

Sample teaching unit 7.4, lesson 3, strategies for inclusion

Lesson

3

Using a spreadsheet to build a model

ICT Framework objectives

DEVELOPING IDEAS AND MAKING THINGS HAPPEN

Models and modelling

- Use software to investigate and amend a simple model by:
 - formatting and labelling data appropriately;
 - entering rules or formulae and checking their appropriateness and accurate working;
 - explaining the rules governing a model.
- Test whether a simple model operates satisfactorily.

GROUP C/D

Break down the objectives, e.g. change variables in a model, create a rule, test a simple model.

Key vocabulary

There is no new vocabulary in this lesson.

Preparation and planning

- Ensure that you are familiar with the resources to be used.
- Ensure that 7.4T3g Disco model.xls is available electronically and that 7.4P3a Disco model.xls is available in the shared area for pupils.
- Copy these resources for pupils:
 - 7.4P3b Rules and variables.doc;
 - 7.4P3f Disco model activity 1.doc;
 - 7.4P3h Disco model activity 2.doc;
 - 7.4P3i Insert.doc;
 - 7.4P3j Interrogate.doc.
- Write the questions for activity 1 on the whiteboard or flipchart.
- If necessary, prepare guidance for the pupils to support the software being used, either as a handout or available on the school's intranet.
- Display the objectives for the lesson, phrased so all pupils will understand them.

Resources

- Large computer screen display
- Sufficient computers for pupils to work in pairs or in small groups
- Spreadsheet software
- Shared network area, or alternative way to pass spreadsheet data to pupils
- Whiteboard or flipchart

- Resource files:
 - 7.4P3a Disco model.xls
 - 7.4P3b Rules and variables.doc
 - 7.4T3c Rules and variables answers.doc
 - 7.4P3d Rule table.doc
 - 7.4T3e Rule table answer.doc
 - 7.4P3f Disco model activity 1.doc
 - 7.4T3g Disco model.xls
 - 7.4P3h Disco model activity 2.doc
 - 7.4P3i Insert.doc
 - 7.4P3j Interrogate.doc

Lesson outline

60 minutes

1	Starter: Identifying rules and variables	Reviewing Whole class	10 minutes
2	Using a model to make predictions	Demonstrating software Whole class	10 minutes
3	Developing the model	Using software Paired work	15 minutes
4	Increasing the function of the model	Using software Paired work	15 minutes
5	Plenary: Reviewing the model	Evaluation Whole class	10 minutes
	Homework	Individual work	

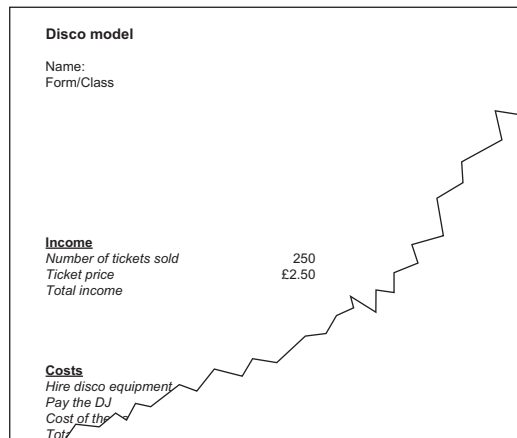
Activities

10 minutes

1 Starter: Identifying rules and variables

Discuss the objectives for the lesson with the class. Review the homework from the previous lesson, identifying rules and variables from a model.

Display **7.4P3a Disco model.xls** on the large screen. Tell pupils that they are going to build up a spreadsheet to model possibilities for a school disco.



Click on each cell in 7.4P3a Disco model.xls, asking pupils to identify variables (data that can be changed) and rules (formulae). Then ask pupils to use **7.4P3b Rules and variables.doc**, ticking the relevant columns to identify the properties of the listed cells. They can use peer groups to check their answers on **7.4T3c Rules and variables answers.doc**.

GROUP C: Express objectives in simpler language related to tasks. Ensure teaching assistant understands objectives and outcomes of the lesson and the activities.

GROUP D: Model the techniques used, extensive questioning to relate to the application of the techniques.

