Powering up your Grade book: A Spreadsheet Designed to Teach Students Excel© Skills and to Make Assigning Students' Grades Easier

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ABSTRACT

In a survey by Bain et al. (2002, Table 13), they found that 72% of business professionals recommended teaching spreadsheet applications as part of an AIS course while only 36% of the faculty polled reported using spreadsheets in the AIS course. This gap between what professionals thought should be taught and what professors teach could lead to students beginning the work force with less than desired spreadsheet skills. The purpose of this article is to provides a scenario (teacher's electronic grade book) in which students are taught advanced Excel© skills to better prepare them for future job requirements. An added bonus of this example tutorial to instructors is an efficient, re-usable spreadsheet to make assigning students' grades easier.

Keywords
Excel© Skills, Instructor's Electronic Grade Book

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INTRODUCTION

Seventy-two percent of business professionals recommended spreadsheet applications be taught during an introductory AIS course while only 36% of the faculty polled reported using spreadsheets in the AIS course according to a recent survey (Bain et al. 2002). This gap between skills that employers want and what professors actually teach in the AIS course could lead to students beginning the work force without desired spreadsheet skills.

The AICPA (2006) also recognizes the importance of technological competency by including "Leverage Technology" as one of its Functional Competencies. More specifically, one of the elements listed in the leveraging technology category is "Builds appropriate models and simulations using electronic spreadsheets and other software". Additionally, the AICPA (2005) suggests the use of tutorials in their "Sample Teaching Strategies and Classroom Techniques that Address the Core Competencies." Given this guidance, this article contains an Excel© classroom tutorial which supports the AICPA's core competencies and one of their suggested methods of delivery.

In this article a Microsoft Excel© project is presented. The Excel© project is a grade book example. The grade book example was adopted because most students understand the concept of grading, whereas a student in the beginning of their accounting curriculum may not have the knowledge to master more advanced accounting examples. Therefore, this paper would best be presented in an introductory accounting or AIS class. The professor may use the simple example in class, then assign a more complex accounting example using the tools learned in class. For example, a tax professor could assign a spreadsheet where the VLookup function is used to calculate tax rates. Similarly, a managerial professor could assign a spreadsheet where the VLookup function is used to choose labor rates based on different job types for product costing. The current project benefits are two-fold; 1) the project is used to teach students advanced concepts in Excel© which gives them a heightened sense of achievement as a greater competence is attained and 2) the project can be used by instructors to expedite assignment of students' grades when simple techniques presented in the tutorial are utilized. Many instructors utilize course management software (i.e. WebCT, Blackboard) which limits the flexibility for grading options. The grading tool presented in this paper expands the options available for grading. For example, this grading tool provides an easy way to drop the one, two or three lowest assignments through the use of formulas. Thus, both the student and the instructor are rewarded when this tutorial is adopted and implemented in the classroom.

In addition to presenting advanced functions in Excel©, an important subtopic introduced in the tutorial is the demonstration of error checking in Excel© formulas. This has implications for internal controls testing. Many businesses have numerous important documents stored in spreadsheets, and this tutorial introduces controls testing through the audit of functions and formulas.

LEARNING OBJECTIVES

Objectives of the tutorial

The objectives of this tutorial are to increase students' Excel© skills as recommended by professionals (Bain et al. 2002) and to design a re-usable spreadsheet to assist instructors in their grading responsibilities. Some of the Excel© skills students learn from this exercise include:

1. Quick copying to save time
2. "Small" function to retrieve the lowest value(s)
3. Find and Replace to correct errors
4. Absolute addressing to reference the same cell(s)
5. "If" statements for optional quiz drops
6. Vlookups for assigning grades and grade points
7. Sorting data to organize it
8. Filtering data to analyze it for potential cheating
9. Subtotal function to obtain Minimum / Maximum / Average values

Intended Audience and Time Requirements

The intended audience for this exercise is an undergraduate introductory accounting or AIS class. While many accounting students are familiar with some basic Excel© skills, this exercise provides additional spreadsheet tools to add to the students' Excel© skill sets. The length of time required to perform this exercise varies, depending on the method employed. If the instructor's time is limited, then the instructor can demonstrate the skills to the students in a fifty minute class period. One of the co-authors prefers to ask the students if there are any students who feel proficient at Excel©. A student is then selected from the volunteers and is asked to come to the computer podium and drive the mouse (demonstrate to others) as the remaining class members help the student volunteer figure out what to do to create the electronic grade book. This is accomplished by asking the students "What should we do next and how should we do it?" The students often make recommendations and the instructor can provide guidance on other, possibly more efficient ways of accomplishing the task if the students get off track.[1] While this method takes longer, it has several benefits. One benefit for the student volunteer is that they gain a better appreciation for some of the challenges of teaching and student participation.[2] A second benefit may occur if all the students are engaged and participating. The students learn from fellow students and every time this method has been employed, one of the co-authors has learned a new, more efficient way to use Excel© from the students.

[1] If a computer lab is available, students can follow along as they make suggestions.

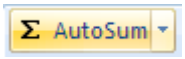
[2] The instructor can inquire as to how the student feels? Are they fatigued after standing for the entire fifty / eighty minutes? Did the student think that the fellow students were engaged and participating? How would the student suggest getting the students more involved?

