

Excel Interactive: Tutorials for Statistics

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Excel *Interactive* consists of 11 Excel workbooks (or tutorials) designed to help students to develop the basic skills in Microsoft Excel needed in their study of Statistics. Four of the workbooks address specific statistical topics, namely Charts, Descriptive Functions, PivotTables and Data Analysis. The remaining seven workbooks cover more general Excel features such as absolute references, use of Solver, lookup tables, data tables and logical functions. The workbook on PivotTables requires Excel 2000, but all the other workbooks will run in Excel 97.

User Interface

The Excel files are supplied on a CD together with a minimal set of HTML files acting as a user interface. Rather disconcertingly the CD is not self-starting and there are no accompanying instructions on the packaging. However, a quick exploration of the CD's contents reveals a start.html file, which brings up the welcome screen in your default browser (assumed to be either Netscape 4.0 or Internet Explorer 4.0 or higher). Whichever browser you use, loading one of the Excel workbooks is by no means seamless. In Netscape, having clicked on the appropriate hyperlink, an alert window appears asking whether to open the tutorial from where it is or save it to your hard drive. Choosing "Open it" then brings up the usual alert warning about the presence of macros, which must be enabled. Surprisingly, given that Excel files can be viewed within Internet Explorer, the interface is even more cumbersome with the user having to first locate and then load each workbook directly from the CD "to take advantage of its full functionality".

Workbook Design

Once a workbook has been loaded the navigation is very simple. The opening page provides a menu of hyperlinks to the other worksheets in the book (see Figure 1), and each subsequent worksheet carries a link back to the home page. Naively no attempt has been made to protect the worksheets, so it is possible to delete or modify vital components accidentally. Many of the screen layouts are rather densely packed and some users would find them difficult to read.

Figure 1 Menu for Charts tutorial

A	B	C	D	E	F	G	H	I	
	©2001 Barbara V. Miller		Excel Charts						
	Objectives:		* Learn which type of charts most effectively represent your data						
			* Identify chart objects						
			* Create and edit an embedded chart						
			* Add chart objects using drawing toolbar						
	Which Chart Type Most Effectively Represents Data:		<u>Pie, Line, and Bar Charts</u>						
			<u>Histograms</u>						
			<u>Scatterdiagrams</u>						
	Identify Chart Objects:		<u>Basic Chart Objects</u>						
	Create and Edit Embedded Charts:		<u>Bar (Column) Chart</u>						
			<u>Line Chart</u>						
			<u>3-D Pie Chart</u>						
			<u>Histogram</u>						
			<u>Scatterdiagram</u>						
	Add Objects to Charts:		<u>Adding chart objects using the drawing toolbar</u>						
	On Your Own:		<u>Apply What You've Learned</u>						

	A	B	C	D	E	F	G	H	I	J
1		<p>=AVERAGE(range) The mean is synonymous with average and is calculated by using the AVERAGE function.</p> <p>=MEDIAN(range) The median represents the middle of the data. In other words, it has 50% of the values on either side of it.</p> <p>=MODE(range) The mode represents the most frequently occurring value in the range.</p>								
2										
3		<p>Enter the correct functions in cells E10, G10, and I10 that will return the correct values.</p>								
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5										
6										
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11										
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14										
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19										
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Final Semester Total Points	MEAN	MEDIAN	MODE
389.2			
919.5			
798.4			
810.5			
880.6			
926.9			
813.1			
955.5			
718.4			
798.4			

Check Answer	Check Answer	Check Answer
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[Return to Main Menu](#)

Figure 2 Interactive Exercise

Admittedly Excel's zoom facility can be used, but much additional scrolling is then required both horizontally and vertically. Some worksheets are purely static pages of text and annotated diagrams, but the information is presented clearly with good use of colour. Other sheets are more interactive, offering feedback on whether the correct procedure has been followed (see Figure 2). Most of the worksheets engage the user by providing lengthy lists of instructions leading them step-by-step through some analysis of a set of data (see Figure 3), with a specimen solution provided lower down the worksheet. The instructions for the particular exercises that I tried were clear and seemed to work satisfactorily. However, at times I felt that I wanted to know not just how but *why* I was doing certain things. For example, the decision as to which summary statistic to use in a pivot table was rather glossed over.

