainer using a projector or interactive whiteboard.

The answers to the questions are provided at the end of the section.

Further activities

In the further activities section there are four different activities which can be accessed by selecting the appropriate icon.

Activity 1

Working in groups learners are encouraged to choose one of the characters and identify the information required by the character and what part they play in the system. They then describe to the rest of the group what is going wrong with the system from their point of view.

Learners then draw a Data Flow Diagram which represents their section of the system.

Using the diagram and the information they have collected they then go on to develop a list of questions which they might ask to find out more about Mia's system.

Activity 2

Learners change groups and form a new group with representatives of each character (order clerk, sandwich maker, driver, customer) in it.

Each member of the group displays their part of the Data Flow Diagram and the group work together to create a Data Flow Diagram for the whole system.

Activity 3

Mia has decided that she would like a computer based system. Using the information from the previous two activities, the group work together to build a set of questions that they might ask Mia to make sure that they can design an efficient system.

Activity 4

The groups work together to develop a presentation for Mia describing their findings.

Worksheet 1



What do people do?

Customer role

What does the customer do?	
What information do they use (give and receive)?	
How do they use the information?	
Who do they pass the information to?	

Order clerk role

What does the order clerk do?	
What information do they use (give and receive?)	
How do they use the information?	
Who do they pass the information to?	

What do people do?

Sandwich maker role

What does the sandwich maker do?	
What information do they use (give and receive)?	
How do they use the information?	
Who do they pass the information to?	

Possible answers to the What do people do? worksheet



Customer role

What does the customer do?	Places an order
What information do they use (give and receive)?	Gives the list of sandwiches required Gives name Gives the delivery address Receives a price for the order
How do they use the information?	Check that the price is acceptable
Who do they pass the information to?	Order clerk

Order clerk role

What does the order clerk do?	Takes an order from the customer
What information do they use (give and receive?)	Takes the sandwich order Uses the menu (price and sandwich list) Takes the name of the customer Takes the delivery address Gives the price of the order
How do they use the information?	Checks that the menu contains the sandwiches ordered Fills in the order form
Who do they pass the information to?	Sandwich maker

Sandwich maker role

What does the sandwich maker do?	Checks that the order is for delivery today Writes up a delivery note for each order Makes up the sandwiches for each order Leaves the sandwiches and delivery note ready for the delivery driver
What information do they use (give and receive)?	The information from the order form
How do they use the information?	To draw up delivery notes for each order To know which sandwiches to make up for each order
Who do they pass the information to?	Delivery driver

Worksheet 2

**What are the problems?**

First of all, discuss how you dealt with the following situations when they arose during the simulation. Keep some brief notes of the answers.

1. What did the order clerk do when customer 1 ordered some sandwiches and asked for the total cost of the order?

2. What did the order clerk do when customer 1 phoned to change their previous order?

3. What did the order clerk do when customer 2 asked for brown bread? How was the order recorded?

4. What did the order clerk do when customer 2 phoned to change their previous order?

5. What did the order clerk do when customer 3 called to change the address? What happened about the order that was made yesterday – would it have reached the correct address?

So, what do you think are the problems with Mia's system?

Discuss this in your group and record your findings below or as directed by your teacher or trainer.

Teacher and trainer prompt sheet

A list of problems with Mia's system are described below. They do not provide the complete answer. Encourage your learners to discover the problems for themselves, rather than present the answers to them.

Slides 9-13 of the PowerPoint presentation 'Mia's Sandwich Shop - an introduction' contain a summary of the main problems. You may wish to use the slides to help you to summarise the discussion.

Problems with Mia's current system

Redundant/repetition of data

- Every time a customer orders more than one type of sandwich, the company name and address has to be re-written.
- Both the product code as well as the product description have to be recorded. Writing out the product description can be tiresome, often the same sandwiches are ordered over and over again.



- The order information has to be written out all over again for the delivery note.
- If a further change to an order is made, the delivery note may have to be re-written again to correspond with this change. Some learners may have missed this in the simulation. Customer 3 phones back with a change to their address, also asking to ensure that the sandwiches ordered yesterday are delivered to the new address. The delivery note for Cars R Us needs to be re-written, otherwise the sandwiches will be delivered to the wrong place.

Increased potential for human error

- Staff have to manually look up the sandwich code from the menu sheet.
- Staff have to manually look up the sandwich price from the menu sheet.
- If the customer requires more than one sandwich of a particular type, the total cost has to be manually calculated.
- There is nowhere on the order sheet to record the overall cost of the customer's order. This also has to be calculated manually.



- The sandwich maker must be able to read the order clerk's handwriting and decipher any alterations that have been made to the order sheet.

