The Use of an Integrative Project in a Computer Applications in Business Course

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ABSTRACT

To provide an academic richness to a course that focuses on the use of application software it is essential to not only learn how to use the tool but to provide a context for its use. A further necessary condition is developing the ability to recognize those problems that the tool can be used to effectively solved. The paper argues that to enhance the academic integrity of such a course requires an emphasis in modeling with the tool and developing problem solving skills that provide an opportunity to integrate the skills learned. In this paper an integrative project/case study is proposed as an approach for achieving this goal. Further this paper discusses factors that mitigate against its successful use.

INTRODUCTION – THE COURSE

In this section a general overview of the Computer Applications in Business course is presented. The catalog description for the course is: This course introduces software applications that are utilized in the business environment. There is a strong emphasis on effectively using these applications as problem solving tools. The course includes an extensive introduction to the use of spreadsheets in business processes. Additionally topics and applications selected from database design and use, presentational software, web page construction, effective use of the Internet, and a general introduction to the computer and computing.

Over the last seven years the department has used applications from the Microsoft Office Suite in the delivery of this course (Excel, Access, and PowerPoint) and FrontPage. In the instantiation of the course by this instructor the two primary emphases are on the use of spreadsheets and relational databases in the business environment.

The topics covered in the spreadsheet emphasis include the typical elementary topics, for example, absolute and relative referencing, formatting, the standard functions, creating a formula, creating graphs/charts, and decision making with =if(), =sumif(), =vlookup(), and =hlookup() functions. Other topics regularly included are the use of goal seek, solver, scenarios, data tables, using multiple worksheets and workbooks, pivot tables and charts, importing data, protection mechanisms, data validation, combo box control, command buttons, and an introduction to the use of Visual Basic scripts for applications.

In the database emphasis, a typical collection of topics include intuitive relational database design methodology, data redundancy, data integrity, creating effective relationship tables, the use of primary keys, importing and exporting data, the use of validation and formatting, referential integrity, querying, creating and modifying forms, and password protecting.

Next, a brief description of how the Excel material is presented to the students is outlined. For virtually every topic there is a brief mini-lecture in which the particular topic is discussed in the context of a simple model. For example, if the =sum() function were being introduced the model might be of the monthly sales of a company's sales force. The scenario might request that the total sales, the total return on sales, and total net sales be computed. The students would be asked to make the preliminary calculations and then the use of the =sum() function would be illustrated. There typically would be a classroom exercise or two (depending on the complexity of the topic) and weekly homework exercises again presented as simple scenarios that the students would be required to complete. The classroom exercises allow the students to use the concept when assistance is readily available. If there are a number of questions or students get stuck on some point additional instruction is provided. Since the object of these exercises is to assist in the mastery of the material, students are permitted to help each other. There are frequent quizzes, worth a significantly larger portion of the course grade than the homework, to discourage students from simply copying.

OBSTACLES TO STUDENT MASTERY

A primary goal of the course is to prepare students to effectively utilize the skills and concepts developed in the course. Given a problem the expectation is that students can apply their modeling and design skills, recognize the potential tools for implementing the model and select the best ones, and to ultimately develop their problem solving skills. Two core impediments to achieving these objectives face an instructor – the nature of the audience and the support for these goals provided by textbooks.

The Audience: The design of the course emphasizes business applications. But, since the course satisfies the general education **computing** requirement at my institution, it is not unusual that 50% of class to have majors outside of business.

Students have demonstrated that they have difficulty in transferring the skills they learn solving one problem to analogous problems especially when presented as word problems or scenarios. This obstacle is typically tackled by practice with classroom and homework exercises, and, ultimately on quizzes and exams. Of course, time is a limiting factor in developing these skills during quizzes and exams. Still, the essential challenge is to have a venue for problems which require a number of functions, formula, and problem solving techniques where students are asked to organize the solution into a sequence of steps. Problems such as these develop the students' problem solving abilities and assist them in making the tool set they are learning their own.