Breadth of Coverage

The range of statistical functions studied in this software is limited to those used in a purely descriptive analysis. There is no coverage of probability distribution functions such as NORMDIST, or regression analysis functions such as SLOPE and CORREL. Use of the RAND function, either for simulation or sampling purposes, is also omitted. For data analysis *Excel Interactive* directs students to the Data Analysis Toolpak. This collection of add-ins to Excel has remained largely unchanged since its introduction in Excel 4.0 and my views on it remain the same as in my review of Excel 5.0 in the May 1996 issue of this newsletter:

The two great benefits of spreadsheets are their transparency - being able to inspect a cell and see

what formula generated it - and their immediacy - cells and charts automatically updating when any change is made. The add-ins disobey both these tenets. All that they produce is non-formula based output, often in a poor format. There is a danger that students will assume that the output is dynamically linked to the data and consider it unnecessary to re-run the macro when their data is changed. Moreover, on inspecting an output cell, the student has no indication how it was calculated. To make matters worse, some of the add-ins still contain statistical errors. For example, the Regression add-in offers a so-called Normal Probability plot which is no more than an ogive of the Y data. Since the full extent of these errors is unknown, the best advice is not to install these add-ins for use by students.

Charts

I was not impressed by the tutorial on Charts. Students are shown how to produce 3D pie and bar charts, which I would instruct them never to use because of the danger of misleading the viewer. The sample data provided for the scatterplot comprises the age and income of 7855 bank customers. I will leave the resulting chart to the reader's imagination – suffice to say that, having printed it out to show to a colleague, I now need a new ink cartridge! The tutorial guides the student through the 17 steps involved in producing a clustered bar chart, but does not address the more pressing question of how to decide when to use a clustered (ie compound) or stacked (ie component) bar chart.

In common with most textbooks and software that I encounter, *Excel Interactive* makes a shameful attempt

	A	B	C	D	E	F	G	H	I	J	K	L
1		Edit and change the layout of a pivot table										
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To edit and change the layout of a pivot table, do the following:

Step 1 - The pivot table in cells B7:B21 presently shows the count for each Letter Grade for all sections. You decide that you now want to be able to see the number of Letter Grades per Section. Right click anywhere in the data table results.

Step 2 - Select Wizard. The PivotTable and PivotChart Report - Step 3 of 3 window will now appear. Move this window to the bottom right of your screen.

Step 3 - Select the Layout button. Drag Section to the Page area of the pivot table diagram. Click OK and click Finish. Close the Pivot Table toolbar window. You can now click on the down arrow next to Section # in order to display the totals for each letter grade listed by section number.

Step 4 - You now decide that you want to change the layout of the pivot table again so that the Letter Grade is in the Page area and the Section is in the Row area. Instead of going into the wizard, you can drag and drop these field names to the desired locations.

- Click on the Letter Grade field name shown in B8 and drag and drop it to cell B5. The Letter Grade field will now appear in cell B4.
- Click on the Section field name that is now in cell B5 and drag and drop it to cell B8. You should now see a count of all letter grades listed per section. To see only the A's for each section, click on the down arrow for Letter Grade, select A, and click OK.

Your results should now look like those shown in cells H27:I35.

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Count of Letter Grade	
Letter Grade	Total
A	11
A-	19
A+	2
B	14
B-	12
B+	14
C	11
C+	5
D	2
D-	5
D+	2
F	2
Grand Total	99

Figure 3 Instruction Sheet

at drawing histograms. Students are told to “Create a histogram when you want to best illustrate data where both the X and Y axes are represented (*sic*) by data” – eh? The subsequent example shows intervals of 19-20 and 21-24 represented by columns of equal width. When it comes to drawing a histogram yourself the example is even worse, with a distribution of tips (in dollars) having intervals 60-70, 70-80, 90-100 which not only overlap but the resulting chart (20 steps later) shows no gap between the last two intervals.

Another section shows you how to add drawing objects such as arrows and text boxes to a chart. Unfortunately these objects are not grouped with the chart and are therefore left behind when you try to copy the chart to another location, eg a report in Word.

Conclusion

With Excel being used more and more on elementary Statistics courses there is undoubtedly a demand for support material such as this, particularly among students with little or no previous experience of spreadsheets. *Excel Interactive* is not a product that I would recommend to my own students in its present form. However, if its more blatant shortcomings can be amended, other less pedantic teachers may find it to their liking.