Accounting Students Opinions towards use of Spreadsheets as an Instructional Tool

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Abstract

Does the use of spreadsheets in applied business instruction promote conceptual understanding of course material by students? To understand this issue we survey accounting students of an institute of higher learning based in Southeastern Unites States. Results from this survey using a Kolmogorov-Smirnov test indicate that there is a preference among students for use of spreadsheets in classrooms as a teaching aide.

Keywords: Spreadsheets, Applied Business Instruction, Classroom teaching

1. Introduction

Several business school educators have started using spreadsheets and other visual presentation media for instructional purposes. Many textbooks have also started including spreadsheet solutions as part of the instructor materials that accompany the textbook. The convenience of these materials may lead instructors into thinking that this tool is a viable way to present subject materials. But is that really the case? Do students feel that spreadsheets provide an effective tool for demonstrating applied course material? The purpose of this study is to determine whether accounting students feel if they are effectively learning materials demonstrated using spreadsheet software, such as Excel.

Using spreadsheets as an instructional tool has been gaining popularity among instructors, primarily as these are believed to improve students modeling skills (Powell 1997a, 1998; Savage, 1997; Thiriez, 2001). Previous research on instructional delivery methods suggests that different courses normally encourage different learning methodologies. For example, Ramsden and Entwistle (1981) surveyed two thousand students from 66 academic departments in six different disciplines to understand "approach to studying" and concluded that a deep approach is more popular when teaching arts courses while case scenario simulation is prominent in applied

disciplines; such as science and engineering. Also, the importance of practical know-how in scholarship is gaining recognition among the applied business instructors. The use of spreadsheets in the classroom one way this objective can be achieved. Spreadsheet usage in applied business courses supports a shift from the traditional lecture approach (passive learning) to a more student-centered approach (active learning) methodology (Goddard et. al., 1995). Today, several applied business instructors rely on the use of spreadsheets as an educational tool to facilitate conceptual understanding; especially in disciplines such as Finance and Accountancy. Evidence of which can be found in the several text books available in the areas of applied Finance and Accountancy areas with focus on the use of spreadsheets (example, "Financial Analysis with Microsoft Excel" by Timothy R. Mayes and Todd M. Shank; "Managerial Decision Modeling with Spreadsheets" by Nagraj Balakrishnan, Barry Render and Ralph M. Stair, Jr.).

Instructors realize the benefits and usually use a combination of electronic tools for instructional purposes. Spreadsheets have been recognized as powerful problem solving tools in teaching applied concepts. The use of spreadsheets is likely to promote conceptual accounting understanding among students. This characteristic of spreadsheet design also promotes an open-ended, problem-oriented and self-investigative learning environment for students. Moreover, spreadsheets are interactive; they give immediate feedback for changing scenarios (such as varying source data or formulae). Accounting instruction design, which is primarily applied, can benefit from these characteristics. However, use of spreadsheets does have a learning curve. What do students themselves feel about the use of spreadsheets over traditional learning tools? To address this issue we surveyed accounting students of an institute of higher learning based in Mississippi. We suggest answers to the question about whether the use of spreadsheets in applied accounting classes promotes the conceptual understanding of course material by students.

The importance of this study is severalfold. Knowledge of student perceptions of the characteristics of spreadsheets can be helpful in the design of spreadsheets. Student spreadsheet preferences can play a role in course composition. Also, information on student "turn-offs" can help to avoid procedures which are distasteful to classes. In summary, the recommendations in this study facilitate teaching with spreadsheets. Training students with skills important to prospective employers is becoming integral in most business programs. Accounting professionals (and prospective employers) point out the importance of the problem solving capability or client data analysis with use of technology, particularly computers. Owing

to the ongoing trend of globalization and competitiveness, employers' expectations of skill-set of applicants applying for a job have increased.

However, it is equally important that the use of learning aids such as spreadsheets and traditional lectures is balanced. What do students themselves feel about the use of spreadsheets in accounting instruction? We analyzed this issue surveying accounting students. We also addressed the issue of preference of accounting students towards the use of spreadsheets in accounting class when compared to traditional teaching techniques (i.e. no electronic aids).

The results from our study indicate the preference of students for the use of spreadsheets in classrooms as a teaching aid. Our results correspond with the related literature that suggests that with increasing popularity of spreadsheets, instructors need continued refinement of their course structure and spreadsheet application knowledge to make spreadsheets an effective teaching tool for instruction and learning (Baker and Sugden, 2003).

