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Student Performance in Introductory Accounting: A Multi-Sample, Multi-Model Analysis

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Abstract

Using prior literature as a starting point, three predictive models are developed to explain the variation in student performance in the first college accounting course. The use of multiple samples provides the opportunity to validate certain measures and to examine the stability of predictive models over time in the same academic institution. The use of multiple models contributes to our understanding of the potential for model misspecification in this line of research. The study includes an examination of the structure of student attitudes toward accounting and need for achievement through the use of exploratory and confirmatory factor analysis. The study evaluates the unique contribution of attitudes toward accounting and need for achievement to course performance. Bivariate correlations and three regression models are used to evaluate eight hypotheses about student characteristics and their association with course grades. Other student characteristics tested include intention to major in accounting, prior accounting education, hours of outside work at a job, academic aptitude, and overall college academic performance. Finally, the incremental contribution of gender on each of the models is analyzed. Results indicate that student attitudes toward accounting and need for achievement, plus several other characteristics, have only moderate explanatory power for course performance. Consistent with prior literature, college academic performance and academic aptitude are found to be the most prominent characteristics for explaining student performance in the first accounting course. Gender makes virtually no incremental contribution to the explanation of student performance. Teaching and research implications are discussed.

Introduction

A good deal of accounting education research focuses on predictive characteristics that contribute to performance in college-level accounting, primarily in the first accounting course. The results identify

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certain characteristics consistently related to student performance and other characteristics proving significant in some studies and not in others.

A second, less developed line of research, examines the structure and importance of student attitudes toward accounting. While relatively few studies of student attitudes toward accounting exist, the ability to understand student attitudes toward learning in general, and accounting specifically, might aid in the recruitment and retention of outstanding students.

This study has six major components. First, we examine attitudes of students toward accounting, including the nature of attitude and its influence on student performance. Second, we investigate other student characteristics that contribute to performance. Third, we determine the influence of certain student characteristics on model specification. Fourth, we examine the influence of student self-selection of the accounting course in which they enroll. Fifth, we look at the impact of gender on course performance. Finally, we discuss some research and teaching implications of the study.

Prior literature on attitude and student performance in accounting are used as starting points to develop a better understanding of student attitude and to construct several models for prediction of student performance. In response to the concerns of Stout and Rebele (1995) about accounting education research, great care is taken to provide information about the strength of the relationships (variation explained) examined. In addition, this study uses multiple samples and multiple models. The research approach used in this study (1) provides insights about groups of students with different attributes, attitudes, and academic intentions, (2) reveals information about the strength of various models (the inclusion and exclusion of particular predictive variables), and (3) measures the robustness of results for different samples and different models over time.

Prior Literature

Attitudes towards Accounting

There are two compelling studies of student attitudes towards accounting. Geiger (1989) found that introductory accounting students are less able to distinguish between accounting concepts and practical accounting applications than intermediate accounting students and that attitudes are positively associated with course performance. Solomon (1975) found that introductory accounting students' general attitudes toward accounting were improved after using the case method of instruction. However, there was no lasting effect in that the improved attitudes subsided once the case method was discontinued. Neither of these studies examined the influence of student attitudes existing at the beginning of the course.

Performance in Accounting

A number of studies have been conducted on performance in the introductory accounting course. Eskew and Faley (1988) found five measures associated with performance in the first college-level financial accounting course. A positive relationship to performance was found for (1) SAT scores, (2) high school math and English grades, (3) collegiate GPA, (4) the number of voluntary quizzes taken (a measure of motivation),

and (5) previous exposure to a course in bookkeeping or accounting. Their model explained about 30 percent of the variation in course performance. They also reported that the number of semester hours of math and statistics preceding the accounting course was not significantly associated with course performance. Doran, Bouillon, and Smith (1991) found a positive and significant relationship between course performance and the following variables (listed in order of highest variance explained to lowest variance explained): cumulative grade point average, standardized academic test scores (ACT's), declaration as an accounting major, male, and high school bookkeeping course. Their model of *ex ante* predictor variables explained 30 percent of the variation in course performance.

Baldwin and Howe (1982) and Bergin (1983) found that while students with previous accounting background perform better on the first accounting examination, their performance deteriorates as the difficulty of material increases until there is no significant difference in the final grade. Schroeder (1986) extended the study of previous accounting background and found that students with over one year of high school bookkeeping performed better than all other students on all examinations throughout the course. He also found performance to be positively associated with the ACT comprehensive score, high school rank, and the intention to major in accounting (for those with more than one year of high school bookkeeping).

Geiger and Cooper (1995) explored the ability of measures developed in expectancy and needs theory to predict the overall grade point average (GPA) of students enrolled in introductory accounting. They found that certain expectancy theory measures and the need for autonomy were able to explain about 12 percent of the variation in overall GPA. However, because their study did not control for academic aptitude (e.g., SAT or ACT scores), their model may have been mis-specified.

Mitchell (1988), in a UK study, found performance to be associated with high school accounting, grades in high school accounting, and high school math grades. Those students with better math grades and no high school accounting were able to catch up in performance after the first examination. Keef (1988), in a New Zealand study, found that the previous study of accounting had no effect on performance, but that the previous study of mathematics and economics each had selective influence on performance. In an Australian study, Rohde and Kavanagh (1996) found a positive association between performance and high school accounting as well as standardized academic achievement scores.

Need for Achievement

Although the need for achievement scale has been used seldomly in the accounting literature on course performance, Harrell and Stahl (1983) found that it was positively associated with overall grade point averages, course grades in Auditing, and intentions to make public accounting a career. However, Geiger and Cooper (1995) found that need for achievement was not significant as part of a model used to explain overall GPA. As it relates to practitioners, Farmer and Rittenberg (1992) found that need for achievement was positively associated with higher ranks in public accounting firms. These results

would suggest that need for achievement could be an important characteristic of students who will be successful in the accounting curriculum and accounting profession.