TEACHING NOTES

Starting the Exercise

Inform the students that you have just exported sample grade information from Blackboard™ or whatever course management software is utilized at your institution.[3] Inform the students that they have been assigned as your grading assistant and that you need them to create a user-friendly grade book so you can analyze and access student performance to assign student grades. Have the student(s) open the Excel© file "Grades_Students_Copy.xls" to display the following grade information.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Name	Quiz #1	Quiz #2	Quiz #3	Quiz #4	Quiz #5	Quiz #6	Quiz #7	Project #1	Project #2	Project #3	Exam #1	Exam #2	Exam #3
2	Student #1	3	3	4	5	5	4	4	22	20	23	78	85	73
3	Student #2	3	4	4	3	2	5	4	20	22	21	83	81	75
4	Student #3	4	4	3	5	-	4	3	18	16	20	73	77	66
5	Student #4	2	3	4	4	-	4	3	20	20	22	85	88	78
6	Student #5	5	4	5	5	4	4	4	21	24	22	86	90	81
7	Student #6	4	3	4	3	5	3	4	23	21	25	93	91	85
8	Student #7	5	5	5	5	5	5	4	24	25	24	97	95	80
9	Student #8	3	3	4	4	5	4	3	19	17	20	76	80	65
10	Student #9	2	2	3	4	3	4	4	18	16	21	56	62	58
11	Student #10	4	4	3	5	4	5	5	19	21	22	80	77	72

Inform the students that you give seven quizzes worth five points each and allow the students to drop one or two of their lowest quiz scores depending on how the semester goes. In addition, you give three projects worth twenty-five points each and three exams worth one hundred points each. The students should suggest to include a row of points possible and to sum each student's points earned.[4] The students should suggest using the shortcuts available such as using the sum button 

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When asked to copy the sum of the total points to the rest of the students (#2 through #10), it is often suggested by students to right click and highlight "Copy" and then highlight the column and "Paste". A quicker procedure is to move the cursor to the bottom right corner of the cell you want to copy (Cell O2) until you see a big bold "+"and then double click to automatically copy and paste to the last row of data – this process we refer to as performing a quick copy. Note that quick copying works in a downward but not an upward fashion.

[3] Appendix A provides the alternative of making the tutorial a student handout assignment.

[4] If the worksheet is getting too wide, show the students how to "Window" "Freeze Panes" in Cell B2. Additionally, a blank row should be left between Student #10 and the points possible for later sorting purposes. You can either inform the students of this or let them see the error later when the data is sorted. It can easily be fixed later by inserting a blank row.

M	N	O
Exam #2	Exam #3	Total Points
85	73	329
81	75	
77	66	
88	78	
90	81	
91	85	
95	80	
80	65	
62	58	
77	72	

Double-click the bold "+"here to easily copy cells here.

M	N	O
Exam #2	Exam #3	Total Points
85	73	329
81	75	327
77	66	293
88	78	333
90	81	355
91	85	364
95	80	379
80	65	303
62	58	253
77	72	321
100	100	410

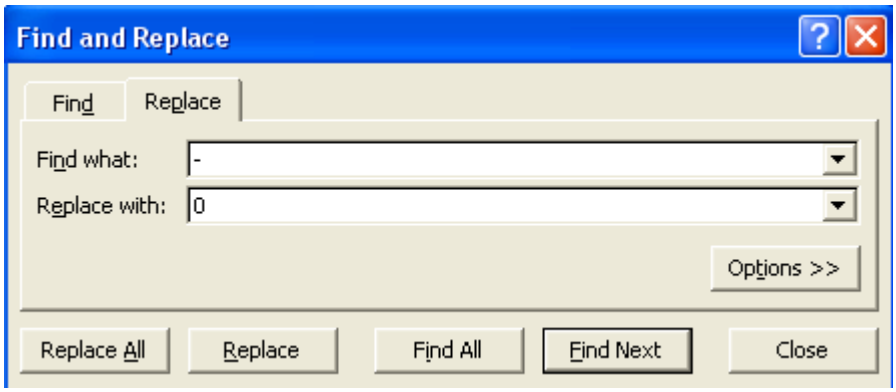
Next inform the students that the total points include all seven of the quizzes and it needs to be adjusted for the lowest quiz score(s). First type the heading "Smallest Quiz" in Cell P1. Since the smallest quiz score is always subtracted, type the formula "=SMALL(B2:H2,1)" in Cell P2.[5] This should result in the number "3" being chosen as the smallest value. The letter "k" in the small function "SMALL(array,k)" informs the function which value to retrieve. For the smallest value in the array of values, then you would place the number "1", place the number "2" for the second smallest and so on. With Cell P2 highlighted, perform a quick copy of the "small" formula to the rest of the rows to reflect the following.

	O	P
1	Total Points	Smallest Quiz
2	329	3
3	327	2
4	293	0
5	333	0
6	355	4
7	364	3
8	379	4
9	303	3
10	253	2
11	321	3
12	410	5

Notice that the formula has selected the smallest values (quiz scores) in the ranges selected. An important item to note is that for Students #3 and #4 that the "small" formula did not select the quiz (#5) score "-" where both the students did not take the quiz and nothing was entered. In

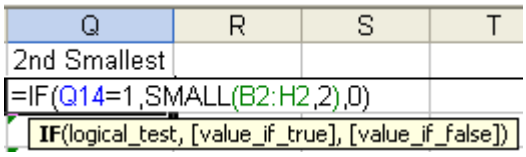
[5] Alternatively, the "Min" function could be utilized for only the smallest value (if only dropping 1 quiz score).

order to have the formula function as desired, it must be understood how the function performs. To resolve this problem, first highlight any one cell in the table of grade information, and then hold down the "Ctrl" key and press the "F" key to perform a find and replace. Type the "-" in the "Find what" area and a "0" in the "Replace with" area.