The remainder of the paper is organized as follows. In section 2 we present a brief review of related literature in the use of spreadsheets in applied instruction. Section 3 describes the survey, data and methodology for current research. Section 4 presents the results of the survey. Section 5 provides concluding remarks and recommendations for future research.

2. Literature Review

The use of spreadsheets, without doubt, has emerged as an essential tool for modern business. The archived data and analysis content on a spreadsheet can be retrieved easily for reprocessing with changed numbers and scenarios. Spreadsheets are extremely useful for *what-if scenario analysis* and *data analysis*. Spreadsheets are interactive, give immediate feedback to varying data; enable data, formulae and graphical output to be available on the screen at once; provide students an effective alternative to have control and ownership over their learning; and, spreadsheets can solve complex problems and handle vast amounts of data without any requirement for knowledge of computer programming (Beare, 1993; Baker and Sugden, 2003).

Spreadsheets offer other advantages, including the ease of use and almost instantaneous numerical modeling possibilities (Baker and Sugden, 2003); spreadsheets promote more open-ended investigations, problem-oriented activities, and active learning by students (Beare 1992, Baker and Sugden, 2003). These characteristics of spreadsheets have been instrumental in reducing business operating expense. Furthermore, owing to the trend of declining computer hardware and software costs we have seen an increasing

adaptation of computers and spreadsheets software (Pemberton and Robson 2000). Over the years spreadsheets have evolved from very basic use such as quotation estimates, bill-of-materials, expenses and departmental budgets to complex applications such as high-level strategic data-analysis and forecasting for businesses.

According to Microsoft, there are over 300 million paid users are employing their popular version of spreadsheet program, Excel (The Register, 2010). With the unpaid users (using pirated versions) put together the total number of users of Excel program is even higher. Excel is now widely used to model real-life business situations, and the results are used for critical business decisions (Condon 2006). Excel is by far the leading example of spreadsheet software. Over 90 percent of respondents indicate its use for several business functions (Pemberton and Robson 2000). Excel, is becoming a preferred tool among accountants and auditors. According to Gray (2006), only 8 % of the surveyed accountants or auditors indicated that their departments did not use Excel at all.

It is natural that use of spreadsheet has found popularity among applied course instructors. According to Lewis (2001), spreadsheet assignments promote avenues to explore abstract concepts which are mathematical in nature. Students who developed a high level of expertise in the use of spreadsheets prior to taking an applied course demonstrate a distinct advantage in understanding underlying course concepts (Evans, 2000). As a problem solving tool, spreadsheets facilitate students visualization of mathematical concepts, permitting an intuitive approach for problem solving, and a situation using multiple representations for analysis (Sinclair, 1998).

Although not initially intended as an educational tool, spreadsheets have grown in popularity among applied course instructors, such as mathematics or business (Jones, 2005). Numerous studies have shown that the use of spreadsheets can lead to understanding of applied abstract topics such as time value of money, balance sheets, algebra and calculus. (Sutherland and Rojano 1993, Rojano 1996, Jones 2005) There has been an emergence and expansion of the spreadsheet as a teaching tool. Spreadsheets have gradually increased in their importance as a tool for teaching. Yet, despite the increasing popularity of spreadsheets, opportunities for improvement in its application still exist (Baker and Sugden, 2003).

Citing Kolb's (1984) four-stage cycle of learning, Marriott (2003) highlights that there is sufficient evidence to suggest that accountancy students (Baldwin and Reckers, 1984; Baker et al., 1986) and practitioners (Brown and Burke, 1987; Collins and Milliron, 1987) fall in a "convergers"

category. "Convergers" are defined as individuals who test the theory and practice and often combine conceptualization and experimentation. Individuals who prefer this style of learning have been found to be successful in their careers (Togo and Baldwin, 1990). Convergers also prefer to deal with things rather than people and respond best to situations where there is one correct answer (Marriott, 2003; Wilson and Hill, 1994). In a their study of the use of computers in accounting education (*business simulation*), Marriott (2003) concludes that the use of the computer simulation and spreadsheet modeling is successful in providing concrete experience of accounting as used in real world context. It enables students to practice and learn accounting skills. Further, computational tools aid in higher-level learning skill goals such as modeling.

