

Developing Students' Skills-Based Competencies: A Strategic Learning Approach

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Abstract

Within the field of accounting, practitioners and educators suggest that accounting students need skills-based competencies, including technical skills. And thus accounting educators continue to debate how they can effectively and efficiently develop students' skills-based competencies. In this study, we examine whether the use of simple structured tasks that are repetitive and require minimal in-class time can be both effective and efficient in the advancement of accounting students' data analysis skills in Excel. Using one class section from a large southwestern university, we find that strategic learning activities within the context of a larger data analysis project increase both perceived and actual skill level in Excel. The findings suggest that strategic learning activities can be an effective, low-cost option for accounting educators to consider when assessing how to best integrate skills-based competencies in the curriculum.

Keywords: Accounting Education, Accounting Skills-Based Competencies, Strategic Learning Activities, Spreadsheet Knowledge, Microsoft Excel

Introduction

We explore whether strategic learning activities can advance the development of accounting students' skills-based competencies. Accounting educators have called for research on ways to strengthen accounting students' skills-based competencies without sacrificing the significant in-class time needed to cover core accounting knowledge (e.g., Grimm & Blazovich 2016).

We examine skill-based Excel competencies used in the context of a larger data analysis project. We focus on Excel skills because they remain highly sought after by accounting employers.¹ Excel is the most widely used technology tool in accounting (e.g., Borkowski et al. 2007; Drew 2012; Lee et al. 2018). In addition, students demonstrating strong Excel skills are viewed as well prepared to handle analytical business decisions (Convery & Swaney 2012), and strong data analysis ability has become increasingly important in the job market (Dzuranin et al. 2018). In our research setting, students work on baseline Excel skills and then work through a methodical data analysis where they extract a text file, load into Excel, and transform to perform additional analysis. This process allows them to hone individual Excel skills that are requested by employers while completing a larger data analysis project, another skill set that has been focused on by the Association to Advance Collegiate Schools of Business (AACSB 2018).

¹ Discussions with two managers at regional firms confirmed that Excel skills are still highly desired from new hires.

We develop two strategic learning assignments: an in-class Excel bootcamp exercise and an out-of-class Excel project. The bootcamp includes simple structured tasks that are repetitive and require minimal in-class time. The larger project builds on skills covered in the bootcamp, creating additional repetition, but it requires no in-class time.

The goal of this exploratory research is to provide accounting educators with useful information related to how strategic learning activities can help develop students' perceived and actual skills-based competencies while consuming little in-class time. For our research design, we collect data during one semester of an undergraduate Accounting Information System (AIS) class. We use a three-step process that is covered across the semester, with one cohort of accounting students. In step one (the pre-measure phase), we collect survey data on students' perceived Excel knowledge. Measures of perceived skill are subject to self-reporting bias (Flinn & Crumbley 2009). We therefore also collect archival data on students' actual (i.e., tested) Excel knowledge. We use this data for baseline measures of students' Excel knowledge prior to participating in the strategic learning activities. In step two (the performance phase), we provide students with an in-class Excel bootcamp exercise. Then we have students complete an outside- of-class Excel project. Lastly, in step three (the post-measure phase), we repeat step one. Collecting longitudinal panel data over the course of a semester allows us to examine students' skills before and after the strategic learning activities as well as calculate change measures.

Overall we find statistically significant improvements in students perceived and actual Excel competency after the strategic learning activities. Notably, our results show that the biggest improvements occur in more advanced Excel skills. Our results suggest that incorporating into the curriculum learning activities that cover skills-based competencies (e.g., Excel skills) important in accounting can help "close the loop" between what students know and what potential employers in accounting firms need them to know.²

Contribution

Our exploratory research makes two contributions to the accounting education literature. First, our study answers a call from accounting educators (Grimm & Blazovich 2016) for research that documents changes in students' competencies before and after learning activities targeting skills-based competencies. This will help educators better understand the relationship between learning activities and learning outcomes.

Second, our study highlights the idea that strategic learning activities can be an *efficient* low-cost option for educators to consider when assessing how to best integrate skills-based competencies while using minimal classroom time. The strategic learning activities analyzed here consume less than 75 minutes of in-class time. Disaggregated across the accounting curriculum, educators could use strategic learning activities to cover various skills-based competencies without subtracting from in-class time needed to cover core accounting concepts.

The remainder of our paper is organized as follows. In the next section, we provide a background and literature review on the development of accounting students' skills-based competencies. In the third section, we discuss our research methodology. In the fourth section, we present our findings. In the last section, we provide concluding remarks, limitations, and outlook for future research.

Background and literature review

Skills-based competencies useful in accounting

Within the field of accounting, professional organizations, practitioners, and educators recommend that accounting students have a general set of competencies that go beyond core accounting knowledge (Jackling & De Lange 2009). That is, accounting students need skills that are useful for accounting and business-related tasks. For instance, the American Institute of Certified Public Accountancy (AICPA) provides a *Core Competency Framework* that defines a set of skills-based competencies that accounting students should have prior to entering the profession (AICPA 2018, p. 2). These competencies are categorized into three groups: accounting, business, and professional.

² For example, Excel is considered an important tool in audit firms. It is commonly used to compile, extract, inspect, sample, test and verify financial and nonfinancial information (KPMG 2007).

Accounting competencies relate to technical skills (e.g., ability to use relevant technical tools) that add value to accounting and business-related functions. Recent curriculum innovations have focused heavily on the addition of data analysis skills in the classroom (Adams et al. 2020; Sarkar et al. 2021), further expanding the definition of strong technology skills in accounting.

In a similar vein, the AACSB recommends that accredited accounting degree programs include in their curricula learning experiences that develop not only students' knowledge but also skills useful in practice (AACSB 2018, p. 23).³ For instance, under Standard A5, the AACSB recommends that accounting students "develop information technology agility."

Public accounting firms (e.g., KPMG 2007) and accounting researchers (e.g., Frownfelter-Lohrke 2017; Lee et al. 2018) echo the sentiments of the AICPA's *Core Competency Framework* and the AACSB's Standards A4 and A5 by suggesting that accounting students should develop skill-based competencies that go beyond traditional accounting knowledge. For instance, Grant Thornton (2012) recommends that accounting graduates be proficient in using information technology (e.g., Excel spreadsheets) because this knowledge increases the effectiveness and efficiency of audit-related services.⁴

Educational studies on skills-based competencies in accounting

Building upon the guidance provided by accounting professional organizations and practitioners (e.g., KPMG 2007; Bagley & Harp 2012; Cornell et al. 2014; Hinson et al. 2015; Grimm & Blazovich 2016; Willis 2016; Best & Schafer 2017), accounting educators have explored a vast array of ideas and resources that relate to skills-based accounting competencies. For example, Grimm and Blzovich (2016) present an instructional resource that uses an integrated approach to a financial statement analysis project that is designed to develop students' accounting knowledge along with Excel skills, strategic thinking, and communication skills. Please see Lawson et al. (2015) for an extensive list of instructional resources related to competency skills useful in accounting.