Once all the "-" have been replaced with "0", you can note that now the smallest quiz score reflects the correct values.

Inform the students that to make dropping the second smallest quiz optional, we will use the "if" function combined with the "small" function. First type the heading "2nd Smallest" in Cell Q1. Next type the number "1" in Cell Q14 – this will be used to determine whether or not to subtract the second smallest quiz score.[6] Type the formula "=IF(Q14=1,SMALL(B2:H2,2),0)" in Cell Q2. The "IF" function



first examines the logical test set forth – "Does the value in Q14 = 1?" – in our example. If this logical test is true (as it is in our example), then the next part of the "IF" formula is the action to be taken. For our example, the "value_if_true" is to find the second smallest quiz score. The "value_if_false" in our example is to put the value "0" in the cell and not allow a quiz score reduction.

Now perform a quick copy of the formula. After performing the quick copy and looking at all the "0's" in the column, now is a good time to explain to the students how to absolute address when referencing cells that you do not wish to change. Demonstrate how to absolute address by clicking on Cell Q2 and pressing the "F2" key to edit the formula. Move the cursor to "Q14" and press the "F4" key one time to reflect "$Q$14". Toggle through all the options as you press the "F4" key several times and explain how you can freeze either columns (letters) or rows (numbers). Once you have toggled back to freezing both the columns and rows, press "enter" and then quick copy the formula down. You can note that now the 2nd smallest quiz score reflects the correct values. Note that when there are ties for the smallest score as in Student #1, the second smallest score is correctly the same as the smallest. Test out the optional dropping of the 2nd

[6] The value "1" is placed in Cell Q14 to leave a blank row so that when the formula is quick copied down, it will not copy over the value "1" which would create a circular reference. Again, this can either be explained prior to doing or corrected after the error is recognized.

smallest quiz score by changing the value in Cell Q14 from “1” to “0” and then back to “1”.

	O	P	Q
1	Total Points	Smallest Quiz	2nd Smallest
2	329	3	3
3	327	2	3
4	293	0	3
5	333	0	2
6	355	4	4
7	364	3	3
8	379	4	5
9	303	3	3
10	253	2	2
11	321	3	4
12	410	5	5
13			
14			1

Next type the heading “Adj. Total” in Cell R1, type the formula “=+O2-P2-Q2” in cell R2 and quick copy the formula down from R2 to R12 to provide an adjusted total points for each student. Type the heading “Grade %” in Cells S1 and type the formula “=R2/$R$12” in Cell S2 (do not forget to absolute address). Format the grade % to percentage and 1 decimal place to reflect “80.8%” in Cell S2 by using the  and  buttons. Next, quick copy the formula down to the remaining students.

Next we will introduce the Vlookup command to automatically assign grades and grade points based on the student’s grade %. Type the headings “Grade” and “Grade Pt” in Cells T1 and U1 respectively. Skip down to Cell S23 and type in the following table[7]:

	A	S	T	U
1	Name	Grade %	Grade	Grade Pt
21				
22				
23		0%	F	0
24		60%	D	1
25		70%	C	2
26		80%	B	3
27		90%	A	4

The vlookup command is “=vlookup(lookup_value, table_array, col_index_num)” and will return an item (value / letter) from a table based upon a sequential list.[8] In Cell T2 enter the formula “=VLOOKUP(S2,S23:U27,2)” and the letter grade “B” should be displayed. How this was derived is that the vlookup function looked up the value in Cell S2 (80.8%) starting with the first value in the table array (S23 to U27). It compared the 80.8% to 0% and since it was equal to

[7] Several rows were skipped to allow for other calculations to be added later. Also, the % amounts are in blue highlighting as that is one way to let individuals know what they can change in a spreadsheet.

[8] Note that it is important that the first column is in ascending order, otherwise the VLookup formula will return an incorrect value. Setting up the table in descending order will produce incorrect results.

or greater than 0% it then compared 80.8% to 60% and since it was equal to or greater than 60% it then compared 80.8% to 70%, then 80%, then 90%. Since 80.8% is not equal to or greater than 90%, it went to the last value (80%) where it was true. The last item ("col_index_num") in the vlookup formula is the value / letter that will be displayed based on the column selected. Column reference #1 is the first column of the table (Grade %), column reference #2 is the second column of the table (Grade), and column reference #3 is the third column of the table (Grade point). Since we desire to display the grade earned, the value 2 was selected for the "col_index_num". Since we want to calculate the grades for each of the students, but do not want the table to change, absolute address the table "$S$23:$U$27" before quick copying the formula down. Similarly calculate the grade points earned for each of the students by entering the formula "=VLOOKUP(S2,$S$23:$U$27,3)" in Cell U2 and quick copy the formula down to the rest of the students. Note that it is the same formula except the third column (grade point) of the table was selected. This should produce the following results:

	A	R	S	T	U
1	Name	Adj Total	Grade %	Grade	Grade Pt
2	Student #1	323	80.8%	B	3
3	Student #2	322	80.5%	B	3
4	Student #3	290	72.5%	C	2
5	Student #4	331	82.8%	B	3
6	Student #5	347	86.8%	B	3
7	Student #6	358	89.5%	B	3
8	Student #7	370	92.5%	A	4
9	Student #8	297	74.3%	C	2
10	Student #9	249	62.3%	D	1
11	Student #10	314	78.5%	C	2
12	Points Possible	400	100.0%	A	4