Gender and Student Performance

The study of the influence of gender on student performance has demonstrated the importance of careful model specification. Tyson (1989) found that higher grades for females in introductory accounting classes were no longer significant after including grade-point averages or high school rankings in the analysis. Buckless *et al*. (1991) found that when controlling for SAT scores, gender effects largely disappeared. Similarly, Gist *et al*. (1996) found SAT's, collegiate GPA, and performance in a previous calculus course to be significantly associated with course performance, but gender was not significant when these other variables were included. Ravenscroft and Buckless (1992) examined the influence of instructor grading policies, gender, and performance. They found that females were more likely to receive higher course grades when homework determined part of the course grade.

The Use of Regression Models

Prior literature that has studied performance in the first accounting course has used a range of sets and subsets of predictor variables. The use of different subsets of predictor variables, the use of different statistical techniques, and the different presentations of results reduces the comparability across studies and introduces the potential for model misspecification within and across studies. Therefore, this study attempts to use those variables that have been most used and/or have provided the highest levels of explanatory power in prior studies. Regression analysis has been used in a number of previous studies. Regression analysis has the added benefit of revealing the incremental explanatory power of variables when controlling for the effect of other variables. However, when important variables are excluded from a model (misspecification) or variables are highly correlated with one another (multicollinearity), the explanation of the association between individual factors and the dependent variable may become spurious.

Research Questions

Little evidence exists about the attitudes of students who choose accounting as a major. This study focuses on the relationship between student attitude toward accounting and performance. It also investigates the impact on performance of other student attributes at the beginning of the first college accounting course. First, we evaluate the measurement scales for attitudes toward accounting and need for achievement. Second, we assess the contribution to performance of student attitudes toward accounting, need for achievement, and other predictive variables. As part of this process, three predictive models of course performance, each evaluating the incremental influence of additional sets of explanatory variables, are examined. Finally, the incremental influence of gender on the predictive models is assessed.

Hypotheses

The following hypotheses, which are stated in the expected direction, will be examined.

H_1: Students' attitudes toward accounting are positively associated with course performance.

H_2: Students' need for achievement is positively associated with course performance.

H_3: Students' intentions to major in accounting are positively associated with course performance.

H_4: Students' prior accounting education is positively associated with course performance.

H_5: Students' outside job work hours are negatively associated with course performance.

H_6: Students' academic aptitudes are positively associated with course performance.

H_7: Students' overall college academic performance is positively associated with course performance.

H_8: Students' gender is not associated with course performance.

Research Methodology

Data Collection

The study was conducted in a four-year private university located in the Great Lakes Region of the United States. The school of business and accounting program are accredited by the American Assembly of Collegiate Schools of Business. For the purposes of this study, one appealing aspect of the university is the existence of a dual-track introductory accounting sequence. Those students who intend to major in accounting or finance take one introductory accounting sequence (hereafter referred to as the Majors Track). Those students who intend to major in other disciplines take a separate introductory sequence (Non-Majors Track)[1]. Therefore, self-selection into one sequence or the other is a strong indicator of intentions toward accounting.

The pedagogical approach used in the two tracks was similar, but not identical, during the time of the first two samples used in this study. Although different textbooks were used in the two tracks, both tracks used traditional accounting textbooks.[2] Instructors in the Non-Majors Track were expected to de-emphasize some of the more technical material, but no empirical evidence is available to determine the actual content differences between tracks or among instructors. During the semester of the third sample used in this study, the Non-Majors Track used a new, nontraditional accounting textbook that emphasized underlying business cycles and de-emphasized traditional technical accounting aspects of the course.[3]

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1 The vast majority of students taking the non-majors track course intend to major in another area of business.

2 *Principles of Accounting 6th Edition*, by Hanson, Hamre, and Walgenbach (Irwin, 1997) was used for the Majors Track. *Accounting Principles, 4th Edition*, by Solomon, Walther, Plunkett, and Vargo (West, 1993) was used for the Non-Majors Track.

3 *Accounting Concepts and Applications, 5th Edition*, by Skousen, Albrecht, and Stice (Southwestern, 1996) was used for the Majors Track. *Introduction to Accounting Concepts and Applications: An Integrated Approach*, by Ainsworth, Deines, Plumlee, and Larsen (Irwin, 1997) was used for the Non-Majors Track.

In the first sample, the instrument was administered in the first week of classes to six separate sections of the Majors Track and four separate sections of the Non-Majors Track. Six different instructors were involved in teaching the ten sections, but no instructor taught both courses. In the second sample, the instrument was administered only to three separate sections of the Majors Track and two separate sections of the Non-Majors Track. One instructor taught all of the Majors Track sections selected and another instructor taught both of the Non-Majors Track sections. In the third sample, 7 different instructors taught the 10 sections (six Majors sections and four Non-Majors sections), with no instructor teaching in both tracks. All administrations of the instrument for all samples were conducted during the first week of the semester. Students were given a brief introduction and told that their instructors would have no access to individual survey results. In the second and third samples, the survey requested permission to gain access to the student's records to obtain SAT and/or ACT scores and their college grade-point average. Table 1 provides a summary of the number of students initially in each sample, and the number of students completing the course.

The Survey Instrument

In this study, student attitudes toward financial accounting were measured using a survey instrument developed by Geiger (1989). Geiger's survey consists of 36 items representing three subscales: (1) general attitudes toward financial accounting, (2) attitudes toward the concepts underlying financial accounting, and (3) attitudes toward the practical application of accounting. Respondents were asked to indicate their relative agreement with each item along a 5-point Likert scale, ranging from strongly agree to strongly disagree. Geiger administered the survey once, halfway through the semester. One of the objectives of the current study is to evaluate the attitudes of students as they entered the course and the effect of those attitudes on course performance. Therefore, the survey instrument was administered during the first week of the semester. The wording of items in the Geiger survey that were related to the student's experiences during the course was revised to be prospective in nature. As explained in the next section, Geiger's original three scales were subsequently modified for this study.

