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Teaching and educational notes

Teaching good Excel design and skills: A three spreadsheet assignment project

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ABSTRACT

Over sixty percent of AIS courses cover Excel because it is an important tool for accounting students to learn and master. Although spreadsheet programs like Excel provide powerful analytical tools for business, in practice, they are often created and used by people with minimal programming experience. Consequently, users can often develop spreadsheets containing critical errors, which, in turn, can cause significant losses for their businesses. Errors can be reduced, however, by learning and employing good spreadsheet design techniques. Good spreadsheet design also makes it easier to update and continue to use a spreadsheet over time. This paper describes a method for teaching spreadsheet design where students complete three spreadsheet assignments in an iterative and repetitive process. By the time students have completed these assignments, they will have acquired good spreadsheet design skills and improved their basic Excel skills.

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1. Introduction and project approach

General agreement exists in the accounting profession that accounting graduates should possess good spreadsheet skills. Substantial evidence exists, however, that spreadsheets created in practice often contain errors, and several studies show that good design would minimize these errors. According to one survey, over 60 percent of Accounting Information Systems (AIS) courses taught cover spreadsheets and include spreadsheet assignments and projects (Premuroso & Herron, 2012). Consequently, AIS seems to be a good place to teach spreadsheet design to accounting majors. This paper illustrates a way to teach good spreadsheet design and basic spreadsheet skills with a project that includes three spreadsheet assignments. The project starts with a simple spreadsheet assignment that illustrates the basics of good design along with some definitions required for basic programming. It ends with a more complex spreadsheet designed to support a decision.¹ There are various foci and learning objectives that can be associated with this project such as systems development and design principles; input, processing, and output controls; and auditability issues.

Spreadsheets are used throughout organizations for various purposes. In a survey of Tuck Business School Alumni, 77% of the respondents thought that spreadsheets were “very important” to “critical” in their job (Madahar, 2011). They also felt that although they had extensive experience with spreadsheets, they only had limited expertise. It did not appear from the responses that experience had significantly increased their expertise; therefore, training might be useful in increasing their expertise because more than half had not been formally trained to use or design spreadsheets (Madahar, 2011). Surveys

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¹ The purpose of these assignments is to teach good design, not Excel skills. It is the opinion of the author that students are more likely to pick up advanced Excel skills, rather than good design (i.e., the use of complex formulas) on their own.

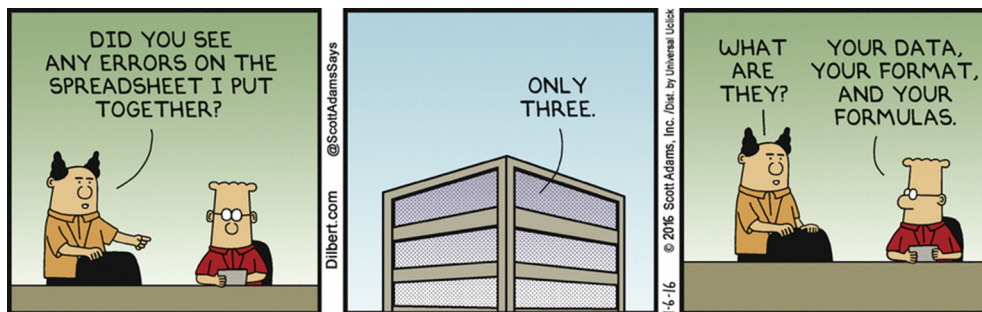
of companies have overwhelmingly shown that spreadsheets are used in financial reporting and therefore accountants would be the primary preparers and users of such spreadsheets (Panko, 2006). Therefore, by focusing on design in Excel instruction for accounting students, faculty can provide expertise not just experience.

Students should learn good spreadsheet design because currently, many individuals with little knowledge of programming create and ultimately utilize spreadsheets with critical errors that are relied on as part the decision-making process. For example, one spreadsheet error contributed to a six-billion-dollar loss at JP Morgan and was cited and discussed in an internal report that summarized an investigation into the loss:

“During the review process, additional operational issues became apparent. For example, the model operated through a series of Excel spreadsheets, which had to be completed manually, by a process of copying and pasting data from one spreadsheet to another.”

[Report of JPMorgan Chase & Co. Management Task Force Regarding 2012 CIO Losses, 2013, p. 124]

This is not the only example of a critical error involving spreadsheets. For example, after a great deal of research in the area of examining and documenting spreadsheet errors, overwhelming evidence exists that significant quantitative errors occur (Panko & Aurigemma, 2010). Good spreadsheet design has been found to be helpful in minimizing and eliminating errors in spreadsheets (Janvrin & Morrison, 2000a, 2000b; Kreie, Cronan, Pendley, & Renwick, 2000). To design is to provide, “a basic scheme or pattern that affects and controls function or development” (<http://www.thefreedictionary.com/design>, 2013). Therefore, good spreadsheet design should provide a scheme or pattern that controls for errors and provides for functional information.



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The primary learning objectives of the project are to: introduce students to the reality that errors in spreadsheets are common; demonstrate that good design principles will help minimize those errors; show that good design ultimately makes easily understood and modifiable spreadsheets, and most importantly, learn how to minimize calculation errors by utilizing good design principles. These objectives may be expanded depending on where in the curriculum these objectives are covered. The only prerequisites for the project are for the student to be able to create basic spreadsheets in Excel and to have a basic understanding of fundamental business topics, such as those taught in introductory business classes.

The incremental approach using three spreadsheet assignments provides a way to teach good spreadsheet design and basic spreadsheet skills with minimal effort and classroom time. The approach starts with providing the students exposure to and practice with the basics of good design using a simple spreadsheet, which illustrates design concepts along with some definitions required for basic programming and ends with a more complex assignment designed to support a management decision. This hands-on approach is both repetitive and iterative. Students must use the global principles of good spreadsheet design and adapt them to each spreadsheet as the requirements change. Students discover, as they interact with each spreadsheet, that they can easily make changes to assumptions (e.g., estimating growth rates in sales) and avoid common errors that often remain hidden in the results (e.g., entering fixed numbers into calculations).

2. Implementation guidance

This project, consisting of three separate spreadsheet assignments, can be implemented by utilizing: (1) one to one and one-half 75-min class meetings and (2) two 15 min sessions in subsequent classes. In the next sections, I describe the steps shown in Fig. 1 for implementing the project.²

² More detailed project implementation guidance is located in Appendix A.

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