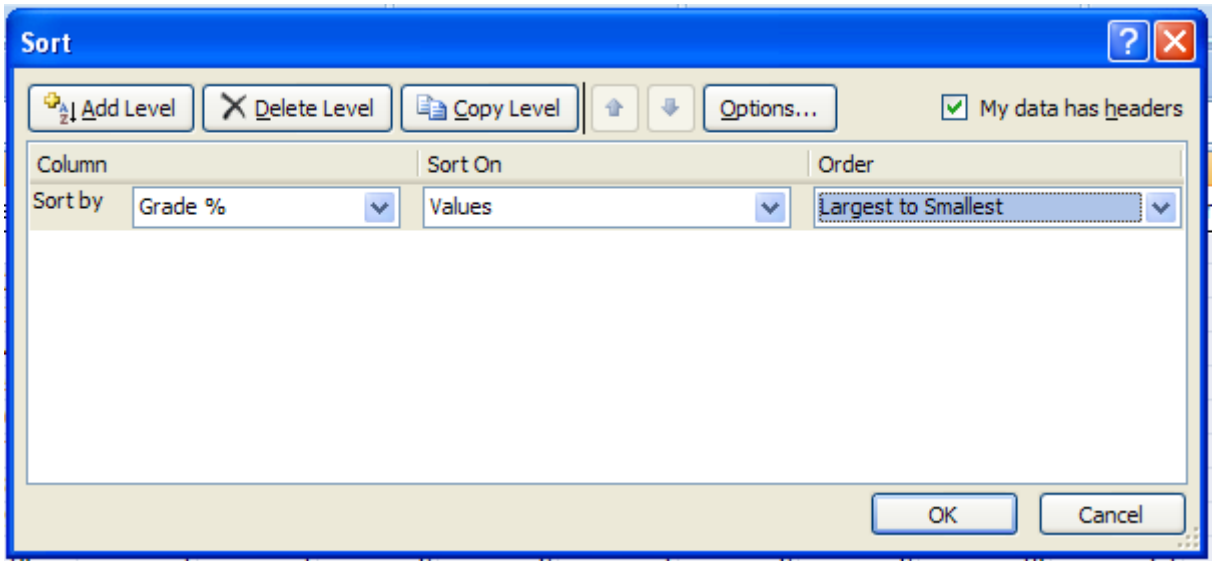
Next type the headings "Name", "Major" and "Section" in Cells V1, W1 and X1 respectively. In Cell V2 enter the formula "+A2" and quick copy the formula down to the rest of the students.[9] Subsequently type in the Major and Section information to reflect the following:

	A	U	V	W	X
1	Name	Grade Pt	Name	Major	Section
2	Student #1	3	Student #1	Acct	2
3	Student #2	3	Student #2	Acct	1
4	Student #3	2	Student #3	Fin	1
5	Student #4	3	Student #4	Fin	2
6	Student #5	3	Student #5	Acct	2
7	Student #6	3	Student #6	Acct	1
8	Student #7	4	Student #7	Acct	2
9	Student #8	2	Student #8	Fin	2
10	Student #9	1	Student #9	Acct	1
11	Student #10	2	Student #10	Acct	2
12	Points Possible	4	Points Possible		

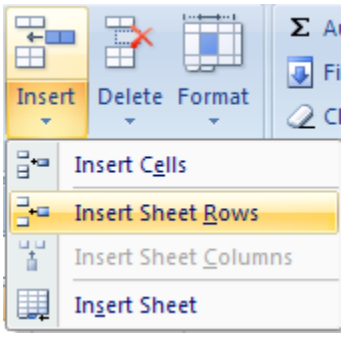
[9] Name is inserted again close to the grades to make it easier to determine section and major. Additionally, if you have too much time on your hands you may include a Gender column to further filter the data.

Manipulating and Analyzing the Data

Now that all the data are entered, the next step is to organize (sort) the data. Highlight the cells from A1 to X12 and click on the "Data" "Sort" menu items.[10] The sorting function automatically outlines all the data connected in a table to the highlighted cell and assumes there is a header row because the top row contains labels.[11] Since we want to organize the grades in descending order, select the "Grade %" option, select "Largest to Smallest" and select "OK".



If you have not previously explained why a blank row is needed between the last student (#10) and the points possible row, then you can show the students the problem. Point out that the grade % is now being divided by the lowest scores. Click on the undo button and then insert a blank row between Student #10 and the points possible by selecting the "Insert Sheet Rows" option. Now highlight the corrected cells from A1 to X11 and click on the "Data" "Sort" menu item and sort the data. It should now be organized in descending order from best (largest) to worst (smallest) grades.

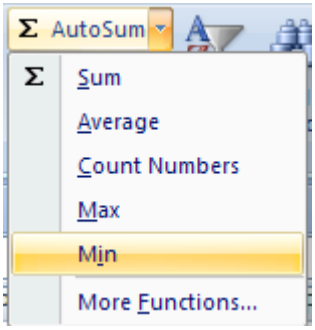


[10] Optionally, you can explain and demonstrate the problem of not highlighting all the items when you sort the data by only highlighting some of the data.

[11] Optionally, you can explain and demonstrate how to sort the data if there was not a header row by highlighting just the data and not the header row and then how difficult it is to determine which column you want to sort by.

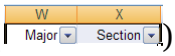
Next we are going to calculate some descriptive statistics so type the headings “Minimum”, “Maximum”, “Maximum %”, “Average” and “Average %” in Cells A16, A17, A18, A20 and A21 respectively as shown.