Attitude Constructs

Geiger's (1989) 36-item survey on student attitudes toward financial accounting contained three *a priori* subscales: general attitudes toward financial accounting, attitudes toward the concepts underlying financial accounting, and attitudes toward the practical application of financial accounting.

A combination of exploratory factor analysis and analysis of inter-item correlations was used to evaluate the three subscales in the first sample. It was found that Geiger's thirteen general attitude items did not load consistently on one factor or in any identifiable pattern on other factors. Therefore, these general attitude items were dropped from further consideration. It was established that thirteen of the remaining twenty-three items formed unique patterns of loadings on three factors that could be adequately interpreted. Items related to conceptual aspects of financial accounting formed two separate factors that can be considered (1) the interest of students in learning about

accounting concepts (INTEREST) and (2) the perceived importance of concepts to the practice of accounting (IMPORTANCE). A third factor consisted of practical aspects of financial accounting (PRACTICAL). In all cases, reliability tests, as measured by Cronbach's Alpha, exceeded .50.[4] Table 2 lists the individual items, their placement on the survey instrument, reliabilities, and the scale with which each is associated.

The resulting three subscales (INTEREST, IMPORTANCE, PRACTICAL) were then used to develop a revised survey instrument for the second and third samples. The confirmatory factor analysis capabilities of LISREL 8 (Jöreskog and Sörbom, 1993) were used to evaluate the structure of the attitudes subscales for the second sample. As shown in Table 3, five different structures were tested. These included (1) a one-factor model that assumes a single underlying attitude, (2) three two-factor models, combining sets of two subscales, and (3) a three-factor model based on the revised subscales from the first sample. Model fits are considered to be better as χ^2/df and RMR get smaller, and as GFI, AGFI, and NFI get larger (closer to 1). As expected, the three subscales derived from the first sample resulted in the best set of fit statistics and indicate a reasonably good fit based on common use of these fit statistics.[5]

Need for Achievement

The need for achievement scale also was analyzed through confirmatory factor analysis using LISREL 8. With all eight of the original items included, the fit statistics were not particularly good. Analysis of the inter-item correlations led to a reduction of items to four. The four-item model resulted in a very acceptable fit. Table 4 shows these results.[6] A summary of measurements used for testing the hypotheses in this study are displayed in Table 5.

Data Analyses

Once the three attitude subscales and the need for achievement scale were validated, the hypotheses were tested in several ways. First, bivariate correlations with the course grade were examined. Next, several regression models were tested to examine the

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[4] Carmines and Zeller (1979, p. 51) believe that reliabilities should be .80 or above for "widely used scales." Nunnally (1967, p. 226) suggests that reliability measures in the range of .50 to .80 are normally satisfactory, especially when used in the early stages of research. Since this is the first study using these attitude measures, a cutoff of .60 seems reasonable.

[5] There are no definitive acceptable levels for these statistics in the literature. Often, the statistics are used to compare nested models, as in this application to the attitudes scales. For some recent applications of LISREL in the accounting literature, see, for example, Gregson, 1992a,b; Gregson et al., 1994; Kalbers and Fogarty, 1993, 1995. Numerous references about goodness of fit statistics exist outside of the accounting literature (see, for example, Bentler and Bonett, 1980; Carmines and McIver, 1981; Jöreskog and Sörbom,1993). Confirmatory factor analysis was also performed using the data from the third sample with comparable results.

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relationships of sets of independent variables with course grades. The regression models were developed to examine the explanatory power of certain related sets of independent variables and to better understand the potential consequences of model misspecification in explaining course performance. Because of the expected difference in the nature of the students selecting the Majors Track and Non-Majors Track, the analysis was performed separately on the two tracks as well as the entire sample.

Results

Descriptive Statistics

Table 6 reveals the means for the independent and dependent variables of interest for the three samples. Only those students who completed the course are included. Composite variables which comprised the items in each subscale (attitudes and need for achievement) were created by summing the scores of items in that subscale and then computing an average. The means are reported for the total sample and separately for the Majors Track and the Non-Majors Track.

A review of the means indicates a different pattern for many variables between the Majors Track and Non-Majors Track. Excluding OUTWORK (number of hours worked at a job) and CRSGRADE (course performance in the first accounting course), the Majors Track has a larger mean for every variable. The intention to major in accounting (MAJOR), as would be expected, is substantially larger for the Majors Track than for the Non-Majors Track. It might also be expected that the attitudes toward accounting would be better for the Majors Track, and this is also the case. The results also clearly support that students in the Majors Track have a stronger academic background (i.e., ACT, SAT, and GPA are all higher). The fact that the Majors Track has a much larger percentage of students who have taken high school accounting might also be expected. However, the reason for this is not entirely obvious. Are students who take accounting in high school more likely to become interested in a career in accounting and take college accounting? Or are students who are interested in a career in accounting more likely to take accounting in high school in the first place? The variation in means between the two tracks supports the value of examining the hypotheses for the total sample and comparing those results to those of the two tracks.

Hypothesis Testing (H1-H7): Correlations Analysis

Table 7 presents the Pearson correlation coefficients and significance levels for the independent variables and course grade for the total sample and the two tracks. Since the sample sizes among and within the three samples vary, the strength of the relationships (*r*'s) are reported as well as the statistical significance.