Research question

Our purpose is to add to the educational literature on skills-based competencies in accounting. In particular, our study answers a call from Grimm and Blazovich (2016) for research examining the association between learning activities and students' development of skills-based competencies. The authors suggest that research should explore changes in students' competency levels pre and post learning activities. By documenting changes in students' competency levels, educators can better understand the degree to which instructional resources are (or can be) valuable in the developing skills-based competencies.⁵ This leads to our formal research question.⁶

Research Question: *To what degree can strategic learning activities [that involve simple structures tasks that are repetitive and require small amounts of in-class time] be an effective and efficient tool in the development of accounting students' skills-based competencies?*

Strategic learning activities

³ Under Standard for Business Accreditation No. 9, *Curriculum Content*, the AACSB suggests that accredited business degree programs need to include in the curriculum learning experiences that develop students' skills (e.g., technology agility) that will be useful in business (AACSB 2018, p. 35).

⁴ From a broad information technology (IT) perspective, the AICPA states in the *Pre-Certification Core Competency Framework* that accounting students should be able to "identify and utilize relevant technology and tools to analyze data, efficiently and effectively perform assigned tasks as well as support other competencies (AICPA 2018, p. 2)." Likewise, the AACSB states in Standard A5 *Information Technology Skills, Agility, and Knowledge for Accounting Graduates* that "accounting degree programs include learning experience that develop skills and knowledge related to the integration of information technology in accounting and business. This includes the ability of both faculty and students to adapt to emerging technologies as well as the mastery of current technology" (AACSB 2018, p. 27).

⁵ Grimm and Blzovich (2016) document students' perceptions about the usefulness of their financial statement analysis project only after the students complete the project.

⁶ The current study is exploratory in nature. We do not formally state or test hypotheses.

We explore the usefulness of a certain type of instructional resource: strategic learning activities. We focus on the general idea presented by Kaplan and Norton (1996), who suggest that strategic learning consists of gathering feedback and reviewing the process by which goals are set. Then necessary adjustments can be made to reflect learning and growth. In our setting, we encourage students to actively participate in the learning process through hands-on activities tailored to meet specific learning objectives.

We focus on strategic learning activities that are *simple, structured, and repetitive* and require *little in-class time*. We concentrate on *simple, structured* activities for two main reasons. These tasks can be less taxing on students' cognition than complex tasks. Most accounting coursework involves complex material. When trying to add a skills-based component to an already challenging course load, the use of simple structured tasks may be effective in terms of requiring fewer (or lower order) mental resources on the part of students and possibly educators. Second, simple structured tasks are commonly used in the development of skills (e.g., Dunlosky et al. 2013).

Relatedly, we concentrate on *repetitive* activities. Research by Cepeda et al. (2006) provides an overview of studies on distributed practice. Overall they find that distributed practice (i.e., learning that is spaced over time rather than compressed into one session) can maximize the acquisition and long-term retention of information. Specific to skills-based learning, Gupta and Cohen (2002) argue that repetitive priming can lead to improved performance in tasks.⁷

Lastly, we concentrate on activities that require *little in-class time*. Our goal is efficiency. It is well known that accounting educators have limited class time to cover a broad body of core accounting topics. As such, adding skills-based competencies to an accounting course or curriculum can be challenging.

Research Methodology

Skills-based competencies

Many business, professional, and analytical skills are useful in accounting. We have opted to examine one regarded as especially important: Excel spreadsheet skills. As suggested by practitioners (e.g., KPMG 2007) and accounting researchers (e.g., Borkowski et al. 2007; Convery & Swaney 2012; Drew 2012; Lee et al. 2018), Excel is the most commonly used analytical tool in accounting.⁸ Improving students' skills in both basic and advanced Excel functions enables them to perform a wide range of data analytics, directly addressing AACSB's Standard A5, which recommends that accounting students develop information technology skills.

Research design

For our research, we collect longitudinal/panel data over one semester, using one cohort of accounting students. To assess the effectiveness of the strategic learning activities, we calculate a change measure in (a) students' perceptions of Excel knowledge pre and post two activities and (b) students' test performance on Excel knowledge pre and post the same activities. Examining both perceived knowledge and actual (i.e., tested) knowledge gives educators a better understanding of learning outcomes.

Participants

A total of 63 undergraduate accounting students from a large southwestern university participated. The students did so as part of their undergraduate level AIS course. All of them were either juniors or seniors.⁹

⁷ Gupta and Cohen (2002) define skill learning as "task performance improvement that is not restricted to specific items to which there has been previous exposure, but that extends to new items; it is the development of generalized task ability as a result of practice in the task." They define repetition priming as the "facilitation (as seen in greater accuracy or faster performance) in the processing of specific items (stimuli) in a task as a result of previous exposure to those items" (Gupta and Cohen 2002, p. 402).

⁸ While many software programs vary across public accounting firms, Excel is a broadly accepted and, since its introduction in 1987, has become the most widely used spreadsheet tool in the accounting profession (Willis 2016).

⁹ This study was approved by the university IRB.

Procedure overview

The study was conducted in three parts over the course of one semester. In part one, during the first quarter of the semester, participants completed a pre-measure survey and a pre-measure skill test that captured the level of their Excel skills. The survey measured students' perceptions of knowledge, whereas the test measured their actual knowledge. In part two, during the second and third quarters of the semester, students participated in an in-class Excel bootcamp and then completed an out-of-class Excel project. In part three, during the last quarter of the semester, participants repeated part one of the study to capture post-activity measures.

The three-part design allowed each student to act as his or her own control.¹⁰ There was no control group, and students across all sections received the same assignments. Withholding assignments with a potential to increase technical skills from a control group would not have been fair or ethical. The details of the surveys, exam, and activities are explained below and summarized in Table 1. Actual survey, exam, and assignment materials are provided in the appendix.

Research Design

Part 1: Pre-measure phase

Perceived knowledge (pre-measure design)

Part one is the pre-measure phase of the study. During the first part of the semester, participants were asked to rate their perceived skill level in Excel overall and in nine specific areas. For each of the Excel functions listed in Table 2, we asked participants to indicate their knowledge on a seven-point scale with one indicating "no knowledge" and seven indicating "extreme knowledge." This survey is designed to capture each student's baseline perceived knowledge.

We focused on several of the Excel functional skills found by prior research to be important in accounting (Ragland and Ramachandran 2014). We categorized the functions into two skill groups: basic and advanced. Because perceived knowledge may be overestimated by participants (Flinn & Crumbley 2009), we also create a measure of tested knowledge, discussed below.