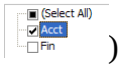
	A	B
1	Name	Quiz #1
12		
13	Points Possible	5
14		
15		
16	Minimum	2.0
17	Maximum	5.0
18	Maximum %	100%
19		
20	Average	3.5
21	Average %	70%

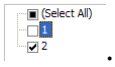


To find the minimum value, highlight Cell B16 and click on the autosum dropdown menu item and select the “Min” option and then change the range to B2:B11 by highlighting those rows.[12] Similarly calculate the maximum value in cell B17. Calculate the maximum % by placing the formula “=+B17/B13” in Cell B18 and formatting to a percentage with zero decimal places. Similarly calculate the average and average % in Cells B20 and B21.

Next demonstrate how to manipulate the data by highlighting Cells W1 and X1 and selecting “Data”, and the Filter button 

. This will create a filtering toolbar (

) in both the Major and Section column headings in which you can manipulate the data. First select “Acct” Majors (

) and then select Section “2” 

. This should filter the data down to students # 7, 5, 1, and 10. Examine the Minimum, Maximum and Average scores again for Quiz #1 – did they change? It is highly unlikely that the same values would be calculated if the other observations were truly being filtered out. The problem is that the other values are just hidden and they are still being used in the calculations. To fix this problem, we will introduce the subtotal function in a side-by-side comparison. First reset the filters to display all the data by clicking on the filtering toolbar in the Major and Section columns and select “Select All” and click “OK”.

The syntax of the subtotal function is “=SUBTOTAL(function_num,ref, ...)” where the first parameter, “function_num”**,** represents a numeric value corresponding to the type of calculation the user wishes to perform. The num_ref calculation available are:

Nu	Calculation type
1	Calculates the average of the data
2	Counts the data
3	Counts all the values
4	Returns the largest value
5	Returns the smallest value
6	Multiplies all the values

[12] Min, Max, and Avg are demonstrated to show potential errors when filtering data if individuals are not aware of how the functions work. This will be compared with the subtotal command which few individuals are aware of, but will fix the problem.

7	Calculates the standard deviation from a sample
8	Calculates the standard deviation from a population
9	Sums the values
10	Calculates the variance from a sample
11	Calculates the variance from a population

To compare similar data, enter the formulas "=SUBTOTAL(5,B2:B11)", "=SUBTOTAL(4,B2:B11)" and "=SUBTOTAL(1,B2:B11)" in Cells C16, C17 and C20 to calculate min, max and average values respectively. Additionally calculate the % for Cells C18 and C21. Now select "Acct" Majors and then select Section "2" and compare the results using just the min, max and avg functions in column B to the subtotal functions in column C. Both functions use the data from column B, but only the subtotal function in column C returns the correct values for the filtered students.

	A	B	C
1	Name	Quiz #1	Quiz #2
2	Student #7	5	5
4	Student #5	5	4
6	Student #1	3	3
8	Student #10	4	4
12			
13	Points Possible	5	5
14			
15			
16	Minimum	2.0	3.0
17	Maximum	5.0	5.0
18	Maximum %	100%	100%
19			
20	Average	3.5	4.3
21	Average %	70%	85%

Fix the grade book by entering the formulas "=SUBTOTAL(5,B2:B11)", "=SUBTOTAL(4,B2:B11)" and "=SUBTOTAL(1,B2:B11)" in Cells B16, B17 and B20 respectively. Reset the filters to display all the data by clicking on the filtering toolbar in the Major and Section columns and select "All" data. Highlight cells B16 to B21 and drag copy the formulas to the Cells in column "U", so that all columns now have the corrected formula.

16	Minimum	2.0
17	Maximum	5.0
18	Maximum %	100%
19		
20	Average	3.5
21	Average %	70%

Click the bold "+" here and drag to the right to copy the formulas. Delete the formulas from Cell T13 to T21 under the "Grade" column.

Lastly, to demonstrate the power of filtering data, have the students calculate the average GPA for students in section "1" and then section "2". Ask them why they think the average GPA for section 1 is 2.3 and the average for section 2 is 2.8 – is it possible that students from section 1 are telling the students in section 2 about upcoming quizzes or exam information? The worksheet titled "Shell" in the Excel© spreadsheet "Grades_Instructors_Copy.xls" contains all the recommendations to this point and can easily be expanded upon to incorporate more Excel© skills if desired.

The functions introduced in this Excel© exercise are also useful for evaluating accounting

data. Many accounting software programs facilitate easy export of accounting data to Excel©. Once the data is in Excel© you can use Excel©'s many functions to analyze your data. For example, the subtotal function can be used to highlight minimum and maximum sales by region. The VLookup function can be used to calculate commissions for salespersons or tax rates to apply to income.

Expanding the Exercise

The authors present this example tutorial to teach the students certain Excel© skills. This example can easily be expanded by incorporating the following desirable Excel© skills:

1. Conditional formatting – highlight averages below 80% in Red or above 90% in green.
2. Scenario manager – demonstrate how changing the grade % table changes the overall GPA's.
3. Protecting cells – demonstrate how to lock down the spreadsheet so that only those items highlighted in blue are what can be changed so formulas are not overwritten.
4. Documenting – demonstrate how to insert a comment that informs other users of the spreadsheet that they can only change items in blue highlighting.
5. Countif function – demonstrate how to create a grade distribution.
6. Scalable printing – demonstrate how to adjust the print options to print the grade book in the desired format.

These are just a few of the Excel© skills that can be incorporated into the grade book example. The amount to include depends on the depth of coverage you prefer, time you have available and the method of presentation utilized.