Organisation and groupings

Pair group A with group B, and group C with group D.

GROUP C/D: Check understanding of variables and rules.

Rules and variables 7.4P3b

Use 7.4P3a Disco model.xls to identify the properties of the cells below. Mark them with a ✓.

Cell	Variable	Rule
B15		
B16		
B17		
B23		
B24		
B25		
B26		

Rules and variables answers 7.4T3c

Use 7.4P3a Disco model.xls to identify the properties of the cells below. Mark them with a ✓.

Cell	Variable	Rule
B15	✓	
B16	✓	
B17		✓
B23	✓	
B24	✓	
B25	✓	
B26		

They then study the rules they have identified, and work out the details of each rule and write it out in the formula column on **7.4P3d Rule table.doc**. They can work with peer groups to check their answers, using **7.4T3e Rule table answer.doc**.

Targeted group work

Teaching assistant supports Group C. Teacher works with Group B.

Rule table 7.4P3d

Write down the formulae of Q6, Q8 and Q9 in the table below. Be sure to show the correct cell address in Q6, Q8 and Q9.

Cell	Formula

Rule table answers 7.4T3e

Write down the formulae of Q6, Q8 and Q9 in the table below. Be sure to show the correct cell address in Q6, Q8 and Q9.

Cell	Formula
B1*	B15-B16
B7%	=(B2-B7)*B7% or =B7-B7*B7%
B8%	B11-B8%

10 minutes **2 Using a model to make predictions**

GROUP C/D: Ensure there is full understanding of PROFIT/LOSS/TOTAL, support through less complex scaffolded models and resources. Supported by teaching assistant.

GROUP A: Support materials and opportunities to apply techniques and skills, e.g. formatting cells.

GROUP B: Opportunities to look at areas of refinement and development of model.

GROUP C/D: Split resource sheet and activity into smaller steps. Mediate resources in relation to literacy and numeracy needs.

Show pupils 7.4P3a Disco model.xls again. Ask them to think about what they could calculate, using formulae in the spreadsheet. Gather suggestions such as:

- the total amount of money raised (the income);
- the total cost of the disco;
- how much of the money raised was profit.

Make sure that pupils understand that profit is calculated by subtracting the costs (money going out) from the income (money coming in). Explain that the income and costs will be in a particular currency and the spreadsheet should be set up to show this. Demonstrate how to set the currency for the data.

Explain that sometimes the costs may be more than the income, so that the disco would have made a loss. This would be shown as a negative number. Discuss an appropriate display for negative numbers, for example, -£1, (£1) or £1 written in red for clearer viewing on the screen.

Give pupils copies of **7.4P3f Disco model activity 1.doc** and tell them that the spreadsheet 7.4P3a Disco model.xls will provide a starting point for them to set up their model. Explain that this is the first stage of the model and that it will become more complex in later lessons. Say that this is what usually happens when a model is developed.

7.4P3f

Write down the formulae of Q6, Q8 and Q9 in the table below. Be sure to show the correct cell address in Q6, Q8 and Q9.

QUESTION A: DISCO MODEL FORMULA

Cell	Formula

15 minutes

3 Developing the model

GROUP A: Peer tutoring of techniques. Teacher intervention to bring out purpose and efficiency.

GROUP C: Stepped through with supporting resources.

GROUP D: Discussion about purpose of formatting cells.

GROUP C: Teacher support for formatting of cells.

An example of what pupils should be producing by the end of this activity is given on sheet 2 – Disco stage 2 – of **7.4T3g Disco model.xls**.

Tell pupils to open 7.4P3a Disco model.xls from the shared area and to follow the instructions on 7.4P3f Disco model activity 1.doc to develop the model. Explain that the worksheet will help them complete their spreadsheet and gives information about formatting data types and presentation.

As pupils work, monitor to check they are using correct formulae. Ask individuals and pairs for reasons for formatting data type and text. Draw out responses such as:

- it is easier to find information;
- it is easier to enter information;
- there is less chance of mixing things up;
- it is easier to recognise currency, for example, £2.50 is clearer than 2.5;
- it enhances the appearance of the sheet.