Tested knowledge (pre-measure design)

Next, during the same part of the semester, participants were presented with a computerized exam and asked to complete 11 multiple choice questions and four exercises (that contain two questions each) that relate to various Excel skills. The exam involved answering Excel questions in both multiple choice and application-based formats. This allowed us to capture several measures of students' actual (tested) knowledge of Excel. The computerized test, consisting of 19 total questions, is detailed in Appendix 1. The exercise questions required the actual usage of Excel skills, and students' work was checked to ensure the requested skill was used. In terms of topical coverage, the exam covers the same skill set as the survey, that is, basic skills and advanced skills.¹¹

To alleviate the concern of "teaching to the test," students were split into two groups for the skill test. Group 1 received financial exercises similar to both the bootcamp and project assignments (that were forthcoming). Group 2 received exercises that were similar in construction and difficulty but unrelated to financial applications. This task

¹⁰ Depending on various circumstances (e.g., exposure, experience, or usage of Excel), each student will vary in his or her baseline perceived and actual (i.e., tested) knowledge on how to use specific Excel functions.

¹¹ The pre-exam was not announced to students to reduce concerns related to priming effects. For this study, we use two different measures (a raw score rubric and a weighted score rubric). The raw score is an overall count of the correct answers for the 19 Excel questions. The weighted score assigns one point for each correct answer on the eight exercise questions and 0.20 points for each of the 11 multiple-choice questions.

was administered as a low-stakes assignment, and students received full credit for simple completion.¹² Students were allowed 45 minutes of in-class time to complete both the survey and skills test.¹³

Part 2: Performance phase

Excel bootcamp (In-class activity)

In the performance phase of the study, students participated in an Excel bootcamp exercise during one in-class period (approximately 75 minutes). The bootcamp provided students with a visual demonstration and hands-on experience with Excel functions deemed important in public accounting.

The instructor provided a brief overview of basic Excel functionality, and then students completed several exercises related to specific Excel skills. The bootcamp exercises are found in Appendix 2. The bootcamp was also intended to provide students with hands-on engagement to learn, practice, and ask questions about using Excel functions. For each Excel function, an example was first provided, and then students worked through an exercise on their own. Instruction started with basic Excel functions, and then built to more advanced functions needed for the later out-of-class project, allowing students exposure to these functions in an instructional setting.

Excel project (out-of-class activity)

Next, in the performance phase of the study, students completed an Excel project outside of class. The project provided students with an independent opportunity to practice and develop Excel skills. On average, the project took three to five hours of outside class time to complete.¹⁴

The project included two parts, with the first focusing on large dataset aggregation, using pivot tables, and the second focusing on financial data benchmarking. For part one, students analyzed a large sales dataset for accuracy and then summarized the data into informative reports, using the pivot table function. For part two, students used financial data to create several ratios and benchmarked a company against its peers. Students needed to import a large dataset into Excel, mimicking a data “extraction” from another source and “loading” activity to the Excel software. Students next “transformed” the data, validating the presence of required fields and cleaning the dataset in preparation for the benchmark analysis. Students heavily used basic, filter/sort, and formatting functions, along with if/then and nested if statements. Appendix 3 provides the project materials, and Appendix 4 provides a sample of the datasets.¹⁵

Note that the performance tasks were designed to be completed over a period-of-time instead of during a point-in-time. The in-class exercise was completed during the second quarter of the semester. The out-of-class project was completed during the third quarter of the semester. This schedule was followed for one reason: repetition and practice over a period-of-time (instead of during a point-in time) is a commonly used learning strategy to develop longer-term retention (Cepeda et al. 2006).

Part 3: Post measure phase

Perceived knowledge and tested knowledge (post-measure design)

¹² Although students received full credit for simple completion, accuracy of answers was tracked for the creation of our measures. Students did not receive feedback on which questions they answered correctly.

¹³ While data related to students’ skills were explicitly collected twice for this study, Excel related questions could be combined with a routine assignment or exam during the normal course of a semester. Alternatively, the pre and post measures could be omitted

¹⁴ Both the time element and the cohort of students will vary semester to semester. As such, instructors can customize the time devoted or the topics covered in each learning activity by pre-testing students and focusing on weaknesses reported by students. Relatedly, instructors can cover strategic learning activities by using various forms of instruction (e.g., face-to-face lectures or online resources).

¹⁵ The authors thank Nancy Harp for development of course project materials.

Part three is the post-measure phase of the study. As a repeat of part one, participants were asked to complete the same survey and Excel skill test. In this phase, students received points based on the number of questions they answer correctly.^{16,17} Administering identical tasks allows for the creation of change measures, examining the difference in each students' pre- and post-project levels of both perceived and tested Excel knowledge.¹⁸

Results

Demographics

Demographic statistics for the participants in our sample are presented in Table 3. Eighty three percent of students are seniors; 17 percent are juniors. On average, the students have 2.60 years of Excel experience and 4.95 years of work experience. In terms of grouping, 46 percent of students participated in Group 1 (financial exercises), while 54 percent of students participated in Group 2 (nonfinancial exercises). The slight difference in grouping is due to students dropping out of the sample for failure to complete one or more of the assigned tasks.

Perceived Knowledge

Table 4 presents results related to pre- and post-survey questions related to perceived Excel skill (on a seven-point scale with one indicating "no knowledge" and seven indicating "extreme knowledge"). In the pre-measurement phase, students perceived themselves to be the most knowledgeable about basic skills (mean=6.63) and formatting (mean=6.23). This is not surprising, as most of the students are seniors and have used Excel in prior courses. Students perceived themselves to be less knowledgeable about more advanced skills, with pivot tables (mean=3.60) and nested if statements (mean=2.70) showing the lowest means. Students begin with a relatively high overall perceived skill level (mean=4.78).

In the post-measurement phase, students perceived themselves to be the most knowledgeable about how to use the following Excel functions: basic skills (mean=6.87) and formatting (mean=6.70). On average, students perceived themselves to be relatively knowledgeable (> five out of seven) on all skills except for nested if statements (mean=4.95). Although the raw post measure is relatively low for this skill, the change in perceived knowledge is the highest for this advanced function.

Turning to change measures, students report the biggest increase in perceived skill for several of the advanced Excel skills (Pivot tables=2.38; nested if statements=2.25; if/then statements=2.08). All nine individual skills as well as the overall skill show a change measure that differs significantly from zero. Overall these results suggest that the strategic learning approach used in this study may be particularly effective in increasing confidence in some of the more complex skills, but the raw confidence level of these advanced skills still does not reach that of the less complex functions.¹⁹ Additional assignments (or repetitive tasks) may thus be necessary with more advanced skills to recognize post-assignment outcomes similar to those for less advanced functions.

Tested Knowledge

To evaluate the change in actual skills, we use pre- and post-measures from the Excel skill test. We assess students' skill level using two disaggregated measures and two aggregated measures. For the disaggregated measures, we

¹⁶ We recognize that differing incentives on the pre- and post-exam may partially drive results. We employ this point structure to increase perceptions of fairness, as points are based on correctness only after classroom instruction on Excel skills. As stated earlier, in the pre-measure phase, students received full credit for simple completion of the Excel skill test. This point system was deemed important because in the pre-measure phase students had yet to receive classroom instruction on Excel skills.