A review of the total sample data shows that all of the hypotheses, with the exception of H_4, have at least some empirical support (i.e., statistical significance at .10 or better). Results are strongest in Sample 2, where every hypothesis except H_4 is strong, in the expected direction, and significant at .01. The most impressive predictors of course grade for all samples for which they were measured, and for both tracks, are the practical aspects of accounting attitudes (H_1), the ACT and/or SAT (H_6), and GPA (H_7). Only for

the Non-Majors Track in Sample 3 is PRACTICAL neither strong nor statistically significant. Need for achievement (H_2) shows a relatively strong association with course grade, but is not consistently significant.

When the Majors Track and Non-Majors Track are evaluated separately, some differences appear. First, the attitudes scales are selectively significant, with IMPORTANCE having a significant positive association for the Majors Track and PRACTICAL having a particularly strong positive association for the Non-Majors Track in Sample 2. Support for intention to major in accounting (H_3), accounting in high school (H_4), and the influence of outside work (H_5) have isolated, but not consistent, support.

Based on correlation testing, several conclusions can be drawn. Of the attitude scales, PRACTICAL attitudes are most strongly and positively associated with performance across and within samples. Need for achievement shows a strong, but not always significant, positive relationship with performance across and within samples. The negative impact of outside work is strongest in Sample 2. Measures of academic aptitude (ACTs and SATs) and prior academic performance (GPAs) are very strongly and positively associated with performance across and within samples. In summary, H1 has reasonably strong, but selective, support, especially as it relates to practical aspects of accounting. H2-H4 (need for achievement, intention to major, and high school accounting) are supported primarily for the majors in Sample 2. H5 (outside work) is strongly supported only in Sample 2. H6 (standardized achievement tests) is strongly supported for both samples for which it was measured. H7 (college academic performance) is strongly supported for all samples and all student groups. The differences among samples and groups highlight the need for multiple samples and multiple groups to fully understand the impact of the predictive variables.

Hypothesis Testing (H1-H7): Regression Models

Three different regression models were used to test hypotheses for course performance. First, the attitudes subscales and the need for achievement scale were used as one model. This first model represents the attitudes of students toward accounting and motivation to do well in classes. A second model includes those variables in the first model plus all other independent variables with the exception of academic aptitude tests (SAT's or ACT's). The academic aptitude tests and the collegiate grade-point average (GPA) have consistently been significantly correlated with course performance in prior studies. Also, they are highly correlated with each other in this study. Because the academic aptitude tests are thought to predict college success, a model with the collegiate GPA was tested before adding the influence of the aptitude tests. In this way, any incremental effect of the aptitude tests can be clearly discerned. Also, since not all students sat for both the SAT and the ACT, only subsets of the samples could be used when the aptitude tests were included as independent variables. Therefore, the third model was split to separately add the SAT (Model 3A) and ACT (Model 3B) scores, respectively. Table 8 presents the correlations among the independent variables. As

would be expected, the strongest correlations exist between the SAT and ACT scores. Certain other independent variables had relationships as strong as .50.[7]

Table 9 provides a summary of Model 1 for the attitudes and need for achievement scales. For the total sample, with all independent variables included, only PRACTICAL is significant for all three samples, at .05. There is an interesting difference in the pattern of significance between the Majors Track and the Non-Majors Track. Importance of accounting concepts has a rather strong, positive relationship with course grade for the Majors Track, but this relationship is entirely absent for the Non-Majors Track. The Non-Majors Track has a strong, consistent relationship between the practical aspects of accounting and course grade. The strength of this relationship shows up only in Sample 3 for the Majors Track. Unexpectedly, the Non-Majors Track has a rather strong negative association between interest and accounting concepts and performance. The influence of the need to achieve is consistently positive, but is only significant for the Non-Majors Track in Sample 3.

Caution is warranted in interpreting the results of Model 1 for two reasons. First, because this model excludes all other independent variables, the impact of attitudes toward accounting may be diminished by the effect of other student characteristics. Second, the explanatory power of this model, on the whole, is not particularly impressive. Despite the fact that over 13 percent of the variation in course grade is explained by the model in Sample 2, the explanatory power of Model 1 in the other two samples is substantially lower. This also highlights the potential problem of using only one sample at one time in a study.

Table 10 provides a summary of results for Model 2. Overall, it can easily be observed that the explanatory power of Model 2 is far superior to that of Model 1. The adjusted R^2's range from .27 to .51 for the total samples. These results compare very favorably with the percentage of variation explained in prior studies.[8] Based on the partial correlation results in Table 10 and the bivariate correlations in Table 7, it is clear that GPA accounts for a substantial portion of the explanatory power of Model 2. In fact, collegiate academic performance (GPA) dominates the model for all sample configurations, strongly supporting H_7. Although the relationships are somewhat weaker,

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[7] There are no hard and fast rules as to when multicollinearity is a problem. However, rules of thumb exist for considering whether multicollinearity is of concern. Berry and Feldman (1985) suggest two methods. First, bivariate correlations above .70 or .80 may suggest high levels of multicollinearity. Second, when regressing one independent variable on the rest of the independent variables, R^2's of close to 1.0 indicate high multicollinearity. Also, Neter, *et al.* (1985) suggest that variance inflation factors (VIFs) when the maximum VIF is greater than 10 and the average VIF is considerably higher than 1 indicate a high level of multicollinearity. All three of these methods were employed in this study, with no evidence of serious multicollinearity found.

[8] Not all studies have included information about the percentage of variance explained. In two studies that included collegiate GPA and standardized academic test scores in the models predicting course performance, about 30 percent of the variation in performance was explained by the models (Eskew and Faley, 1988; Doran, Bouillon, and Smith, 1991).

IMPORTANCE still shows a strong positive relationship for the Majors Track in two of the three samples, and PRACTICAL is strong and positive for the Non-Majors Track (though statistically significant only in Sample 3), despite the addition of the other independent variables. Evidently, GPA includes most of the influence of need to achieve, since ACHIEVE shows no strong relationship within Model 2. The isolated significant result related to INTEREST for Non-Majors Track, Sample 3, Model 1, still exists.