Our approach in the past has been in two phases: first, a problem or a set of problems that have limited scope and that use a particular concept, function or technique. The second phase explores its use in a modestly larger setting where it a key component of a larger solution algorithm. The former is typical of a classroom exercise, a homework exercise or a quiz question. The latter type problem is more likely to appear as part of a homework problem following a phase one problem after a collection of such items are covered and to a limited extent on an exam problem. Quite frankly neither of these phases is sufficient due to scope of such an exercise and time constraints.

Textbooks: Virtually all of the texts I have reviewed for the course do not truly emphasize problem solving. In many cases in the tutorials and exercises the authors actually spell out the calculation to use and even where to place that calculation as well as the nature of the presentation of the data. In

fairness to these texts their primary focus is on accessing the features, the parameters available for the features, and the correct use of the features introduced in the chapter and giving the students practice in the use of the features. The O'Leary text [3] is an example of this type of text.

In my department the instructors use these textbooks to minimize the amount of time that needs to be spent working through all the details of the software menu system and the less frequently used parameters available in functions. The textbook's chapter tutorials do a very thorough job of that, and, in addition, provide broader coverage of the available features than a problem solving approach could ever hope to achieve.

A text such as Miller's[2], which contains a set of case studies appropriate for use in a course such as ours, does not provide the elementary topics needed for beginners to develop a facility and confidence with the application software. The book would be an excellent one for a follow up course for honing students design and problem solving skills with the software.

The text by Krishan [1] has a most promising title which includes the phrase "A Problem Solving Approach". The text does an interesting job of integrating the access and skills. In a number of sections the approach has a "just in time" feature to developing the instruction of how to access and use the features of Excel within the discussion of a problem. I found the presentation to be very accessible and does in fact cover most of the Excel topics but some not at the depth I would like. The text does provide some problems that require students to exercise their problem solving skills.

AN APPROACH TO INTEGRATION: PROJECTS/CASE STUDIES

As indicated in the paper title, the approach used was to exercise student problem solving skills and to assist them in integrating the tools, concepts and techniques covered in the Excel and Access portions of the course. The vehicle used was a fairly comprehensive project/case study.

There are two Excel projects and two Database projects which are briefly outlined below.

For both Excel projects students are advised that wherever possible entries should be calculated from other entries on the worksheets (rather than simply entering constants which are computed by hand or calculator).

A brief overview of the projects is provided below.

Excel project one: This project is an extension of a problem instructors have frequently utilized in the course. The basic scenario: Georgia Oceanside Vacations, located on the Georgia coast, is a popular area for family vacations from May through mid October. The property is run and managed by Bill and Agnes Downes. Reservations can be made for up to a year in advance. Agnes manages the reservations for Georgia Oceanside Vacations.

Agnes has decided that she is going to use an Excel workbook to maintain the reservations. Bill and Agnes are determined to integrate all their bookkeeping activities into the workbook. All their budgetary activities will reside on one of the worksheets in the workbook.

This case requires the student to compute current income based upon current rental information, to perform an income projection for the remainder of the season based upon historical rental data, to perform a cost analysis, and to make a projection of income and expenses for next year. The project has a requirement that a "what if" analysis must be included using the appropriate tools to develop the overall problem analysis.

The first two tasks have a model provided; the students are required to develop a model for the final two tasks.

Excel project two: The Mercury Energy Corporation is a small company that supplies products that are well known for their energy efficiency. The company chief executive officer Bill Kratzer wants to use Excel to maintain records of the company's benefits package and assist him in better understanding the financial impact of the package. Mr. Kratzer has requested that you develop this Excel workbook.

The benefits package has three major features: a medical plan, a dental plan, and a retirement plan. Each employee is free to allocate its benefits package allocation in any way they desire with the caveat that an employee must allocate at least 3% to the retirement plan. The students are to manage data on both the overall plan cost and the individual employee allocations. The selection of the employee's allocation requires a user-friendly interface. The project also requires a projection of the next year's company budget given percent increases in the plan costs and salary.

Tables containing medical plans and dental plans and an employee listing with salary and dependents are provided. All the remaining models are left for the students.

Database project one: An agent who represents a number of artists wishes to maintain a database which among other entities will contain the artifacts produced by these artists. The artifacts are shown at various venues and many are for sale. The agent has kept careful records of those patrons who have purchased artifacts or expressed interest in so doing.