¹⁷ Students were not primed with knowledge that the post-measure exam would be the same as the pre-measure exam. The post-measure exam was not announced to students prior to the date and time of the exam. Thus, students could not spend time studying or accumulating notes for the pre-measure exam that could be applied to the post-measure exam.

¹⁸ Most of the changes in knowledge should be attributed to learning activities conducted during the period between the pre- and post-measure phase of the research. However, we acknowledge that some student learning may be independent of the activities provided in the current study.

¹⁹ Our measurement does not differentiate between knowledge gained from the bootcamp and project assignments. We do not measure skill between these two assignments to avoid priming students through additional viewings of the skill test materials.

examine students' performance in terms of questions answered correctly based on knowledge retrieval—recognition or recall. Multiple choice questions are quantified as recognition based, whereas short exercise questions are quantified as recall based. Students answer 11 multiple choice and eight exercise-based questions. Relatedly, we examine students' performance in terms of questions answered correctly based on the type of Excel skill—basic or advanced. We code each test question as basic or advanced based on the skill classification from Table 2. Students answer eight basic and 11 advanced questions.

For the aggregated measures, we examine students' performance in terms of questions answered correctly based on raw exam scores and weighted exam scores. The raw scores are a cumulative count of correct answers for the 19 questions. The weighted score places heavier emphasis on exercise-based questions, as these questions require in-depth usage of Excel skills. Total possible points for the weighted score are 14.2 points (11 multiple choice question at 0.20 per correct question and eight exercise questions at 1.5 point per correct answer). This weighting closely matches the scoring students receive for their post-test class assignment.

As shown in Table 5, when looking at the disaggregated measures, we find that students, on average, answer 78.6% (8.65/11) of multiple-choice questions and 77.8% (6.22/8) of exercise questions correctly on the pre-test. Students answer 86.8% (6.94/8) of basic skill questions and 72.2% (7.94/11) of advanced skill questions correctly. On average, they scored an 78.3% (14.87/19) overall on the Excel pre-test with a weighted total of 77.9% (11.06/14.2).

Turning to post-assessment measures, students answer 90.4% of the multiple-choice and 89.6% of the exercise questions correctly. This represents a significant increase of 11.8% (1.29 points) and 11.8% (0.95 points), respectively. Students answer 93.0% of basic skill questions and 87.9% of advanced skill questions correctly. This represents a significant increase of 6.2% (0.51 points) for basic skills and 15.7% (1.73 points) for advanced skills. The greater increase in advanced skills may be due to the lower baseline for these skills (i.e., students have more room for growth).

Examining aggregated measures, we find that students, on average, scored a 90.1% on the Excel post-test (89.8% weighted total). This represents a significant increase of 11.8% (2.24 points) questions correct, compared to the pre-test at 11.9% (1.69 points increase weighted). Taken together, the results suggest that students exhibit a significant increase in *actual* Excel skill when considering both our disaggregated and aggregated measures.

Regression Analysis

We next turn to regression analysis to examine whether perceived and actual skill levels are associated with factors specific to the individual student or to the group separation for the Excel skill tests. We utilized the following OLS regression model.

$$Pre\text{-}Measure/Change\ Measure = \beta_0 + \beta_1 Job\ Years_t + \beta_2 Excel\ Years + \beta_3 Senior + \beta_4 Group1 + \varepsilon, \quad (1)$$

where the dependent variable is either the perceived/actual skill *Pre-measure* or the perceived/actual *Change* measure. *Job Years* is equal to the natural log of the participant's years of job experience, and *Excel Years* is equal to the natural log of the participant's years of Excel experience. *Senior* is a dummy variable equal to one if the participant's academic status is senior and 0 otherwise. *Group 1* is equal to one if the student was assigned to group 1 for the Excel skill test.

Table 6 presents regression results related to *Perceived* Excel skill. Column 1 presents results with the overall Excel pre-measure as the dependent variable. The results show that students with more Excel experience exhibit higher levels of confidence with the tool. Job experience, academic status, and group assignment are not significantly related to the students' baseline perceived skill level.

Column 2 presents results with the *Perceived* change measure as the dependent variable. Students with a higher baseline exhibit a lower change in perceived skill (coef. = -0.628). This is likely because students with a higher baseline have less room for improvement.²⁰ Additional control variables are insignificant.

Table 7 presents regression results related to *Actual* Excel skill. Column 1 (Column 2) examines the change in basic (advanced) skill questions correct. For both measures, the pre-assessment level is negatively associated with change in skill level, again suggesting a baseline effect. Additional control variables are insignificant.

Column 3 (Column 4) examines the change in Excel skill using the raw (weighted) total score. Again, pre-assessment levels for each measure are negatively associated with the change measure. When considering the weighted change, students in group one exhibit a higher overall change in Excel skill. This may be because financial exercises presented in the pre/post-assessment skill test for this group are quite similar to exercises in the bootcamp and project assignments. While group one exhibits a slightly higher change in weighted skill (2.25 versus 1.20), a t-test reveals that members of group two exhibit a change in weighted skill that is significantly different from zero. In terms of raw score, the group one mean is 2.52, and the group two mean is 2.00. A t-test ($p = 0.33$) shows that the raw score is not significantly different between the two groups. Except for the significant relationships noted, students from varying backgrounds and academic status appear to benefit equally from the strategic assignment approach utilized in this study.

Post Hoc Analysis

We next explore the potential relationship between *Perceived* and *Actual* change in Excel skill. Measures of perceived skill may be subject to self-reporting bias (Flinn & Crumbley 2009). As such, we measure both perceived and actual skill change as part of our project design. In our post-hoc analysis, we explore whether participants' perceptions are associated with actual change in skill. While we believe student confidence and actual skill are both important in different ways, we are also interested in the ability for students to perceive their actual change in skill. Table 8 presents correlations between change measures of perceived and actual skill. We construct measures of perceived change in basic and advanced skills for each participant by taking an average of the perceived change for all skills assigned to each category in Table 2. Results show that the overall change in *perceived* and *actual* skill are not significantly correlated for either of the actual skill measures. This suggests that students may not accurately perceive their true change in skill level. When examining different types of skills (basic and advanced), the *perceived* change in advanced skills is correlated with the *actual* change ($p < 0.10$). This suggests that students may be better at perceiving their true change in skill level for more advanced Excel skills. Interestingly, the correlation between *perceived* basic skill change and *actual* advanced skill change is also significant. Students may have difficulty assessing the specific areas in which they have improved. Overall these findings suggest that researchers may benefit from using a tested measure of skill change, instead of or in addition to perceived measures.

Summary

Overview of findings

Those in the field of accounting (e.g., AICPA 2018) recommend that skills-based competencies be included in accounting education. Skill-based competencies provide students with knowledge on how to be more efficient and effective in accounting and business-related tasks. As business requirements lean increasingly toward stronger data analysis skills, the typical accounting curriculum has struggled to improve students' technology skills within the bounds of an already crowded schedule.