Tables 11 and 12 show the results of Models 3A and 3B. Data on SAT's and ACT's were not collected in the first sample, so only data from the second and third samples could be used. Since not all students took the SAT and ACT, a subset of the samples used in Models 1 and 2 was used. Therefore, results from Models 3A and 3B with Models 1 and 2 may not be entirely comparable. The model results may differ due to the smaller sample used to generate the statistics as well as any bias that exists in those students who took one aptitude test and not the other, or who took both and performed differently on the two exams. In order to minimize some of these problems and to use as much information as available, missing data for all regression models was deleted on a pairwise basis.[9]

The results for Models 3A and 3B proved to be very similar to those for Model 2. The patterns identified in Model 2 exist in Models 3A and 3B, although the levels of significance and strength are not always as high. GPA and the academic achievement tests (either SAT or ACT) dominate both models. The adjusted R^2's in Models 3A and 3B are also higher than those in Model 2, ranging from .32 to .60 in the total samples. The incremental adjusted R^2 for the ACT is more dramatic than that for the SAT, especially for those in the Non-Majors Track. The ACT is significant at .01 in all Model 3B variations and it explains 65 percent of the variance for the Non-Majors Track, an increase in adjusted R^2 of about 20 percent in the Non-Majors Track sample over Model 2. However, fewer students took the ACT than the SAT. There may be some unknown bias in this student group, especially as it relates to the Non-Majors Track. The small absolute number of students taking the ACT in the Non-Majors Track, 29, may also have affected the results of this model for this group. For Models 3A and 3B, H_6, related to academic aptitude, is supported both for the SAT and ACT. However, caution is advised in interpreting the academic aptitude results, especially those for the ACT, since the entire sample did not take both exams.

Based on results of the regression models, several conclusions can be drawn. Overall, the student attitude scales have limited explanatory power, especially once additional independent variables are introduced (H1). Similarly, the need for achievement scale shows little incremental influence beyond other explanatory variables (H2). Measures of academic aptitude (ACTs and SATs) and prior academic performance (GPAs) are

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9 In Sample 2, 100 students took the SAT (71 Majors Track, 29 Non-Majors Track) and 92 students took the ACT (63 Majors Track, 29 Non-Majors Track). In Sample 3, 131 students took the SAT (88 Majors Track, 43 Non-Majors Track) and 152 students took the ACT (97 Majors Track, 55 Non-Majors Track). Therefore, the Non-Majors Track results especially should be evaluated with caution.

strongly and positively associated with performance across and within samples (H6 and H7).

The Influence of Gender (H8)

As discussed earlier, several previous studies demonstrate that gender differences are minimal for student performance in accounting once other important independent variables are introduced. The influence of gender was tested through an examination of (1) correlations between gender and course performance, and (2) adding gender to each regression model and evaluating its incremental contribution toward explaining course performance. Correlation analysis for the total sample, and the Majors and Non-Majors samples separately, reveals a significant correlation only for the Non-Majors Track. Gender is significantly correlated with course performance in all three Non-Majors Track samples ($p<.05$ or $p<.10$), but in none of the total or Majors Track samples. Based on the coding of the gender variable, this indicates that females performed better in the Non-Majors Track than did males. When gender was added to the independent variables in Models 1, 2, 3A, and 3B, gender was not significant in any model for any sample. Therefore, the predicted absence of an influence of gender on course performance (H8) is partially supported by correlation analysis and fully supported by regression analysis.

The results of analyzing gender and student performance is fundamentally consistent with most prior studies. That is, gender has little explanatory power after controlling for other explanatory variables. However, the research design permitted in this study by the self-selection into the Majors Track and the Non-Majors Track reveals an interesting pattern. Gender differences found before controlling for other variables such as academic aptitude and prior academic performance may be explained by a subset of males who are academically less motivated and/or less successful (the strongest statistically significant relationship across Non-Majors Track samples is a negative correlation with GPA and being male). Evidently, the attributes of those males and females motivated to take the Majors Track are more similar than those males and females selecting the Non-Majors Track.

Limitations

There are several potential limitations of this current study. First, because the study is based on samples from one school, the results may not be representative of all introductory accounting students. Second, although the dual-track system was thought to enhance the ability to examine differences between accounting students with different backgrounds and motivations, there may be some unknown bias that exists in this system. Although separate samples were used to validate the attitudes scales, further validation and elaboration on students' attitudes towards accounting should prove useful. Although this study is similar to most of the previous literature in its use of one school, using three samples may have reduced the likelihood of significant bias.

Summary and Implications

This study extended a line of research that has sought to understand and explain the performance of students in the first accounting course. This study provides some unique

contributions to the literature. The use of three samples, multiple models, and comparison of those students who have self-selected different accounting tracks aided in evaluating the consistency of predictor variables over time, across models, and across groups.

In large measure, the results of this study are consistent with prior research. A student's GPA and academic achievement scores were found to be the most powerful and significant predictors of performance. In addition to exploring a number of important variables from the prior literature, the study refined, tested the validity of, and examined the incremental contribution toward performance of student attitudes toward accounting. It was found that students' attitudes toward accounting are empirically different with regard to conceptual and practical aspects. The unique and rather consistent patterns of certain student attitudes within subgroups of students suggest that further work on student attitudes may be worthwhile. In particular, the self-selection of students in their study of accounting indicates that particular biases exist that may be useful to explore further.

The inconsistent pattern of the influence of high school accounting in this and other studies suggests that something about high school accounting may influence results, but that the nature of it has not been sufficiently captured in measures to date. The results of this study also indicate no major differences in outcomes based on gender alone. However, there still are patterns of self-selection, work ethic, and course policies that could be explored with regard to gender.