It is essential that the agent be able to track the artifacts currently for sale and artifacts of artists the agent has sold (for possible purchase from owner for resale to interested patron). Each artifact that is for sale will have a price, a description of the artifact and possibly be on display at some venue.

The project provides the design of the three primary tables, Artists, Patrons and Venues. An Excel workbook containing three worksheets contains the data for these tables.

The requirements include the design of the relationship tables; the students are provided with the expected contents for a number of reports and queries they need to process. In designing the relationship table the students are cautioned to pay careful attention to redundancy. To protect the user from improper data entry data validation and formatting features are to be used wherever appropriate. Referential integrity is expected to be enforced.

Database project two: Lake Winona College is a private college that is required to maintain data on its internship program. Due to the complexity of the data, the numerous information requests and reports, internal and external, that the college is required to respond, the college has decided it is time to design a database and to enter the necessary data to meet these needs.

Amongst the data the college is required to track are the students participating in internships, the semester they participated, the internship course number, the participating companies, their location and other relevant information, the faculty sponsors, the company's internship supervisor, and more.

The first phase of the project requires the students to use the problem description to decide on the identity and design of the primary entity tables including the identification of the primary key and the attributes.

For the second phase all students are provided with a standard design of the primary entities by the instructor. They are required to design the relationship tables given a collection of queries and reports that need to be produced. In addition, data for the primary tables is provided for importing. As part of the case study requirements all listed reports and queries must be produced. The remainder of the case requirements are the same as provided above for the first database case study.

OBSERVATIONS, ADJUSTMENTS, AND WHAT NEXT

Assigning the case study where students have a number of weeks to complete their work caused me to be concerned about the independence of their work. To address this concern I took the following precautions. First, I assigned different case studies to students that I had observed working together on lab and tutorial exercises. Since the primary function of lab and tutorial activities is to learn Excel's functionality and how to use it in solving problems, this cooperation is permitted and, in fact, often encouraged. Second, as part of the grade for the case, study students were told there would be a question or two on a subsequent quiz or the final (in actuality it was the final) which required the students to discuss how they approached solving a specific part of the case study or asked them to solve a problem very similar to a component of the project.

It turned out that in examining the results of the case study there was no evidence that information or approaches were shared. The presentation and the approaches used were in most cases quite dissimilar. Within the projects the students were provided with opportunities to approach a subproblem in a variety of ways. During the assessment of the projects it became clear that they did not think through the consequences of their choices in completing that portion of the project or did not connect their choice with the rest of the project. In general, the quality of solutions on the project matched performance on the students' other assessed work in class.

I decided to wait to distribute the case study until the class had covered all the material needed to successfully complete all aspects of its requirements. Since the work required to do well on the case study was quite extensive by the time the student solutions were completed there was insufficient time left in the semester to complete the database case study. In the next iteration of the course I plan to distribute the case study to the students during the second week of classes with a due date of one week after the completion the Excel portion of the course.

Grades	Distribution	Distribution	Distribution
	Course Grades	Case Study Grades	Final Exam Problem
А	3	2	3
В	7	7	5
С	7	6	7
D	5	6	5
F	2	3	4

Table 1: Comparative grade distribution

The results on the case study related question on the final examination indicated that the students had learned the material at least to the level they had in other graded activities in the course. The results contained in Table 1 do not, in and of themselves, guarantee that their work was done independently. But based upon the questions I was asked and the end results I believe that the project was reasonably successful; that is, the students, even those whose grades were not stellar, showed a level of mastery of the requisite Excel material and problem solving skills. And, they were able to successfully use these skills in the project which was the primary goal of the exercise.

SELECTED REFERENCES

[1] Kirshan, S.I., Computing with Excel and VBA, A Problem Solving Approach, Jones and Bartlett, 2009.

[2] Miller, M. Lisa, MIS CASES Decision Making with Application Software, Prentice-Hall, 2003.

[3] O'Leary, L. & O'Leary T., Microsoft Office 2007 Excel, Introductory Edition, McGraw-Hill, 2007.