The purpose of this research is to conduct an exploratory analysis of the degree to which strategic learning assignments can help develop students' skills-based competencies. Following the prescription from prior research (Grimm & Blazovich 2016), we capture a change measure in students' perceived and tested Excel competency levels pre and post two strategic learning activities that focus directly on Excel skills deemed to matter in accounting (Ragland and Ramachandran 2014). Our change measure design allows us to explore the degree to which the

²⁰ All regression results are robust to removal of one outlier observation, where job years = 36 and excel years = 27.

strategic learning assignments can contribute to the development of functional skills. Students complete a series of strategically designed activities throughout the semester, building from simple, structured tasks to a more complex data analysis project. Our findings suggest that repetitive tasks can build perceived and actual student skills in the context of a full semester.

The contribution of the current study is twofold. First, we document that strategic learning assignments related to Excel can be a useful (*effective*) tool to “close the loop” between accounting students’ actual skills and the skills that public accounting firms may desire from new hires. Second, our strategic learning approach is an *efficient* low-cost option (in terms of devoted class time), which could be applied to an assessment of other skills-based competencies and business-related tasks. For example, the research method used here could be applied to strategic learning assignments tailored to improve accounting students’ competencies related to merging big data science with accounting analytic skills.

Limitations

As with any research, this study has limitations. One is generalizability. We focus only on one form of skills-based competency (i.e., Excel skills). Another possible limitation is that, as technology advances, the deemed list of most important Excel functions used in accounting may change. Still, a tailored approach could be applied to adjust learning activities to meet the needs of employers. A third limitation of our study is that capturing learning outcomes is difficult to operationalize and quantitative measures related to Excel can induce memorization rather than deep learning (Nijhuis et al. 2005). Our research design does not disentangle the benefits gained from the bootcamp and project activities but rather focuses on overall change in perceived and tested skills. In addition, it is difficult to disentangle the effects of a single course in the context of the overall accounting curriculum.

We leave development of more advanced tools to fully measure student Excel knowledge to future research. A further limitation of our study is that we did not include, in our research design, a control group that received the pre- and post-tests but not the learning activities. As discussed earlier, Excel skills are extremely useful, even essential, in accounting. As such, we felt a responsibility to provide all students in our setting with the learning activities.

Future research

There is much to learn about how to develop accounting students’ skills-based competencies applicable to accounting. Future studies could explore other effective and efficient ways to improve accounting students’ Excel competency skills. For instance, research should examine whether there is value, in terms of students’ Excel competency levels, if Excel-related lessons are incorporated across an accounting curriculum instead of in just one course. As discussed earlier, repetition can often help students with longer-term retention.

Second, questions remain about how to tie accounting students’ skills-based competencies with the rapid changes in accounting and information technology. Future research could explore operationalizing our strategic learning activities approach with various other tools (e.g., data visualization or robotic process automation).

Future work should also examine additional ways to improve more advanced skills through repetition or other strategically focused methods. For instance, in our study, we examine a change measure pre and post strategic learning activities. Future research could explore change measures: (a) pre (b) between and (c) and post strategic learning activities to assess the incremental value-added from each additional strategic learning assignment.

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Table 1
Steps in Measuring Excel Competency Skills

Excel Competency Skills**		Time Period*	Duration of Time
		Based on a 16-Week course*	Approximately
Part 1 Pre-Measure Phase (<i>Survey & Test on Excel Knowledge</i>)	<i>Survey/Test I: Two Baseline Measures</i> 1. Self-Assessment: Students complete a survey on perceived competency level related to Excel functional skills deemed important in accounting. 2. Test: Students complete a two-part test on Excel functional skills deemed important in accounting. - Part one includes multiple-choice questions. - Part two includes exercises testing specific Excel skills. For this part, students are separated into two groups. Group 1 receives financial exercises similar to both the bootcamp and project activities. Group 2 receives exercises that are similar in construct and difficulty, but not related to financial applications. The grouping was used to mitigate accounting specific knowledge (and/or testing to the test) from possibly influencing skill level.	1 st quarter of the semester	Self-Assessment Survey and Skill Test: 45 minutes
Part 2 Performance Phase: (<i>Excel Activities: Bootcamp & Project</i>)	Students participate in a bootcamp on Excel functions that are deemed important in accounting** The exercise is “hands-on” in-class with computerized Excel spreadsheets so that students can visually see and ask questions about how to use the applicable Excel functions.	2 nd quarter of the semester	75 minutes of in-class time
	Students complete an Excel project. The activity is outside-of-class and requires students to critically and analytically complete a task that involves using skills covered in the Bootcamp.	3 rd quarter of the semester	3-5 hours of outside class time
Part 3 Post-Measure Phase (<i>Survey & Test on Excel Knowledge</i>)	<i>Survey/Test II: Two Post-Activity Measures (Repeat of Part I):</i>	4 th quarter of the semester	Self-Assessment Survey and Skill Test: 45 minutes
<p>* The time outline can be altered to fit a course’s timeline. The time spent on the pre- and post- measure phases are specific to the current study and are not necessary for application of the performance phase (i.e., the learning activities). The performance phase utilizes approximately 75 minutes of in-class time. If an instructor uses all phases, the pre-measure should be administered first to gather baseline data on students perceived & actual Excel knowledge. The Excel activities should be administered second. The post-measure should be administered last to gather data on changes in students perceived & actual Excel knowledge. ** In the current study, the Excel activities are both related to Accounting Information System course work. The assignments, however, can be tailored to fit any accounting course need.</p>			

Table 2
Excel Functional Skills Deemed Important
in Public Accounting

Top 10 Excel Functions Identified by New Hires at Public Accounting Firms to be the Most Important in Accounting Job		Categorized as Basic or Advanced Skills
Rank Order	Excel Function*	
1	Basic (e.g., add & subtract)	Basic
2	Filter/sort data	Basic
3	<i>Vertical (horizontal) lookup**</i>	
4	Formatting	Basic
5	If/Then Statements (+ Nested If Statements***)	Advanced
6	Keyboard Shortcuts	Advanced
7	Pivot tables	Advanced
8	<i>Concatenate**</i>	
9	Charts/graphs	Advanced
10	Financial	Advanced
<p>* The Excel bootcamp focuses on important Excel functional skills used by new hires in public accounting. The data on important Excel functions is collected from Ragland and Ramachandran (2014).</p> <p>** Due to time constraints the bootcamp included eight of the top ten Excel functions identified by new hires at public accounting firms to be the most important in accounting job. The two functions excluded were vertical/horizontal lookup & concatenate.</p>		

Table 3
Demographics & Descriptive Statistics
(n = 63)

Variable	Mean	Median	Std. Dev	Min	Max
Student Demographics:					
Years Job Experience	4.95	4.00	5.48	0.00	36.00
Years Excel Experience	2.60	2.00	3.75	0.00	27.00
Academic: Senior Status	0.83	1.00	0.38	0.00	1.00
Group 1: Financial Exercises	0.46	0.00	0.50	0.00	1.00
Change Measure in Perceived Excel Skill Knowledge:					
Basic Skills	1.02	1.00	0.80	-0.75	2.75
Advanced Skills	1.55	1.60	0.93	-0.20	3.80
Overall Skills	0.79	1.00	0.78	-1.00	2.00
Change Measure in Tested Excel Skill Knowledge:					
Basic Skills	0.51	0.00	1.11	-2.00	4.00
Advanced Skills	1.73	2.00	1.69	-2.00	6.00
Raw Test Score	2.24	2.00	2.09	-3.00	7.00
Weighted Test Score	1.69	1.70	2.24	-2.80	7.90

This table presents demographic information for participants and descriptive statistics for change measures. Academic: Senior status is coded as 1 if the student is a Senior, 0 otherwise. Group 1 is coded as 1 if the student was assigned to Group 1 for the Excel skill test. Change measures show the difference between post- and pre-assessment measures.