Use of spreadsheets and what they are capable of continues to grow with innovation in software and application expertise of the users (Lacher, 1997). This greatly influences the way accounting is taught at universities. Accounting is inherently an applied discipline, which requires intensive computation and cross referencing. Spreadsheets aid in both computation as well as cross reference, while leaving the focus of the student on understanding of the concepts involved. Although not initially intended, owing to large built-in analytical capabilities and function lists, instructors and students have rapidly been adapting spreadsheets for leaning purposes. For example with Microsoft Excel, using available functions, instructors can educate students to perform tasks such as maintenance of financial and accounting statements or use available statistical tests, to demonstrate Multiple regression analysis or use Monte Carlo simulations aid students visualize various hedging strategies (Mayes and Shank, 2010). Possibilities of adapting spreadsheets in classroom setting are quite endless.

3. Data and Methodology

As the research setting, we developed a questionnaire based on a previous study done by Dania et al. (2007) and Simpson et al. (2003), which investigates student opinions towards the use of Excel and PowerPoint in classroom lectures (see appendix 1). A five-point scale ranging from "strongly agree" to "strongly disagree" is used to record student responses to questions concerning the use of spreadsheet in accounting classrooms.

Data were collected using a self-administered questionnaire provided to graduate students of an accounting class of an institute of higher learning based in Southeastern United States. Most students have had several accounting courses taken previously, however with little or no use of spreadsheets. The questionnaire and instructions were handed out to students during their scheduled class. After students returned their

responses, questionnaires were analyzed for missing data and responses. Responses were completely anonymous and students had the option of opting themselves from filling the survey. Survey participation was left completely at students own accord and no incentive paid or otherwise was promised or given to participating students. In all twenty four surveys were handed out. Eighteen responses were deemed fit in correctness for analysis. Two surveys were incomplete and four did not wish to participate in the study. The data form questionnaires were entered into SPSS software and analyzed. The Komogorov-Smirnov One-Sample Test is used to evaluate the student opinion towards the use of spreadsheets in accounting class. Considering response size, non-parametric analysis is appropriate for the current study.

Table 1: Descriptive Statistics
Descriptive statistics for the student response on their opinion regarding the use of spreadsheets as a teaching aid in accounting classes. The variables V1 – V25 are questions on the questionnaire. N are the number of responses found usable for analysis. Mean, Median, Std. Deviation, Maximum and Minimum represent individual descriptive statistics for each variable.

Variable	N	Mean	Std. Devn	Minimum	Maximum
V1	18	4.389	0.698	3	5
V2	18	4.333	0.594	3	5
V3	18	4.500	0.618	3	5
V4	18	4.389	0.698	3	5
V5	18	4.222	0.647	3	5
V6	18	3.889	0.832	2	5
V7	18	4.222	0.647	3	5
V8	18	4.389	0.608	3	5
V9	18	3.667	0.840	2	5
V10	18	4.389	0.502	4	5
V11	18	4.111	0.758	3	5
V12	18	3.722	1.018	2	5
V13	17	3.444	1.097	1	5
V14	18	3.500	1.098	1	5
V15	18	4.333	0.767	3	5
V16	18	4.500	0.618	3	5
V17	18	4.333	0.594	3	5
V18	18	3.944	0.725	3	5
V19	18	3.667	1.188	1	5
V20	18	4.111	0.676	3	5
V21	18	4.111	0.963	2	5
V22	18	3.778	0.808	2	5
V23	18	4.556	0.616	3	5
V24	18	4.444	0.616	3	5
V25	18	4.611	0.502	4	5

Non-parametric tests place less stringent demands on the data being analyzed, especially its sample size. Standard parametric procedures place strict underlying assumptions, particularly for sample sizes. The one-sample *t-test*, for example, requires that sample observations be drawn from a normally distributed population. If these conditions are violated, we may not rely on the resulting P-values and confidence intervals. However, normality is not a core assumption for the Kolmogorov-Smirnov test to produce valid

inferences. When Kolmogorov-Smirnov one-sample test (Daniel 1990) is applied, the focus is placed on two cumulative distribution functions: a hypothesized cumulative distribution (in this study, uniform distribution) and the observed cumulative distribution (survey response). To perceive that student response is going to be normally distributed would place bias in research. Furthermore, a Kolmogorov-Smirnov test is appropriate when response data are nominal in structure[1].