Inflexibility

- If a customer wishes to change their order, it means crossing through the existing order and writing over the top of it, or writing out a whole new order. Either way it makes the order form very messy.
- If a customer needs to change any of their contact details, e.g. their company address, the same issue applies.
- It is difficult in the current system to carry out any summarising of data. For example, how many sandwiches were ordered on a particular day, total cost of orders for the day, most frequently ordered sandwich type etc. If Mia requires this type of information it has to be done manually by trawling through the order sheets.
- Currently there is nowhere on the order pad to record special requests from the customer, for example, brown bread instead of white, no butter etc.

- The system only holds information on customers when they have placed an order.
- The system only holds information on sandwiches once they have been ordered.
- If any row of information is removed, you may lose valuable data about customers or products.

Continuation and extension activities

At this point you will have completed the simulation activity and discussed the problems with Mia's system. The next stage is up to you and will depend on the group of learners that you are working with.

A list of possible continuation and extension activities is given below.

Introduction to relational databases

The discussion in the plenary (Stage 3) can be used to introduce relational databases. The data created during the simulation activity (Stage 2) can be used to introduce repeating data and data redundancy. The PowerPoint presentation, 'Introducing relational databases' on the Teacher resources CD-ROM shows one example of how the attributes can be organised into a relational database. The presentation does not include key terms e.g. primary key etc. which may need to be revised.



See the Understanding Normalisation pack where data from Mia's Sandwich Shop is used for a normalisation activity.

Introduction to terms and terminology

The case study material can be used to introduce terms used in database design e.g. attribute, entity, data redundancy. You could then go on to use further examples. There are many ways to do this.



See the Active learning examples at advanced level box which includes using active learning methods to help learners to understand new terms and concepts.

Create a computerised system for Mia's Sandwich Shop

Learners can develop a better system for Mia. The type and sophistication of the system will depend on the group of learners. A group of AS learners could use the example to help them to practise project management skills before moving on to their individual projects.

Introduction to entity relationship modelling

Learners can use Mia's Sandwich Shop to develop entity-relationship diagrams.

Introduction to information flow diagrams and organisation charts

Learners can use the case study to develop an information flow diagram. After running the simulation, they can work in small groups to draw a diagram showing how information flows through Mia's business. They could move on to show how information flow might be improved.



See the Further activities tab on the main menu of the Mia's Sandwich Shop interactive activity on the Interactive resources CD-ROM.

Embedding Key Skills in the activity

Communication level 1

To achieve Communication level 1 learners must be able to apply their communication skills to suit different purposes, to show that they can:

- i) take part in a discussion
- ii) read and obtain information from at least one document
- iii) write two types of document.

Discussion

To describe events, express opinions and develop ideas using language that everyone can understand, adapting the tone of voice, expression and manner to suit the formality of the situation. Learners will do this during the small group discussion and the plenary.

Read and obtain information

To get instructions, facts, opinions and ideas from straightforward documents such as letters and memos, and to collate this information as notes to use in discussions or written material,



such as letters, or short essays. Learners will be gathering information throughout the activity and recording it as notes on the worksheets.

Write

To complete forms and produce documents, such as business letters, memos, notes, short reports and essays. To give or obtain facts, opinions and ideas. All learners will write notes when they complete the worksheets. The order clerk will also complete a form.

Wider key skills

Mia's Sandwich Shop maps well to some of the wider key skills, in particular: working with others and problem solving.

Working with others focuses on the ability of the individual to meet their own responsibilities and work cooperatively in a pair or group of people for the purpose of achieving shared objectives.

Problem solving focuses on the ability of the individual to tackle problems systematically, to work towards their solution and learn from this process.

Working with others

During the activity learners may be able to meet the following Key Skills criteria.

Part A

Confirming targets

Learners can:

- check their understanding of objectives
- identify what needs to be done to achieve these objectives
- suggest ways to help
- make sure they are clear about their own responsibilities.

Following a plan

Learners can:

- work through an action plan to complete tasks on time
- use support given by others to help complete the task
- use methods to suit different learning styles
- make changes suggested by supervisor.

Reviewing progress and achievements

Learners can:

- give an opinion on what they have learned
- give an opinion on how they have learnt it
- identify targets met by checking to see if they have done what they set out to do
- identify their achievements
- check what they need to do to improve their performance.

Part B

W01.1

Learners can:

- confirm what needs to be done to achieve given objectives including responsibilities and working arrangements.

W01.2

Learners can:

- work with others towards given objectives and carry out tasks to meet those responsibilities.

WO1.3

Learners can:

- identify progress and suggest ways of improving work with others to help achieve these objectives.