Table 4
Perceived Excel Knowledge

Excel Skill	Mean (n = 63)			t-test
	Pre	Post	Change	
Basic Skills:				
Basic functions	6.63	6.87	0.24	<.01
Filter & Sort data	4.52	6.19	1.67	<.01
Formatting	6.23	6.70	0.47	<.01
Advanced Skills:				
Keyboard Shortcuts	3.98	5.66	1.68	<.01
Charts and Graphs	4.55	5.65	1.10	<.01
Financial	4.22	5.28	1.05	<.01
Pivot tables	3.60	5.98	2.38	<.01
If/Then Statements	3.69	5.77	2.08	<.01
Nested If Statements	2.70	4.95	2.25	<.01
Overall	4.78	5.56	0.79	<.01

This table presents descriptive statistics related to participants *Perceived* skills in Excel. Participants are asked to indicate the degree to which they know how to use each of the listed Excel functions on a 7-point scale with 1 indicating “no knowledge” and 7 indicating “extreme knowledge.” A t-test examining if each change measure is equal to zero is presented in the last column.

Table 5
Participant Actual Skill Level with Excel

Excel Assessment Type	Mean (n = 63)			t-test
	Pre	Post	Change	
Knowledge Retrieval:				
Multiple Choice Questions (out of 11)	8.65 (78.6%)	9.94 (90.4%)	1.29	<.01
Exercise Questions (out of 8)	6.22 (77.8%)	7.17 (89.6%)	0.95	<.01
Excel Skills:				
Basic Skill Questions (out of 8)	6.94 (86.8%)	7.44 (93.0%)	0.51	<.01
Advanced Skill Questions (out of 11)	7.94 (72.2%)	9.67 (87.9%)	1.73	<.01
Total Score:				
Raw Total (out of 19)	14.87 (78.3%)	17.11 (90.1%)	2.24	<.01
Weighted Total (out of 14.2)	11.06 (77.9%)	12.75 (89.8%)	1.69	<.01

This table presents descriptive statistics related to participants *Actual* skill in Excel. Participants complete a pre- and post-assessment skills test consisting of 11 multiple choice and 8 short exercise questions. Basic skills questions relate to Basic, Formatting, Filter/Sorting, and Keyboard Shortcuts. Advanced skills questions include Pivot Tables, Financial, If/Then Statements, Nested If Statements and Charts/Graphs. There are 8 Basic questions and 11 Advanced questions on the assessments. The Raw Total is a count of correct total questions and the Weighted Total is an overall score that weights exercise questions as 1.5 points each and multiple-choice questions as 0.2 points each.

Table 6
Regression Analysis of Perceived Skill Level

	Pre-Assessment (Overall Skill)		Change in Skill (Overall Skill)	
	(1)		(2)	
	Coef.	p-value	Coef.	p-value
Pre-Assessment Skills:				
Overall Skill Level			-0.628***	0.000
Control Variables:				
Job Experience (Years)	-0.055	0.711	-0.093	0.360
Excel Experience (Years)	0.344**	0.012	0.080	0.530
College Status: (Senior)	-0.163	0.548	-0.180	0.335
Group Level (1,0)	0.033	0.873	0.024	0.880
Intercept	4.734***	0.000	3.988***	0.000
N	63		63	
Adjusted R2	0.031		0.423	

This table presents regression results for participant *Perceived* skill measures. Column 1 presents results with the participant's pre-assessment rating of overall Excel skill as the dependent variable and Column 2 presents results with the change between the participant's post- and pre-assessment survey rating of overall Excel skill as the dependent variable. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 7
Regression Analysis
Tested Skill Level

	Change in Basic Skill Level (1)		Change in Advanced Skill Level (2)		Change in Raw Exam Score (3)		Change in Weighted Exam Score (4)	
	Coef.	P-value	Coef.	P-value	Coef.	P-value	Coef.	p-value
Pre-Assessment Skills:								
Basics	-0.809***	0.000						
Advanced			-0.686***	0.000				
Pre-Assessment Exam Score:								
Raw					-0.686***	0.000		
Weighted							-0.727***	0.000
Control Variables:								
Job Exp. (Yrs)	-0.030	0.797	0.169	0.301	0.139	0.523	0.128	0.543
Excel Exp. (Yrs)	0.158	0.155	0.169	0.383	0.340	0.155	0.050	0.842
College Status (Senior)	0.162	0.531	-0.457	0.280	-0.281	0.608	-0.104	0.858
Group (1)	0.003	0.989	0.507	0.104	0.523	0.181	0.779*	0.057
Intercept	5.914***	0.000	6.995***	0.000	12.028***	0.000	9.295***	0.000
N	63		63		63		63	
Adjusted R2	0.593		0.488		0.512		0.514	

This table presents regression results for participant *Actual* (tested) skill measures. Columns 1-4 present results for dependent variables Change in Basic Skill, Change in Advanced Skill, Change in Total Raw Score and Change in Total Weighted Score, respectively. *** p<0.01, ** p<0.05, * p<0.1

Table 8
Correlations Between Perceived and Actual Skill Change

Perceived Skill	Actual (Tested) Skill			
	Overall Raw	Overall Weighted	Basic	Advanced
Overall	-0.03	0.02	-0.10	0.04
Basic	0.15	0.21	-0.10	0.25**
Advanced	0.18	0.17	-0.01	0.23*

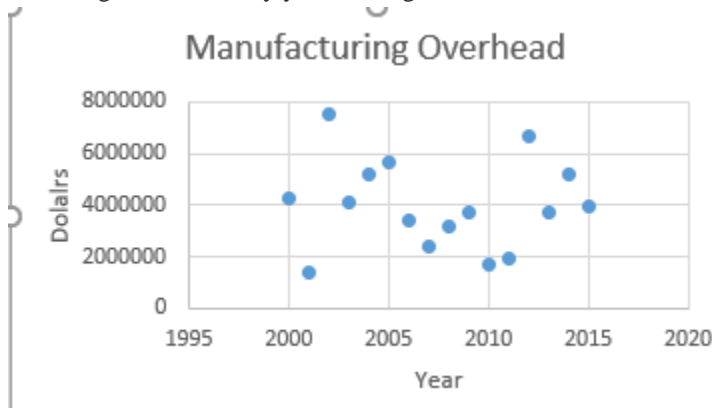
This table presents correlations between *Perceived* change and *Actual* (tested) change measures.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appendix 1 – Excel Skill Test

