Performance in Auditing: The Effect of the Accounting Information Systems Course

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In 1986, the Audit Education Committee of the Audit Section of the world’s foremost accounting scholarly association—the American Accounting Association—concluded that knowledge of business systems was important to the study of auditing but should be acquired prior to taking auditing. Although the close relationship between the accounting information systems (AIS) and auditing courses has been recognized, the linkage has not been empirically confirmed. This study examines the relationship between the AIS course and the auditing course. The value of AIS performance in modeling subsequent performance in auditing was tested and confirmed in two different universities having similar curricula but distinctly different student populations. The AIS grade was found to be a highly significant predictor of subsequent performance in the auditing course for students at both universities, even after considering more general determinants of academic performance such as cumulative GPA and selected demographic variables.

Introduction

A purported value of the Accounting Information Systems (AIS) course is improved understanding and performance in subsequent auditing classes (AAA, 1987; Arens et al., 1985; Davis, 1985; Wilkinson, 1985). In 1986, the Audit Education Committee of the American Accounting Association’s Audit Section concluded that systems knowledge was important to the study of auditing and that such knowledge should be obtained prior to taking the auditing course (Smith, 1985). The importance of systems knowledge for accounting graduates was echoed by the Bedford Committee. In discussing changes in accounting programs needed to meet the demands of the 21st century, the Committee recommended that accounting systems be taken as an early topic in the accounting curriculum (AAA, 1986).

However, despite these recommendations, consensus as to the sequencing of the AIS course does not exist (Mock & Campbell, 1985), and educators have apparently been slow to adopt the AIS course as a prerequisite for auditing. A 1986 survey of 470 universities disclosed that only 17.1% of the 233 responding schools required a systems course as a prerequisite for auditing, although practice varied between AACSB-accredited schools (26%) and nonaccredited schools (5%) (Frakes, 1987). Perhaps the conceptual arguments that have been made supporting the close relationship between AIS and auditing would be more convincing and educators would have a stronger mandate for curriculum change if the linkage were confirmed empirically.

A study by Campbell and Glezen (1989) reported the development and testing of a comprehensive model of student performance in the first auditing course. The study tested whether or not taking AIS was related to performance in auditing. It was conducted at a university where AIS was required, but not as a prerequisite to auditing. Campbell and Glezen found that students who had taken AIS before auditing or were taking it concurrently with...
auditing performed better than auditing students who had not yet taken AIS. However, they believed that the linkage between AIS and auditing could be better established by using an AIS performance variable to model auditing performance in a setting where AIS was a prerequisite.

The purpose of this study was to examine AIS performance as a determinant of student performance in auditing at two universities where AIS was generally taken prior to auditing. An expanded set of intellective and demographic variables was also included to more fully understand the determinants of auditing performance.

Research Design

Model of Student Performance

Regression analysis was used to develop a model of student performance in auditing. Components of a broad theoretical model for the prediction of academic performance can be identified in the education literature. Predictor variables reflect various dimensions of intelligence or academic ability, personality characteristics, and sociological factors. Frakes (1977), in his study of the effect of introductory accounting knowledge on intermediate accounting performance, identified three groups of predictor variables. They were (1) variables representing achievement of introductory accounting subject matter, (2) general academic ability control variables, and (3) demographic control variables. The second and third sets of variables statistically controlled for the effect of ability, personality traits, and other environmental characteristics so that the incremental effect of achievement of supposedly prerequisite subject matter could be evaluated.

Williams, et al. (1988) acknowledged these categorical components of an academic performance prediction model in reporting the results of their exhaustive review of the educational research literature. They recommended that future studies of academic achievement in accounting include both intellective and nonintellective variables but did not identify specific predictor variables except to suggest that “...this research should control for age, sex, and demographic variables to be of maximum value.”

In this study, auditing performance was predicted by (1) AIS performance, (2) measures of general academic ability and aptitude, and (3) other demographic variables reasoned to be relevant to student performance in auditing. The dependent variable was measured as the percentage of total points received in the auditing course. Both dependent and independent variables are identified in Table I. Independent variables were selected based on the literature cited above as well as a detailed review of other prediction studies in the accounting education literature.