Creating an Electronic Grade Book Shell for Actual Instructor Use

The above tutorial was designed to develop students' Excel© skills in an electronic grade book environment. However, there are a few other bells and whistles that the instructor can incorporate to make the grade book re-usable, efficient and grader friendly. The worksheet titled "Final_Product" in the Excel© spreadsheet "Grades_Instructors_Copy.xls" contains all the items from the "Shell" worksheet plus a few modifications. This part of the article addresses the modifications made and how one of the co-authors uses the spreadsheet during the semester.

If you design your courses in a similar manner in regards to the number of quizzes, projects and exams each semester, then the grade book shell can be created to easily calculate your grades. For example, if you give between 10 and 13 quizzes, then design the shell with the maximum (13) as it is easier to delete a few unneeded columns than to add columns. Similarly, if you generally have between 60 and 75 students, then design the shell with 75 rows.

	A	B
1	Name	Quiz # 1
23	Item Averages:	
24	Quizzes	76%
25	Projects	83%
26	Exams	79%
27	Total Average	79%
28	Adj Total Avg	80%

The first modification made to the grade book is to also include quiz, project, exam, total and adjusted total averages (Cells A23 to B28). These are rough straight (not weighted) averages for each of the items and are calculated using the average function.

Analyzing this information provides the instructor with an overview of how the students are

doing. In addition you can inform the students that by allowing them to drop 2 quizzes that it increased the overall average in the class by about 1% - the students appreciate the generosity.

The second modification to the grade book was to delete the items in Cells U13 to U19 and U21. Only the overall GPA was kept and in Cells V16 and V17 the text "Drop #1" and "Drop #2" were added. These items were added because there are some students that drop the course and are eliminated from the Blackboard roster. It is desired to see the overall GPA with and without drops. Students that dropped are generally failing the course. So the formula in Cell U20 is modified to include the Cells down to U19. As long as the cells are blank and do not contain a value, they will not affect the overall GPA. To calculate the overall GPA including the students that dropped, simply input a 0 in each row by the Drop #1, Drop #2, etc. until you have accounted for all the students that dropped the course.

	S	T	U	V
1	Grade %	Grade	Grade Pt	Name
2	92.5%	A	4	Student #7
3	89.5%	B	3	Student #6
4	86.8%	B	3	Student #5
5	82.8%	B	3	Student #4
6	80.8%	B	3	Student #1
7	80.5%	B	3	Student #2
8	78.5%	C	2	Student #10
9	74.3%	C	2	Student #8
10	72.5%	C	2	Student #3
11	62.3%	D	1	Student #9
12				
13	100.0%			Points Possible
14				
15				
16	0.6			Drop #1
17	0.9			Drop #2
18	93%			
19				
20	0.8		2.60	Avg GPA
21	80%			

A third modification is to include a grade distribution in cells V24 to W29. This allows the instructor to see the number and percentages of the different grades assigned. This is accomplished by using the "countif" function. For example in Cell V24, the following formula was entered "=COUNTIF($U$2:$U$19,U24)". The formula counts the number of times that the range U2 to U19 matches the grade point (grade) of 0 (F). By simply summing the counts and dividing by the total, the instructor can obtain the grade distributions.

	S	T	U	V	W
23				# of F, D, C, B, A	% of Grades
24	0%	F	0	0	0%
25	60%	D	1	1	10%
26	70%	C	2	2	20%
27	78%	B	3	5	50%
28	89%	A	4	2	20%
29				10	100%

The last modification was to add exam % scores. If a student has a borderline grade, one co-author analyzes exam scores and trends. Generally students can raise their scores by group projects, so exam scores are examined for increasing / decreasing trends and whether the individual has earned the possible curve. For example, Student #6 set the curve on the final (85%) and probably deserves an "A" in the course.

	S	T	U	V	W	X	Y	Z	AA
1	Grade %	Grade	Grade Pt	Name	Major	Section	Exam #1%	Exam #2%	Exam #3%
2	92.5%	A	4	Student #7	Acct	2	97.0%	95.0%	80.0%
3	89.5%	A	4	Student #6	Acct	1	93.0%	91.0%	85.0%
4	86.8%	B	3	Student #5	Acct	2	86.0%	90.0%	81.0%
5	82.8%	B	3	Student #4	Fin	2	85.0%	88.0%	78.0%
6	80.8%	B	3	Student #1	Acct	2	78.0%	85.0%	73.0%
7	80.5%	B	3	Student #2	Acct	1	83.0%	81.0%	75.0%
8	78.5%	B	3	Student #10	Acct	2	80.0%	77.0%	72.0%
9	74.3%	C	2	Student #8	Fin	2	76.0%	80.0%	65.0%
10	72.5%	C	2	Student #3	Fin	1	73.0%	77.0%	66.0%
11	62.3%	D	1	Student #9	Acct	1	56.0%	62.0%	58.0%

Once the shell is created the process is somewhat simple. First, download the grades from the course management system. If you are using Blackboard, the grade data is saved in an "Export.CSV" file that can be opened in Excel©. Copy the quiz data to the quiz section, the project data to the project section and the exam data to the exam section. Find and replace the blank values with zeroes. Make sure your points possible are correct for each of the items copied. Sort the data to determine grade cutoffs.

One co-author shows the students where they stand after every exam during the semester. Of course the names are deleted and the students are informed to look up their total points the day before going over the exams so they can identify which row is theirs. For example, Student #4 would look up their total points (before dropping quizzes) on Blackboard and find they have 333 points. They would then be able to compare their performance with the rest of the class (see next page).