Multiple Choice Questions:

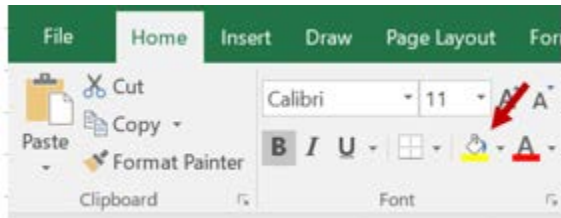
1. David wants to key the numbers 1-1000 in column A of the spreadsheet. What command should he use to complete this task?
 1. **Autofill**
 2. Find and Replace
 3. Filter
 4. Sort
2. When you create a copy of a worksheet named August, Excel gives that worksheet which of the following names?
 1. September
 2. Sheet2
 3. **August (2)**
 4. July
3. The following was created by your colleague in Excel:



What navigation did your colleague most likely take?

1. **Insert-Scatterplot**
 2. Insert-Pie Chart
 3. Data-Charts-Line Graph
 4. Data-Charts-Bar Graph
4. You have inserted a chart to your Excel worksheet. However, the chart is obscuring your data. How can you fix this situation?
 1. Cut and paste the chart to a different worksheet
 2. Delete the current chart and first select a blank sheet or space before inserting the chart
 3. Right-click the chart and select Move Below Data Table
 4. **All of these options would work**
 5. Portrait orientation is the default orientation and it prints the page taller than it is wide.
 1. **True**
 2. False

6. What will happen when you click the button highlighted by the red arrow below?



1. the selected text will be bold, Calibri, 11 pt, yellow font
 2. the selected text will be bold, Calibri, 12 pt, yellow font
 3. **the selected text will be bold, Calibri, 11 pt, highlighted in yellow**
 4. the selected text will be bold, Calibri, 12 pt, highlighted in yellow
7. The keyboard shortcut to "paste" text that has been copied is:
1. Alt + P
 2. Ctrl + P
 3. Ctrl + E
 4. **Ctrl + V**
8. To quickly copy/paste a formula to an entire column, what shortcut should be used?
1. Right click on the cell and select "Paste All"
 2. **Double click the bottom right corner of the cell**
 3. Ctrl + P
 4. Ctrl + D

9. Your company wants to calculate average assets for the year based on the following year-end financial data:

	A	B	C
3		Year	Assets (in millions)
4		2010	\$567
5		2011	\$542
6		2012	\$556

Which of the following is the correct calculation for 2011 average assets?

1. =AVERAGE(C4:C6)
 2. =AVERAGE(C4:C5)
 3. =AVERAGE(C5:C6)
 4. =C4+C5+C6
10. Using the data table from Question #9 - Your company wants to calculate average assets for the year based on the following year-end financial data.
- True or False: Data is available to calculate average assets for 2010.
1. True
 2. **False**
11. Your company has borrowed \$1,000 at an interest rate of 10%. The loan has a 3-year payment period and payments are made yearly. Which of the following would correctly calculate the periodic payment?
- a. =PMT(0.1, 3, 1000)
 - b. =NPV(0.1, 3, 1000)
 - c. =PAY(3, 1000, .1)
 - d. =XNPV(1000, .1, 3)

Exercises and Questions (data sets have been truncated for brevity)**Exercise 1**

Note: In Group 2, Company and Sales are replaced with Bacteria names and a Ranking number.

Directions: Sort the following data by ID# (smallest to largest).		
Id#	Company	Sales
346	ABC Co	\$ 2,268.00
118	Wilson Inc	\$ 1,311.00
378	Jazzy Music Supply	\$ 1,951.00
172	Acme Corporation	\$ 3,555.00
156	Globex Corporation	\$ 2,486.00
125	Soylent Corp	\$ 4,140.00
455	Initech	\$ 8,036.00
368	Bluth Company	\$ 8,242.00
375	Umbrella Corporation	\$ 8,721.00
306	Hooli	\$ 6,580.00
484	Vehement Capital Partners	\$ 6,895.00

12. What is the smallest ID# in the file (i.e., the first value after sorting)?

13. What Sales value is associated with the lowest ID#?

Exercise 2

Note: In Group 2, students are presented with Storm Event data from the NOAA database. Pivot tables are created based on State, Event Type and Dollars in Damage.

Appendix 2 – Excel Bootcamp Exercises

Exercise 1: SUM function

Exercise:	Calculate the SUM of the Quantity Column and the Amount Column. Enter your solution into cells B33 and C33.	
	Quantity	Amount
	57	72
	94	94
	49	12
	41	56
	63	13
	50	96
	5	2
	0	3
	100	97
	64	12
	83	20
Total		

Exercise 2: IF Statement

Exercise:	If the value in Column A is Blue, output "Go Team" in column B, otherwise output the number 0	
Value	Output	
Green		
Yellow		
Blue		
Red		
Blue		
Purple		
Black		
Grey		

Exercise 3: Nested IF Statement

The IF function can be used in conjunction with AND/OR functions for more complex logical tests.	
You can use and AND/OR functions as the first argument (logical test) to the IF statement.	
<input type="text"/>	
Exercise:	If the value in Column A is Blue or Orange, output "Go Team" in column B, otherwise output the number 0
Value	Output
Green	
Yellow	
Blue	
Red	
Blue	
Orange	
Black	
Grey	
Orange	

Exercise 4: Nested IF Statement

Advanced IF Statement: Many Accounting ratios use the average of this year and last year to calculate financial position (i.e. average assets can be calculated as this year + last year, divided by 2)				
Use the following financial data to calculate average assets. Note that you will not be able to calculate for the year 2015				
If you copy/paste your formula, make sure to consider instances where the companyID changes.				
Step 1:	Make sure data is sorted in an appropriate way to make calculations			
Step 2:	Use an IF statement to calculate average assets, where the average = (this year + last year) / 2			
	Make sure calculation is not made for the year 2015. You should be able to copy/paste your formula for the entire column.			
CompanyID	Company_Name	Year	Assets	Average_Assets
123	Bailey Corp	2015	401.1	
128	Hart Industries	2015	21.4	
130	Smith & Co	2015	10.1	
123	Bailey Corp	2016	405.6	
128	Hart Industries	2016	30.1	
130	Smith & Co	2016	9.6	
123	Bailey Corp	2017	410.8	
128	Hart Industries	2017	28.9	
130	Smith & Co	2017	9.4	
123	Bailey Corp	2018	406.7	
128	Hart Industries	2018	28.7	
130	Smith & Co	2018	9.1	

Exercise 5: Pivot Tables

Pivot Tables allow us to quickly summarize data and present in a condensed visual.