In the future, similar studies using the multi-sample, multi-model approach using the same measurements and models could eliminate concerns of model misspecification, differences in measurements, and school biases. Although high school accounting did not prove to be consistently influential in the models, it could also be observed from the descriptive data that a higher percentage of students in the Majors Track had high school accounting than those in the Non-Majors Track. This type of bias carries over all the way to the CPA examination, where nearly 40 percent of undergraduate exam takers made their decision to major in accounting in high school or earlier (National Association of State Boards of Accountancy, 1998). Perhaps more information about how many students take high school accounting and why they take it could provide additional insight into the decision to major in accounting, success in accounting, and attracting students to accounting.

As educators, the results of this study suggest that we have little more to go on for predicting students' success than their prior success. Even their level of intention to major in accounting did not seem to have an impact beyond the other variables measured. At one level, this is a disturbing finding. It suggests that a high percentage of course performance is predetermined before we teach one class. On the other hand, it provides educators the opportunity to identify students at risk and to explore options for better meeting the needs of those students. It is in the unexplained variance where we can perhaps find comfort that our teaching methods can make a difference in outcomes.

Applications for Future Research

This study demonstrates that a limited number of variables provide valuable information about characteristics associated with course performance. The dominance of

GPA, and to a lesser extent, academic aptitude tests, suggest that it may be difficult to build a better predictive model for performance in the first accounting course beyond that of a few key variables. Additional work on various student characteristics, such as attitudes, is still necessary to identify those attributes that will be uniquely important to the success of accounting students. A second research direction may be to expand the investigation to characteristics of those students who have demonstrated success in the later stages of accounting programs and accounting practice and then to determine whether those characteristics are present and important for students entering accounting programs.

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Table 1: Summary of Study Samples

	Sample 1		2		3	
	Initial	Complete	Initial	Complete	Initial	Complete
Majors Track	162	130	98	94	166	140
Non-Majors Track	114	93	58	41	102	85
Total	276	223	159	135	268	225

Table 2: Items Included in Construct Categories

Student's attitudes towards interest in accounting concepts:

1. Discussions about the concepts of financial accounting is boring (Item #16)
2. Discussions about the conceptual framework of financial accounting is stimulating. (Item #17)
3. I think a course on financial accounting would be interesting. (Item #19)
4. Thinking about conceptually difficult financial accounting problems is stimulating to me. (Item #33)
5. I enjoy thinking about the theories that financial accounting is based on. (Item #35)

Reliability (Cronbach's alpha), Samples 1, 2, 3, respectively = .8261, .8064, .8396

Student's attitudes towards the importance of accounting concepts:

1. It is important to learn the concepts underlying accounting. (Item #13)
2. One cannot be a professional accountant without a good understanding of the concepts underlying accounting. (Item #18)
3. Understanding fundamental accounting concepts are essential for a competent accountant. (Item #23)
4. Concepts behind financial accounting are not important, what is important is just knowing how to account for actual business activities. (Item #31)

Reliability (Cronbach's alpha), Samples 1, 2, 3, respectively = .6175, .7060, .5135

Student's attitudes towards the practical aspects of accounting.

1. I seem to have a lot of difficulty learning how to solve numeric problems in accounting. (Item #6)
2. I like to solve number-oriented accounting problems. (Item #7)
3. I make a lot of errors when I work numeric financial accounting problems. (Item #10)
4. Working through long, complex numerical accounting problems puts me to sleep. (Item #12)

Reliability (Cronbach's alpha), Samples 1, 2, 3, respectively = .7084, .7033, .7504

Table 3: Results of Confirmatory Factor Analysis: Student Attitudes

	X^2	df	X^2/df	GFI	AGFI	RMR	NFI
One-factor model	299.91	65	4.61	0.76	0.67	0.09	0.55
Two-factor model(a)	247.81	64	4.03	0.79	0.71	0.09	0.62
Two-factor model (b)	169.30	64	2.65	0.85	0.79	0.08	0.75
Two-factor model (c)	271.63	64	4.24	0.76	0.66	0.13	0.59
Three-factor model	124.11	62	2.00	0.90	0.85	0.07	0.82

N=158; GFI=Goodness-of-fit; AGFI=Adjusted goodness-of-fit; RMR=root-mean-square residual; NFI=normed fit index; (a) Combines interest and importance, practical aspects separate. (b) Combines interest and practical aspects, importance separate. (c) Combines importance and practical aspects, interest separate.

Table 4: Results of Confirmatory Factor Analysis: Need for Achievement

	X^2	df	X^2/df	GFI	AGFI	RMR	NFI
One-factor model (eight items)	114.98	20	5.75	0.87	0.76	0.26	0.53
One-factor model (four items)	5.14	2	2.57	0.99	0.92	0.04	0.96

N=158; GFI=Goodness-of-fit; AGFI=Adjusted goodness-of-fit; RMR=root-mean-square residual; NFI=normed fit index

Table 5: Summary of Study Measurements

Description	Measurement	Abbreviation
Attitudes Toward Accounting: Interest in Learning Concepts	Five items adapted from Geiger (1989): 5-point scale	**INTEREST**
Attitudes Toward Accounting: Importance of Concepts	Four items adapted from Geiger (1989): 5-point scale	**IMPORTANCE**
Attitudes Toward Accounting: Practical Aspects of Accounting	Four items adapted from Geiger (1989): 5-point scale	**PRACTICAL**
Need for Achievement	Four items adapted from Spence and Helmreich (1983): 7-point scale	**ACHIEVE**
Intention to Major in Accounting	How likely the student is to major in accounting: 5-point scale	**MAJOR**
Prior High School Accounting Course	Previous accounting course in high school: 1 if yes, 0 if no	**HSACCT**
Outside Work Load	Hours per week the student expects to work during the semester.	**OUTWORK**
ACT	Actual ACT comprehensive score obtained from registrar.	**ACT**
SAT	Actual SAT total score (math plus verbal) obtained from registrar.	**SAT**
Collegiate grade-point average	Actual GPA obtained from registrar.	**GPA**
Gender	Gender: 1=male; 0=female	**GENDER**
Course grade	Actual course grade: A=4.0; A-=3.7; B+=3.3; B=3.0; etc., through F=0.	**CRSGRADE**