4. Results

The student responses are tested using SPSS statistical software. Table 2 shows the results of the Kolmogorov-Smirnov test. Columns V1 through V25 (Variable 1 – Variable 25) represent the results of the student's responses. The responses were tested at an alpha level of .05.

[1] The appropriateness of nonparametric tests for a survey response such as our study has been widely discussed by Daniel (1990).

Table 2: Analysis of Student Survey: (One-Sample Kolmogorov-Smirnov Test)

Kolmogorov-Smirnov test result for the student response on their opinion regarding the use of spreadsheets as a teaching aid in accounting classes. The variables V2 – V26 are questions on the questionnaire. Asymp. Sig. (2-tailed) indicates the statistical significance. When a Kolmogorov-Smirnov (K-S) test (Daniel 1990) is applied; the focus is placed on two cumulative distribution functions: a hypothesized cumulative distribution (in this study, a uniform distribution) and the observed cumulative distribution (survey response).

		V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20	V21	V22	V23	V24	V25
N		18	18	18	18	18	18	18	18	18	18	18	18	17	18	18	18	18	18	18	18	18	18	18	18	18
Normal Parameters	Mean	4.389	4.333	4.500	4.389	4.222	3.889	4.222	4.389	3.667	4.389	4.111	3.722	3.444	3.500	4.333	4.500	4.333	3.944	3.667	4.111	4.111	3.778	4.556	4.444	4.611
	Std. Deviation	0.698	0.594	0.618	0.698	0.647	0.832	0.647	0.608	0.840	0.502	0.758	1.018	1.097	1.098	0.767	0.618	0.594	0.725	1.188	0.676	0.963	0.808	0.616	0.616	0.502
Most Extreme Differences	Absolute	0.309	0.324	0.346	0.309	0.301	0.275	0.301	0.294	0.231	0.392	0.225	0.205	0.194	0.231	0.308	0.346	0.324	0.253	0.222	0.287	0.266	0.275	0.376	0.317	0.392
	Positive	0.211	0.324	0.235	0.211	0.301	0.225	0.301	0.294	0.231	0.392	0.225	0.205	0.157	0.158	0.192	0.235	0.324	0.247	0.131	0.287	0.178	0.225	0.235	0.265	0.277
	Negative	-0.309	-0.258	-0.346	-0.309	-0.254	-0.275	-0.254	-0.287	-0.210	-0.277	-0.220	-0.173	-0.194	-0.231	-0.308	-0.346	-0.258	-0.253	-0.222	-0.268	-0.266	-0.275	-0.376	-0.317	-0.392
Kolmogorov-Smirnov Z		1.394	1.313	1.374	1.469	1.313	1.277	1.168	1.277	1.249	0.979	1.663	0.954	0.872	0.822	0.981	1.305	1.469	1.374	1.072	0.940	1.220	1.130	1.167	1.595	1.343
Asymp. Sig. (2-tailed)		0.041	0.064	0.046	0.027	0.064	0.076	0.131	0.076	0.088	0.293	0.008	0.322	0.433	0.509	0.291	0.066	0.027	0.046	0.200	0.340	0.102	0.155	0.131	0.012	0.054

Student opinions on the following questions were significant: V1 (Excel examples help me understand ideas, V2 (Excel examples add interest to the material, V3 (I understand the lecture better when presented using Excel examples, V4 (Excel examples help organize the main points of the lesson), V5 (Excel text on the screen is large enough to read), V6 (Long solutions of Excel examples are easy to read), V8 (The pace of the course when using Excel is faster than when using chalkboard only), V9 (I feel that I do not need to attend the class if I receive the Excel solutions before or after a lecture), V11 (The use of Excel examples is helping me get a better grade in this course), V16 (Excel examples help me ask relevant questions about the material, V17 (The way Excel is used in the class helps with class discussion), V18 (The instructor balances to the use of overhead projector screen and traditional lecture when using Excel, V24 (All things considered, I would take another course that uses Excel in a similar way, V25 (Overall, I prefer Excel over strictly lecture classes).

Results from the test indicate that student responses incline towards an opinion of agreement towards the following variables: V1, V2, V3, V4, V5, V8, V16, V17, V24 and V25. The results from the test also indicate that student responses incline towards neutral or moderate agreement for the following variables: V6 and V9. However, important are results for V24 and V25 which indicates an overall student preference for the use of a spreadsheet based class over a strictly lecture class.