Hypotheses

Two hypotheses were tested in this research. The first hypothesis was that performance in the AIS course was relevant to and positively impacted performance in auditing. The independent variable measuring AIS performance should have a significant incremental effect in predicting auditing performance in a model also containing both general ability and demographic variables. The second hypothesis was that the broad theoretical model for the prediction of academic performance would apply to the auditing course. A prediction model should be identifiable in which variables from each of the three predictor categories are significant.
Sample

Data were gathered from senior-level students at two universities who took the required auditing course between Fall 1988 and Spring 1991. Two distinctly different environments were represented in this study: a regional university drawing students from counties within a 60 mile radius and a comprehensive residential university in a rural setting. Data were taken from transcripts and student questionnaires. AIS was a prerequisite for the auditing course at both of these universities and other curricula requirements for accounting majors were similar. Approximately one-fifth of the 232 students (14 regional and 36 residential students) took the AIS course concurrently with auditing. Closer examination of these students revealed that they were typically playing “catch-up” and carrying large credit loads in an effort to graduate in the near term. As a result, their academic performance suffered in both AIS and auditing and any potential benefits arising from the transfer of AIS performance to auditing performance were lost. Given the poor academic performance of these students, the main effect of their inclusion was weaker results. The significant results obtained despite their inclusion indicate the overall strength of the AIS-auditing relationship and the predictive model.

Data Analysis Results

The initial step in the analysis consisted of an examination of the distribution of and correlations among the variables. Descriptive statistics for all variables are shown in Table II. The residential students were a fairly homogeneous group. The vast majority of the students were 22 to 23, single, and living on or near campus. They were equally divided between male and female. The regional students were a more diverse group with respect to age and marital status. They tended to work more hours and a higher percentage were female.

Correlations among the variables were examined as shown in Tables IIIa and IIIb. For both the regional and residential populations, OVERALL GPA and ACCOUNTING GPA were highly correlated (.903 and .868, respectively) and were therefore employed in alternate regressions. Because of the similarity of results, the models discussed in this paper use ACCOUNTING GPA as the general academic ability control variable. The AIS GRADE was highly correlated with OVERALL GPA (.730 and .790) and with ACCOUNTING GPA (.655 and .779), respectively. Additional diagnostics were examined during the final model evaluation phase to determine the impact of collinearity among these variables.

Regression analysis with all three sets of the independent variables included (as shown in Table IV) produced adjusted \( R^2 \)'s of 67.28% (regional) and 69.17% (residential). While the predictive ability of the models was relatively high, not all of the independent variables were significant. Therefore, stepwise regression analysis was employed to reduce the number of independent variables in the models as shown in Table V.

Hypothesis 1

In both the full and reduced regression models, the coefficient of the AIS performance measure was positive and statistically significant, supporting the hypothesized relationship between AIS and auditing. Concerns regarding potential multicollinearity problems were addressed by examination of the variance inflation factor (VIF) statistic and collinearity diagnostics for each variable. Neter, et al. (1985) note that a VIF in excess of 10 is an indication of severe multicollinearity. The largest VIF (2.78 from Table V) is well under 10. Thus, it does not appear that multicollinearity represents a serious problem, although care must still be taken when interpreting regression coefficients.
Because the coefficients of the AIS variable were critical to the evaluation of Hypothesis 1, an alternative analysis was performed to test its stability. A first-stage regression was run including as independent variables only the measures of general academic ability and demographic factors previously found significant in the reduced models. (See Tables VIa and VIb.) In a second stage analysis, the remaining independent variables were introduced by stepwise regression to see if the remaining unexplained variation in auditing performance would be accounted for by any of those variables, particularly AIS % / GRADE. The AIS variable provided an increase in $R^2$ of 10.78% and 4.59% for the regional and residential students, respectively, and represented a statistically significant addition to both models. The consistency of these results with the full and reduced models discussed previously strengthen the conclusion that performance in the AIS course has incremental value in predicting performance in auditing.

**Hypothesis 2**

The results of the reduced regression models provide clear support for Hypothesis 2. Prediction models were derived in which each of the three sets of independent variables—achievement of AIS subject matter, general academic ability and aptitude, and relevant demographic variables—made significant contributions to predicting performance in the auditing course. A comparison of the models for the two universities indicates stability among the three sets of predictor variables, although specific demographic factors varied somewhat reflecting environmental differences.

The models included an academic performance variable (ACCOUNTING GPA) as well as the AIS variable reflecting the specific contribution of the AIS course. Also included in the models are demographic variables indicative of experience, time constraints, and motivation. Differences occur between the residential and regional populations in the type of time constraints encountered, motivational variables, and the impact of work experience. WORK LOAD appears as a time constraint for regional students where ACTIVITY LOAD serves the same purpose for residential students. Regional students work more hours than residential students. This reflects both greater opportunities to work and a higher percentage of self-supporting students. Limited opportunities for employment at the residential university result in more emphasis on outside activities such as intramural sports.