When pupils have set up their model, ask them to use it to answer the questions at the end of 7.4P3f Disco model activity 1.doc.

Differentiation

Work with a less able group to demonstrate formatting.

15 minutes

4 Increasing the function of the model

GROUP C/D: Split activity into smaller steps. Scaffolding of mathematics.

An example of what pupils should be producing by the end of this activity is given on sheet 2 – Disco stage 3 – of 7.4T3g Disco model.xls.

Tell pupils that they will now add two more variables to their model. Give out **7.4P3h Disco model activity 2.doc** and ask pupils to follow the instructions for adding the number of teachers required and the cost of paying the teachers. Circulate and help pupils who are having difficulty with tasks such as creating formulae. Tell pupils to save their final models for use in the next lesson.

7.4P3h

Disco model activity 2 Adding supervising teachers

This activity sheet will help you to develop your disco model.

As more variables are added to the model it becomes more realistic and useful. You are going to add teachers to your model.

Teachers must be present!
The headteacher at the school has said that the disco can only go ahead if there are teachers present. There must be one teacher for every 50 pupils. If there are 51 pupils then two teachers would be needed, and so on. Each teacher will have to be paid £20 for doing this.

You now have to add three extra pieces of information to your model:

- 1 the number of teachers required (this will change according to the number of pupils)
- 2 the cost of paying each teacher
- 3 the total cost of paying the teachers.

Step 1 Adding extra labels
You will need to put a new heading on your spreadsheet for Additional information.

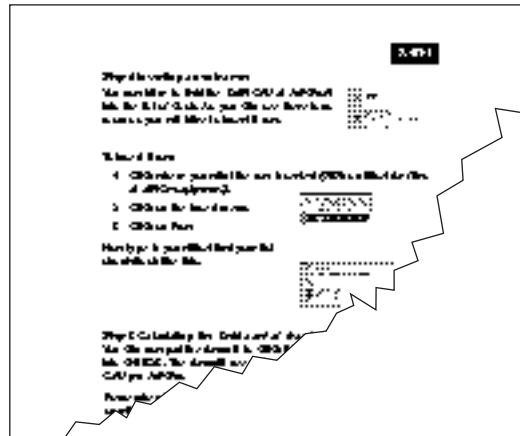
Type this in cell A6. By
Number of teachers

The nu

GROUP A/B:
Extension task, support materials where necessary, to guide rather than lead.

Differentiation

Pupils who finish the task quickly could be given **7.4P3i Insert.doc** and asked to insert a row to calculate the total cost of the teachers. Remind them that they will need to alter the formula for total costs.



In addition, these pupils could be given **7.4P3j Interrogate.doc** and asked to explore the model to answer the questions on the worksheet.



Identify pupils who do not progress to these worksheets. They will have an opportunity to do so in lesson 4.

10 minutes

5 Plenary: Reviewing the model

GROUPS A/B/C/D:
Ensure plenary includes contributions from each group (different models) – discussion on improving models, etc. can be related to all groups.

GROUP C/D: Question about refining a model by adding variables and rules.

GROUP A/B: Question about the efficiency of the model and how it could be improved.

Review the objectives for this lesson. Ask pupils who have completed 7.4P3i Interrogate.doc to explain how the model showed whether the disco would make a profit if it were held on a Wednesday, Thursday or Friday. Ask pupils to judge how effective the model is and whether it could be improved by adding other variables. Then ask about the limitations of the model. If necessary, prompt by saying:

- we used multiples of 50 for the number of tickets sold and calculated the number of teachers by dividing this by 50;
- anything other than multiples of 50 would have caused a problem because of the resulting decimals.

Explain that this is a limitation of the model but, at this stage, it would be too complicated to add a formula to deal with this. Discuss rounding up to the nearest whole number. Explain that pupils will learn more about doing this at a later stage.

Homework

GROUP C/D

Ask the pupils to identify any further limitations of the model and to suggest possible solutions. Support pupils by offering some limitations from the plenary for them to develop solutions.

- What would be the effects of using different variables?
- Which variables could be added to improve the model?

GROUP A/B

More able pupils should identify a limitation and develop a solution.