	A	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1	Name	Total Points	Smallest Quiz	2nd Smallest	Adj Total	Grade %	Grade	Grade Pt	Name	Major	Section	Exam #1%	Exam #2%	Exam #3%
2	Student #7	379	4	5	370	92.5%	A	4	Student #7	Acct	2	97.0%	95.0%	80.0%
3	Student #6	364	3	3	358	89.5%	A	4	Student #6	Acct	1	93.0%	91.0%	85.0%
4	Student #5	355	4	4	347	86.8%	B	3	Student #5	Acct	2	86.0%	90.0%	81.0%
5	Student #4	333	0	2	331	82.8%	B	3	Student #4	Fin	2	85.0%	88.0%	78.0%
6	Student #1	329	3	3	323	80.8%	B	3	Student #1	Acct	2	78.0%	85.0%	73.0%
7	Student #2	327	2	3	322	80.5%	B	3	Student #2	Acct	1	83.0%	81.0%	75.0%
8	Student #10	321	3	4	314	78.5%	B	3	Student #10	Acct	2	80.0%	77.0%	72.0%
9	Student #8	303	3	3	297	74.3%	C	2	Student #8	Fin	2	76.0%	80.0%	65.0%
10	Student #3	293	0	3	290	72.5%	C	2	Student #3	Fin	1	73.0%	77.0%	66.0%
11	Student #9	253	2	2	249	62.3%	D	1	Student #9	Acct	1	56.0%	62.0%	58.0%
12														
13	Points Possible	410	5	5	400	100.0%			Points Possible					

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Name	Quiz #1	Quiz #2	Quiz #3	Quiz #4	Quiz #5	Quiz #6	Quiz #7	Project #1	Project #2	Project #3	Exam #1	Exam #2	Exam #3	Total Points	Smallest Quiz	2nd Smallest	Adj Total
2		5	5	5	5	5	5	4	24	25	24	97	95	80	379	4	5	370
3		4	3	4	3	5	3	4	23	21	25	93	91	85	364	3	3	358
4		5	4	5	5	4	4	4	21	24	22	86	90	81	355	4	4	347
5		2	3	4	4	0	4	3	20	20	22	85	88	78	333	0	2	331
6		3	3	4	5	5	4	4	22	20	23	78	85	73	329	3	3	323
7		3	4	4	3	2	5	4	20	22	21	83	81	75	327	2	3	322
8		4	4	3	5	4	5	5	19	21	22	80	77	72	321	3	4	314
9		3	3	4	4	5	4	3	19	17	20	76	80	65	303	3	3	297
10		4	4	3	5	0	4	3	18	16	20	73	77	66	293	0	3	290
11		2	2	3	4	3	4	4	18	16	21	56	62	58	253	2	2	249
12																		
13	Points Possible	5	5	5	5	5	5	5	25	25	25	100	100	100	410	5	5	400
14																		
15																	1	
16	Minimum	2.0	2.0	3.0	3.0	0.0	3.0	3.0	18.0	16.0	20.0	56.0	62.0	58.0	253.0	0.0	2.0	249.0
17	Maximum	5.0	5.0	5.0	5.0	5.0	5.0	5.0	24.0	25.0	25.0	97.0	95.0	85.0	379.0	4.0	5.0	370.0
18	Maximum %	100%	100%	100%	100%	100%	100%	100%	96%	100%	100%	97%	95%	85%	92%	80%	100%	93%
19																		
20	Average	3.5	3.5	3.9	4.3	3.3	4.2	3.8	20.4	20.2	22.0	80.7	82.6	73.3	325.7	2.4	3.2	320.1
21	Average %	70%	70%	78%	86%	66%	84%	76%	82%	81%	88%	81%	83%	73%	79%	48%	64%	80%
22																		
23	Item Averages:																	
24	Quizzes	76%																
25	Projects	83%																
26	Exams	79%																
27	Total Average	79%																

By pointing out to the students that the maximum % is generally greater than 95% (except on the final), then there is less whining about the difficulty of the course (see maximum % on the previous page). It is not always the same student that has the high score, but it allows the students to see that at least someone was able to obtain a high score and maybe they should work harder if they want a better grade – but that it is possible.

The co-author also demonstrates how grades are determined at the end of the semester. They inform the students to look for natural breaks. Using the example data, the students generally see that the curve will probably be at 89% for A's, 78% for B's 70% for C's and 60% for D's. The only thing that needs to be changed is the blue % scores in the table (Cells S27 and S28). Once the changes are made, the vlookups automatically change the grades and grade points. The students can see that the overall GPA for the course is 2.80, the distribution of the grades and where they stand. Over the years, several students have commented that they appreciated being able to see where they stand so they could determine how hard they needed to study for the final and that they felt the grade assignment process was fair. The next section discusses a few items to consider when designing the grade book.

	R	S	T	U	V	W
1	Adj Total	Grade %	Grade	Grade Pt	Name	Major
2	370	92.5%	A	4	Student #7	Acct
3	358	89.5%	A	4	Student #6	Acct
4	347	86.8%	B	3	Student #5	Acct
5	331	82.8%	B	3	Student #4	Fin
6	323	80.8%	B	3	Student #1	Acct
7	322	80.5%	B	3	Student #2	Acct
8	314	78.5%	B	3	Student #10	Acct
9	297	74.3%	C	2	Student #8	Fin
10	290	72.5%	C	2	Student #3	Fin
11	249	62.3%	D	1	Student #9	Acct
12						
13	400	100.0%			Points Possible	
14						
15						
16	249.0	0.6			Drop #1	
17	370.0	0.9			Drop #2	
18	93%	93%				
19						
20	320.1	0.8		2.80	Avg GPA	
21	80%	80%				
22						
23					# of F, D, C, B, A	% of Grades
24		0%	F	0	0	0%
25		60%	D	1	1	10%
26		70%	C	2	2	20%
27		78%	B	3	5	50%
28		89%	A	4	2	20%
29					10	100%

Potential Problems and Solutions with the Electronic Grade Book

There are a couple of items to watch out for and consider when using the electronic grade book.[13] As mentioned earlier, if students are not given a grade of "0" in Blackboard™, then the "Small" function will not select the correct quiz scores to drop. Make sure and either enter the "0" grades in Blackboard™ or perform the find and replace function in Excel©.