Hence, the results from this study exhibit that student preference towards the use of spreadsheets in applied coursework teachings such as accounting. This is reflected from student comments listed on the survey, for e.g. "Excel examples help me understand ideas"; "Excel examples add interest to the material"; "Overall, I prefer Excel over strictly lecture classes." Overall, the surveyed students seem to agree on the benefits of the use of spreadsheets in the class.

While there are several benefits of using spreadsheets, in applied courses such as accounting, a customized balanced approach between traditional lecture and the use of spreadsheets is better recommended. Students often express concerns that with the use of spreadsheets, course instructors may cover new material too quickly (agreement for V8: The pace of the course when using Excel is faster than when using chalkboard only). Moreover, the use of spreadsheets themselves requires conceptual understanding of computing, and may present a steep learning curve (of spreadsheet software) for students and instructors. Students who may not have been exposed to computers may feel left behind in classrooms using spreadsheets extensively. Instructors who have not been exposed to the use of computing or related software may find it difficult to design courses based

on spreadsheets. A recommendation may be to take a pre-assessment of the skill level of students in the knowledge of spreadsheets. Another recommendation is to hold classes using spreadsheets in computer labs with help of research assistants who are well conversed with use of computers and spreadsheets. These are relevant and important issues; however, we leave these issues to be explored as a future study.

5. Conclusion

The purpose of this research was to analyze whether the use of spreadsheets in applied courses such as accounting promotes the conceptual understanding of course material by students. The survey results from our study seem to indicate the preference of students for the use of Excel in classrooms as a teaching aid. Statistical analysis of our study suggests that sampled students indicate preference for a spreadsheet incorporated class over an accounting class based on traditional lecture techniques.

For future studies, we recommend covering other applied courses in business disciplines (finance, economics) and engineering (electrical, computer science), etc. We also recommend a survey of students from different demographic backgrounds and countries. Finally, it would be interesting to analyze the same research questions from the perspective of the instructors of applied courses.

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Appendix 1: Student survey questionnaire

Student survey questionnaire is designed to assess student opinion towards the use of spreadsheets in accounting classes. The questionnaire is based on a previous study done by Dania et al. (2007), and Simpson et al. (2003). A five-point ordinal scale ranging from "strongly agree" to "strongly disagree" is used, (SA – Strongly agree, A – Agree, N – Neutral, D – Disagree, and SA – Strongly disagree).

Survey Questions

	Questions	SA (5)	A (4)	N (3)	D (2)	SD (1)
1	Excel examples help me understand ideas.					
2	Excel examples add interest to the material					
3	I understand the lecture better when presented using Excel examples.					
4	Excel examples help organize the main points of the lesson.					
5	Excel text on the screen is large enough to read.					
6	Long solutions of Excel examples are easy to read.					
7	The lighting in the classroom is bright enough for taking notes when using Excel on an overhead projector					
8	The pace of the course when using Excel is faster than when using chalkboard only.					
9	I feel that I do not need to attend the class if I receive the Excel solutions before or after a lecture.					
10	Being able to review Excel solutions after class helps me to reinforce my understanding of the material.					
11	The use of Excel examples is helping me get a better grade in this course.					
12	I do not think I could pass this course if Excel examples were not available.					
13	I would prefer for the instructor to use the chalkboard rather than Excel.					
14	I would prefer the instructor provide more lectures and discussion rather than provide Excel examples.					
15	Excel examples help organize the main points of the lesson.					
16	Excel examples help me ask relevant questions about the material.					
17	The way Excel is used in the class helps with class discussion.					
18	The instructor balances to the use of overhead projector screen and traditional lecture when using Excel.					
19	There is less face to face instructor-student interaction when using the chalk board method					
20	The instructor balances Excel examples with other class activities. (e.g., discussion, classroom work on projects, exercises, etc.)					
21	Technical problems with the computer presentation are distracting.					
22	My professor(s) hands out copies of Excel examples to students in class.					
23	All things considered, I would regard Excel as a positive aspect of the course.					
24	All things considered, I would take another course that uses Excel in a similar way.					
25	Overall, I prefer Excel over strictly lecture classes.					