Problem solving

During the activity learners may be able to meet the following key skills criteria.

Part A

Learners can:

- check that they are clear about the problems they have been given
- check that they know how to show success in solving the problem
- use help given by others (e.g. tutor, supervisor, peers) to identify any limits to what you can do and to decide which options are most likely to solve the problem.

Part B

Learners may be able to meet the criteria during extension activities, especially if they identify several solutions to Mia's problems and try out one of them.

PS1.1

Learners can:

- confirm their understanding of a given problem with an appropriate person and identify two options for solving it.

PS1.2

Learners can:

- plan and carry out at least one option for solving the problem, using advice and support given by others.

PS1.3

Learners can:

- check if the problem has been solved by following given methods and describe the results, including ways to improve their approach to problem solving.

Section 6

Mia's Sandwich Shop

Quick guide to key stages for teachers and trainers

Stage 1	Introduction
Stage 2: Video clips	Learners analyse the roles within the case study Worksheet: What do people do?
Stage 3: Simulation	Learners run the simulation and experience the frustrations of a poorly designed system
Stage 4: Small group work	Learners identify the exact nature of the problems Worksheet: What are the problems?
Stage 5: Plenary	Learners present their findings and discuss key issues in database design

Section 7

Sample session plan:

Date:

Time: 2 hours

Room:

Group:

Number in group:

Session aim: to investigate some of the real-life issues that face database designers, using a case study: Mia's Sandwich Shop.

Generic learning outcomes:	Differentiated learning outcomes	Differentiation achieved through
<ul style="list-style-type: none">• to experience the frustrations that arise from poorly designed systems• to identify the exact nature of the data handling problems in the case study• to identify some key issues in database design.	<ul style="list-style-type: none">• more confident learners should be able to identify key issues in the use and design of databases by generalising from the concrete example of Mia's Sandwich Shop.• less confident learners should be able to identify the data handling problems in Mia's business and understand the importance of good database design.	<p>Content – variety and stimulus.</p> <p>Group work - simulation – to identify potential problems with current system.</p> <p>Response – targeted questioning, worksheets.</p> <p>Small group and whole class discussions.</p>

Link to previous session: From Chaos to Database activity – why we need databases and when they are useful.

Key terms/theory: information flow, data handling, human error, redundant data, repeated data, flexibility of use.

Continuation activity: entity, table, columns, rows, records, fields, attributes, primary keys, relational databases.

Time	Key stages	Teacher and trainer activity	Learner activity and assessment	Resources
5 minutes	Stage 1 Session aims and objectives	Discuss aims and objectives. Check learners' prior knowledge. Introduce case study scenario to learners. Show video clip of Mia explaining her business.	Take notes, Q and A. Watch video clip.	Slides Video clip of Mia Data projector
20 minutes	Stage 2 Understanding the roles within the case study	Give What do people do? worksheet to learners. Play video clips of the employees and customers of Mia's Sandwich Shop.	Watch video clips Record information on What do people do? worksheet.	What do people do? worksheet Video clips
10 minutes	Understanding the roles within the case study	Confirm understanding of scenario roles via class discussion and Q and A.	Put forward answers from completed What do people do? activity.	Whiteboard, flip chart, marker pens Answer sheet to What do people do? activity

Time	Key stages	Teacher and trainer activity	Learner activity and assessment	Resources
30 minutes	Stage 3 Run the simulation	Organise learners into groups of three, four or five. Allocate roles. Explain how to run the simulation. Provide support throughout simulation.	Take part in simulation.	Partially completed order sheet Order pad Customer order cards Delivery note pad Menu card Product cards Paper clips In and out Optional – mobile phones – switched off
10 minutes	Break			
20 minutes	Stage 4 Small group work Problems with the current system	Hand out worksheet 2, What are the problems? Provide support while learners complete task. Ensure the learners move on to listing the problems before time runs out.	Identify problems with current system. Prepare a list of the problems to present to the rest of group.	Worksheet 2 What are the problems? Flip chart paper and pens Teacher prompt sheet

Time	Key stages	Teacher and trainer activity	Learner activity and assessment	Resources
20 minutes	Stage 5 Plenary	Facilitate feedback from previous activity. Summarise key points. Check understanding through Q and A.	Present findings. Contribute to discussion Q and A.	Flip chart Slides
5 minutes	Evaluation	Evaluate session. Complete relevant section of session plan.	Q and A.	Learner feedback sheets Session plan

Evaluation and comments

What went well?

What didn't work well?

Aspects of the session not covered

Summary of learners' own evaluation of the session

Pointers to take forward