A second item to watch out for is to make sure and delete empty, unused columns so the calculations are not inaccurate. For example, the items in B24 to B28 (averages) would be wrong if unused items were not deleted – this is especially important if you show the students where they stand during the semester.

Lastly, if you assign different point values to the quizzes, then the small function may erroneously drop a quiz. For example, a student could get a score of 3 out of 3 on a quiz and a 4 out of 5 on another quiz, but the score of 3 would be dropped because it is the lowest value. Possible solutions are to keep the quizzes the same values or to just inform the students that the lowest scores will be dropped regardless of which quizzes they are.

CONCLUSIONS

Both the AICPA and the survey by Bain et al. (2002, Table 13) acknowledge the desire for students to be technologically competent as they enter the work force. The purpose of this article is to provide a practical case (instructor's electronic grade book) in which students are taught numerous Excel© skills to better prepare them for future job requirements. In the authors' experience, when students learn sophisticated spreadsheet techniques they are motivated to use Excel© more frequently because they can perform advanced functions. The more exposure the students have to Excel© in the classroom, the more comfortable they feel using it as a standard tool for analysis. Informal discussions with accounting professionals in our respective business communities confirm that the students are expected to utilize advanced functions when they begin their professional career. Completion of this tutorial in the classroom will better prepare students for their accounting careers.

A side benefit to instructors is an efficient, re-usable spreadsheet to make assigning students' grades easier. Additionally we have provided some examples of how errors can occur if individuals are not aware of how Excel© functions operate. Many companies use spreadsheet applications within their accounting departments to calculate information for the financials such as EPS or percentage of completion items. With an increased reliance on spreadsheet generated financial information, it is critical to understand how functions work if they are to be relied upon for decision making. Helping students understand and develop competencies in Excel©Excel© will help them as they enter the workforce and begin working with EExcel© in this manner.

[13] You should always keep a blank "shell" of the electronic grade book so before you start changing the grade book you should create a backup copy by performing a "file", "Save as".

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APPENDIX A – POSSIBLE STUDENT PROJECT HANDOUT ASSIGNMENT

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Name	Quiz #1	Quiz #2	Quiz #3	Quiz #4	Quiz #5	Quiz #6	Quiz #7	Project #1	Project #2	Project #3	Exam #1	Exam #2	Exam #3	Major	Section
2	Student #1	3	3	4	5	5	4	4	22	20	23	78	85	73	Acct	2
3	Student #2	3	4	4	3	2	5	4	20	22	21	83	81	75	Acct	1
4	Student #3	4	4	3	5	-	4	3	18	16	20	73	77	66	Fin	1
5	Student #4	2	3	4	4	-	4	3	20	20	22	85	88	78	Fin	2
6	Student #5	5	4	5	5	4	4	4	21	24	22	86	90	81	Acct	2
7	Student #6	4	3	4	3	5	3	4	23	21	25	93	91	85	Acct	1
8	Student #7	5	5	5	5	5	5	4	24	25	24	97	95	80	Acct	2
9	Student #8	3	3	4	4	5	4	3	19	17	20	76	80	65	Fin	2
10	Student #9	2	2	3	4	3	4	4	18	16	21	56	62	58	Acct	1
11	Student #10	4	4	3	5	4	5	5	19	21	22	80	77	72	Acct	2

Assignment – assume you have been hired as an instructor's aid and have been given the students' grade information above that has been imported from Blackboard. You are to design a grade book using Excel© that will provide the following information:

1) The total points possible for each assignment are as follows:
    a. Quizzes – 5 points possible for each quiz.
    b. Projects – 25 points possible for each project.
    c. Exams – 100 points possible for each exam.
2) Minimum, Maximum and Average scores for each assignment (quiz, project and exam). Also find a Maximum % and Average % for each assignment.
3) Total each student's points and the total points possible.
4) Allow the grade book to drop the lowest quiz score and provide the opportunity to drop the second lowest quiz score if the instructor decides to be that generous.
5) The overall average quiz, project, exam and total scores before and after dropping a student's lowest quiz score(s).
6) Calculate each student's score as a percentage of the total adjusted possible points.
7) Have the grade book automatically assign a student a letter grade based on a scale of 90%, 80%, 70%, 60% and below with the option of being flexible in the event the instructor desires to curve the grades.
8) Calculate the individual student's GPAs and provide an overall average GPA. Also make this flexible in the event the instructor desires to curve the grades.
9) Calculate each student's exam % score for the instructor to analyze for trends and possible curves.
10) Provide a grade distribution by having the spreadsheet automatically calculate the number of and % of each grade awarded ("A", "B", etc.).
11) Allow the instructor to analyze the data by putting it in order from the highest score to the lowest score.
12) Allow the instructor to analyze the data for cheaters by comparing average GPAs by major or section or both combined.
13) Make recommendations to the instructor about where you think the grading scale (curve) should be and if you think there is any cheating occurring.