The regional model also includes AGE, which is normally considered a maturity/motivational variable. The effects of maturity and motivation are difficult to separate as older students returning to school are typically very highly motivated. Both maturity and motivation, however, would be expected to have a positive impact on performance in auditing. The AGE coefficient in the reduced model for the regional school is negative, indicating that older students do less well in auditing. The AGE coefficient was also negative in the initial regression results for both the regional and the residential populations.

A possible explanation for these results relates to the manner in which the dependent variable was measured. Performance in auditing was measured primarily in terms of performance on exams. Anecdotal evidence suggests that students who are appreciably older than the traditional undergraduate tend to perform less well under time pressure. As a result, older students may have lower exam scores and thus lower performance scores in auditing. Given the potential for both positive and negative effects, therefore, AGE may serve as a proxy for multiple factors.
Interest in public accounting careers (CPA INTEREST) serves as a motivational factor for regional students. Many regional students are already working in accounting. Their motivation for continuing coursework is a specific interest in a public accounting career. Residential students, on the other hand, have less work experience and thus have only been able to select “accounting” as their primary career goal.

An additional component of both models is an experience variable. AUDITING WORK was significant for residential students, while ACCOUNTING WORK was significant for regional students. Students at the residential university seek internships in other locations. Auditing internships would provide experience directly related to the auditing course. For the regional students, a strong positive relationship exists between accounting work experience and performance in the auditing course. Without knowing the exact nature of the work experience, it is difficult to determine why such a relationship was not found among the residential students. It could be speculated that regional students received greater exposure to accounting systems and higher level accounting activities because of their more extensive work experience and ongoing work commitments.

Conclusion and Implications

This study provides empirical support for the influence of performance in the AIS course upon subsequent performance in the auditing course, and thus the logic of requiring AIS as a prerequisite. Specific knowledge of performance in the AIS course adds to the ability to predict performance in the auditing course. The AIS grade was a significant component of an explanatory model which, in total, addressed approximately 70% of the variation in auditing performance. Other factors influencing student performance in auditing were measures of general academic ability and demographic factors including time constraints, motivation, and relevant work experience. These factors were relatively stable across different student populations.

Research results indicate that student demographics play a critical role in determination of variables impacting performance in the auditing course. Similar results were found by Frakes (1977) in identifying predictor variables for achievement in the first intermediate accounting course. Identification of factors which predict performance in accounting courses appears dependent, therefore, upon the initial identification and isolation of demographic factors affecting each student population.

The impact of accounting work experience is interesting in its differing effects on the two populations. Large percentages of both the regional and residential samples (60% and 50%, respectively) had accounting-related work experience. This experience could be expected to improve a student’s understanding of real-world operations and provide a positive impact on courses requiring such understanding (i.e., auditing). Yet such experience failed to aid the residential students’ subsequent performance in auditing, while significantly aiding the regional students’ auditing performance. The explanation may lie in the nature of the accounting duties performed. Many accounting activities are clerical and routine in nature. Their performance does not necessarily provide students with a better understanding of internal controls, nor a better understanding of overall systems operation. Thus, the predictive value of accounting experience in relation to an auditing course would be dependent upon the specific duties performed and the environment in which they were performed.

The failure of accounting work experience as a general category to benefit subsequent accounting studies has important implications for internship development and promotion. If internships do not involve activities which increase understanding, the benefits of internship programs may not be achieved.
Limitations

Data were collected from different sections of auditing offered over a three year period. The assumption is therefore made that course instruction remained relatively constant throughout this period. While not explicitly controlled, course content and delivery were comparable because instructors for the AIS and auditing courses either remained the same throughout the period or did not differ appreciably.

Recommendations for Future Studies

Future research should be directed toward identifying more specifically the knowledge/skills obtained from the AIS course that aid performance in the auditing course. Such identification may enable AIS and auditing instructors to coordinate their efforts more effectively, potentially improving both the learning and the teaching experiences. Efforts should be made in future studies to obtain more specific measures of accounting and auditing experience in order to isolate the components of such experience that are useful. This knowledge would link the classroom to the working world and enable instructors to focus on those elements improving future work capabilities.
References