Table 6: Summary of Sample Means

Variable	Total Sample		
	Sample 1 Mean	Sample 2 Mean	Sample 3 Mean
INTEREST	3.15	3.20	3.20
IMPORTANCE	4.37	4.30	4.32
PRACTICAL	3.42	3.24	3.19
ACHIEVE	NA	5.93	5.92
MAJOR	NA	2.95	2.49
HSACCT	0.33	0.33	0.26
OUTWORK	NA	9.81	9.03
ACT	NA	24.51	24.48
SAT	NA	1029	1057
GPA	2.99	3.21	3.07
CRSGRADE	2.50	2.58	2.54

Variable	Non-Majors Track		
	Sample 1 Mean	Sample 2 Mean	Sample 3 Mean
INTEREST	2.93	2.92	2.94
IMPORTANCE	4.28	4.19	4.28
PRACTICAL	3.08	2.85	2.81
ACHIEVE	NA	5.84	5.80
MAJOR	NA	1.79	1.59
HSACCT	0.22	0.29	0.14
OUTWORK	NA	10.76	8.79
ACT	NA	23.55	23.67
SAT	NA	991	1040
GPA	2.90	3.03	3.04
CRSGRADE	2.52	2.33	2.58

Variable	Majors Track		
	Sample 1 Mean	Sample 2 Mean	Sample 3 Mean
INTEREST	3.31	3.32	3.36
IMPORTANCE	4.43	4.35	4.35
PRACTICAL	3.68	3.41	3.43
ACHIEVE	NA	5.97	5.99
MAJOR	NA	3.43	3.04
HSACCT	.41	0.34	0.33
OUTWORK	NA	9.39	9.17
ACT	NA	24.95	24.94
SAT	NA	1045	1065
GPA	3.05	3.29	3.09
CRSGRADE	2.48	2.68	2.52

Table 7: Pearson Correlation Coefficients for Association Between Independent Variables and Course Grade

	Total Sample		
Variable	**1**	**2**	**3**
INTEREST (H_1)	+.03	+.20**	+.01
IMPORTANCE (H_1)	+.07	+.22***	+.11
PRACTICAL (H_1)	+.15**	+.34***	+.14**
ACHIEVE (H_2)	NA	+.23***	+.13*
MAJOR (H_3)	NA	+.24***	-.03
HSACCT (H_4)	+.00	+.14	+.06
OUTWORK (H_5)	NA	-.31***	-.03
ACTCOMP (H_6)	NA	+.61***	+.51***
SAT (H_6)	NA	+.44***	+.46***
GPA (H_7)	+.57***	+.70***	+.53***

	Majors Track		
Variable	**1**	**2**	**3**
INTEREST (H_1)	+.10	+.15	+.04
IMPORTANCE (H_1)	+.14*	+.30***	+.19**
PRACTICAL (H_1)	+.16*	+.18*	+.16*
ACHIEVE (H_2)	NA	+.22**	+.12
MAJOR (H_3)	NA	+.25**	+.01
HSACCT (H_4)	+.06	+.23**	-.09
OUTWORK (H_5)	NA	-.29***	+.00
ACTCOMP (H_6)	NA	+.48***	+.51***
SAT (H_6)	NA	+.31***	+.45***
GPA (H_7)	+.57***	+.67***	+.52***

	Non-Majors Track		
Variable	**1**	**2**	**3**
INTEREST (H_1)	-.05	+.13	-.06
IMPORTANCE (H_1)	-.02	-.07	-.07
PRACTICAL (H_1)	+.19*	+.50***	+.14
ACHIEVE (H_2)	NA	+.21	+.17
MAJOR (H_3)	NA	-.05	-.16
HSACCT (H_4)	-.08	-.07	+.05
OUTWORK (H_5)	NA	-.33**	-.12
ACTCOMP (H_6)	NA	+.79***	+.56***
SAT (H_6)	NA	+.58***	+.53***
GPA (H_7)	+.61***	+.70***	+.60***

+=positive correlation; -=negative correlation; * p .10 (two-tailed); ** p .05 (two-tailed); *** p .01 (two-tailed).

Table 8: Correlations Among the Independent Variables: Total Samples

		INTER	IMPORT	PROCED	ACH	MAJOR	HSACC	OUTWK	ACT	SAT
IMPORTANCE	**-1**	+.33***								
	-2	+.16*								
	-3	+.12*								
PRACTICAL	**-1**	+.48***	+.27***							
	-2	+.43***	+.20**							
	-3	+.56***	+.05							
ACHIEVE	**-1**	NA	NA	NA						
	-2	+.24***	+.09	+.20**						
	-3	+.31***	+.18***	+.17**						
MAJOR	**-1**	NA	NA	NA	NA					
	-2	+.48***	+.16*	+.35***	+.12					
	-3	+.41***	+.12*	+.36***	+.11					
HSACCT	**-1**	+.17***	+.09	+***	NA	NA				
	-2	+.14	+.05	+.28***	+.12	+.09				
	-3	+.20***	+.00	+.30***	+.03*	+.30**				
OUTWORK	**-1**	NA	NA	NA	NA	NA	NA			
	-2	-.15*	-.06	-.06	-.08	-.12	+.03			
	-3	+.06	-.08	-.03	-.03	-.00	-.04			
ACTCOMP	**-1**	NA	NA	NA	NA	NA	NA	NA		
	-2	-.09	+.20*	+.26**	+.14	+.09	+.11	-.16		
	-3	-.03	+.04	+.14***	+.05	-.01	-.05	-.10		
SAT	**-1**	NA	NA	NA	NA	NA	NA	NA	NA	
	-2	-.02	+.28***	+.25**	-.04	+.09	-.09	-.18*	+.78***	
	-3	-.10	+.03	+.14**	-.07	-.24***	+.10	-.25***	+.79***	
GPA	**-1**	-.02	+.10	+.16**	NA	NA	-.11	NA	NA	NA
	-2	+.21**	+.16*	+.29***	+.30***	+.26***	-.04	-.33***	+.41***	+.40***
	-3	-.03	+.03	+.08*	+.23***	-.07	+.07	-.05	+.53***	+.41***