Navigate to the following Pivot Table tutorial. Download the Excel file on the right hand side of the screen and follow along with the tutorial directions:
<http://www.excel-easy.com/data-analysis/pivot-tables.html#insert-pivot-table>

After completing the tutorial, create a Pivot Table that summarizes each of the following:

- 1) Total dollars by Product
- 2) Total dollars by Category and Product

Students are directed to a tutorial and dataset download from: <http://www.excel-easy.com/data-analysis/pivot-tables.html#insert-pivot-table>

Appendix 3 – Excel Project Instructions

PART 1: SALES ORDER DATA ANALYSIS

Task: Use Excel to quickly and effectively summarize sales order data in the Excel file called “SalesOrderData” available for you on Blackboard. Assume an accountant downloaded the information in the spreadsheet from your accounting system and provided it to you to analyze.

Follow the steps below to understand the data:

1. Verify the accuracy of the Total column using formulas in Excel. Are there any errors? If so, identify the errors in the table below and **fix them in Excel**.
2. Ensure there are no “blanks” in the dataset. Correct any blanks.

Next, use Pivot Tables in Excel to present the information in a useful way.

OrderDate	Region	Rep	Item	Units	Unit Cost	Total		Corrected Total

1. **Pivot 1:** Create a Pivot Table showing the total units sold and the total sales by item (cumulative for all years of data, not by year). Format the data in the table, give it an appropriate and meaningful title, and create a screen shot of the table to turn in.
2. **Pivot 2:** Create a Pivot Table showing the total sales by region, sales rep, and item (for all years of data). Format the data in the table, give it an appropriate and meaningful title, and create a screen shot to turn in. Make sure this table is neatly formatted onto one page.
3. **Pivot 3:** Create a Pivot Table showing total sales by year, sales rep, and item. Format the data in the table, give it an appropriate and meaningful title, and create a screen shot to turn in. It’s ok if your fully expanded table does not fit on the screen.

PART 2: INDUSTRY BENCHMARKING FOR FINISH LINE

Task: Assume you work as an accountant for Finish Line (the publicly traded shoe company based in Indianapolis, Indiana – ticker symbol “FINL”). The CFO would like you to perform some financial analysis that she can use to benchmark how well Finish Line is doing compared to competitors in the retail footwear industry (SIC code “5661”).

Download financial information for SIC 5661 companies from the WRDS database.

First, as always in real life, examine the data and clean it before you can analyze it. To start, open your downloaded file in Excel. Next, examine and clean the data file using the steps below. Keep note of answers to questions listed.

1. What is the range of fiscal years with data available for Finish Line in the download? _____
2. Remove any companies that report in non-US currency (since these are not comparable). List the name(s) of any companies reporting in non-US currency that need to be filtered out.

3. The CFO only wants to look at the 3 most recent years of data for the benchmarking analysis. Filter out all years not needed for the benchmarking analysis requested by the CFO. (Remember you need to calculate “average inventory” and “average total assets” for each of the 3 most recent years...which requires you to also keep the 4th most recent year in this step)
4. Remove firm-year rows with missing key data (i.e., remove rows that are missing information for the key variables needed to calculate our specific ratios). Look at the data in detail again...remove any other rows that you feel are not needed.
5. Sort the data by Company, then by fiscal year (in ascending order).

Next, perform some benchmarking analysis.

1. Use formulas in Excel to create new fields that will help you calculate the following 3 financial ratios:
 1. Inventory Turnover
 1. First, calculate each company's "average Inventory" for each year of data available. (Note: this is done by taking the current year inventory plus the prior year inventory divided by 2). Use an "IF" conditional statement to make sure the calculation is only made when data is available.
 2. Use the average inventory just calculated and the COGS to calculate Inventory Turnover in a new column.
 2. Current Ratio
 1. Use current assets and current liabilities to calculate Current Ratio in a new column.
 3. Cash Holdings
 1. First, calculate each company's "average total assets" for each year of data available. (Note: this is done by taking the current year total assets plus the prior year total assets divided by 2). Use an "IF" conditional statement to make sure the calculation is only made when data is available.
 2. Use the average total assets just calculated and the cash to calculate cash holdings as a percentage of average total assets.
2. Hide unnecessary columns at this point to clean things up a bit. Your data should now nicely fit onto one screen.
3. Copy your entire data set and paste into a new tab. Be sure to use Special Paste (values & formats).
4. Use filters and sorts to quickly and easily see where Finish Line ranks in order of each ratio.
5. Create a screenshot of your Excel data. Make sure that the Fiscal Year, Company Name and three calculated ratios appear on screen. All other fields should be hidden per step 2 above.

Appendix 4 – Excel Project Data Samples

Part I: Sales Data Sample

OrderDate	Region	Rep	Item	Units	Unit Cost	Total
1/1/10	West	Hollingsworth	Pencil	1	1.29	1.29
1/1/10	East	Welton	Pen	8	2.59	20.72
1/1/10	East	Welton	Pencil	20	1.29	25.8
1/1/10	East	Madray	Pencil	32	1.29	41.28
1/1/10	East	Welton	Pencil	32	1.29	41.28
1/1/10	East	Madray	Pencil	37	1.29	47.73
1/1/10	East	Welton	Pencil	38	1.29	49.02
1/1/10	Central	Widener	Pencil	57	1.29	73.53
1/1/10	Central	Widener	Pencil	58	1.29	74.82
1/1/10	Central	Widener	Pen	29	2.59	75.11
1/1/10	West	Dalton	Pencil	61	1.29	78.69
1/1/10	West	Dalton	Pencil	70	1.29	90.3
1/1/10	Central	Kennedy	Pen	36	2.59	93.24
1/1/10	Central	Widener	Pencil	76	1.29	98.04
1/1/10	Central	Widener	Pen Set	13	24.99	324.87
1/1/10	Central	Kennedy	Binder	17	19.99	339.83
1/1/10	East	Madray	Pen Set	21	24.99	524.79
1/1/10	Central	Widener	Pen Set	30	24.99	749.7
1/1/10	West	Harp	Binder	39	19.99	779.61
1/1/10	East	Welton	Pen Set	43	24.99	1074.57

Note: This data set contains 65,491 Sales Order Entries.

Part II: Industry Benchmarking Data List

Students are asked to download the following fields from the Wharton Research Services Compustat Database, filtering for companies in SIC 5661:

GVKEY	Identifying key for the company
DATADATE	date of the data provided
FYEAR	fiscal year for data provided
TIC	ticker symbol
CITY	city of headquarters
SIC	Industry code
CURCD	Currency code
CONM	Company name
CUSIP	Cusip #
CIK	CIK company identifying code
EXCHG	Stock Exchange Code
FYR	Fiscal year end month code
ACT	Total Current Assets
AT	Total Assets
CH	Total Cash
DLTT	Total Long-term Debt
GDWL	Goodwill
INVT	Total Inventory
LCT	Total Current Liabilities
LT	Total Liabilities
RE	Retained Earnings
RECTR	Total Receivables
COGS	Cost of Goods Sold
NI	Net Income
OPITI	Operating Income
REVT	Total Revenues
SALE	Total Net Sales
TXT	Taxes
EMP	Employees