+=positive correlation; -=negative correlation; * p .10 (two-tailed); ** p .05 (two-tailed); *** p .01 (two-tailed).

Table 9: Summary of Adjusted R^2 and Partial Correlations: Regression Model 1

	Total Sample		
	1	**2**	**3**
Adj. R^2	.0153	.1366	.0349
INTEREST	-.0656	.0191	-.1247*
IMPORTANCE	.0499	.1603	.0958
PRACTICAL	.1539**	.2497**	.1644**
ACHIEVE	NA	.1609	.1204*
	Majors Track		
	1	**2**	**3**
Adj. R^2	.0165	.0903	.0390
INTEREST	.0019	.0573	-.0991
IMPORTANCE	.1117	.2445**	.1661*
PRACTICAL	.1189	.0397	.1662*
ACHIEVE	NA	.1740	.0740
	Non-Majors Track		
	1	**2**	**3**
Adj. R^2	.0218	.1914	.0390
INTEREST	-.1100	-.1026	-.1843*
IMPORTANCE	-.0130	.0081	-.0702
PRACTICAL	.2240**	.4854***	.1933*
ACHIEVE	NA	.1778	.2211**

Table 10: Summary of Adjusted R^2 and Partial Correlations: Regression Model 2

	Total Sample		
	1	**2**	**3**
Adj. R^2	.3185	.5081	.2692
INTEREST	.0116	-.0427	-.0387
IMPORTANCE	-.0120	.1312	.1140
PRACTICAL	.0526	.1156	.1313*
ACHIEVE	NA	-.0098	-.0130
MAJOR	NA	.0275	-.0275
HSACCT	.0637	.1959**	-.0545
OUTWORK	NA	-.1259	.0053
GPA	.5605***	.6245***	.5035***
	Majors Track		
	1	**2**	**3**
Adj. R^2	.3409	.4770	.2603
INTEREST	.0519	-.0374	.0367
IMPORTANCE	.0928	.2097*	.1885*
PRACTICAL	.0974	-.0008	.1013
ACHIEVE	NA	-.0449	-0578
MAJOR	NA	.0783	.0318
HSACCT	.1314	.2362**	-.0435
OUTWORK	NA	-.1176	.0201
GPA	.5835***	.6140***	.5004***
	Non-Majors Track		
	1	**2**	**3**
Adj. R^2	.3651	.4362	.3566
INTEREST	.0630	-.0378	-.2592**
IMPORTANCE	-.1631	-.0286	-.0828
PRACTICAL	.1072	.2855	.2173*
ACHIEVE	NA	.0845	.0668
MAJOR	NA	-.0355	-.1060
HSACCT	.0031	.0902	-.1152
OUTWORK	NA	-.1695	-.0802
GPA	.5995***	.5671***	.5963***

**** p. .10; * *p. .05; ***p. .01***

Table 11: Summary of Adjusted R^2 and P-Values: Regression Model 3

	Total Sample		Majors Track		Non-Majors Track	
	Sample 2	**Sample 3**	**Sample 2**	**Sample 3**	**Sample 2**	**Sample 3**
Adj. R^2	.5215	.3223	.4721	.3475	.4505	.3768
INTEREST	-.0028	-.0231	-.0263	.1347	.1021	-.3525**
IMPORTANCE	.0730	.0988	.1623	.1697	-.1844	-.0938
PRACTICAL	.0629	.0509	-.0056	-.0322	.0735	.2072
ACHIEVE	.0294	.0498	-.0097	.0056	.1031	.2000
MAJOR	.0320	.0601	.0967	.1475	-.1283	.1067
HSACCT	.2252**	-.0302	.2358*	-.0170	.1988	.0036
OUTWORK	.1114	.0907	-.1110	.1265	-.2237	.0886
GPA	.5704***	.3867***	.5843***	.4164***	.4050*	.4000**
SAT	.2313**	.3143***	.1728	.3902***	.3777*	.3739**

p .10; ** p .05; ***p .01

Table 12: Summary of Adjusted R^2 and Partial Correlations: Regression Model 4

	Total Sample		Majors Track		Non-Majors Track	
	Sample 2	Sample 3	Sample 2	Sample 3	Sample 2	Sample 3
Adj. R^2	.6016	.3261	.5413	.3328	.6501	.4095
INTEREST	.1181	-.0194	.0923	.0990	.1334	-.2946**
IMPORTANCE	.0673	.1081	.1258	.1965*	-.1395	-.1292
PRACTICAL	.0175	.0909	.0195	.0356	.0140	.2203
ACHIEVE	-.0353	.0136	-.1293	-.0187	.2634	.0890
MAJOR	.0120	-.0366	.0785	.0488	-.1826	-.0827
HSACCT	.1606	-.0389	.1519	-.0234	.1520	-.0501
OUTWORK	-.1014	.0311	-.1108	.0318	-.1970	-.0162
GPA	.5559***	.3363***	.6060***	.3390***	.3201	.4275***
ACT	.4679***	.3053***	.4167***	.3495***	.6739***	.3602**

p .10; ** p .05; ***p .01