The Long-Term Effect of the First Course in Accounting on Graduation Rates

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We study the impact of business major student performance in the Introductory Financial Accounting (IFA) class on their graduation rates. The results show that the student GPA in the first semester, the cumulative final exam score in the IFA class and the term in which the class is taken significantly impact graduation rates. Though past studies have indicated that first term GPA is a good predictor of graduation rates, we find that performance in the IFA class has additional predictive value of graduation rates. Our results remain robust after controlling race, gender, major and embedded tutors.

Keywords: graduation rates, financial accounting, embedded tutors

INTRODUCTION

According to the National Student Clearinghouse Research Center (NSCRC) report in 2024, the six-year completion rate for the fall 2018 cohort was 61.1%, while the eight-year completion rate for the fall 2016 cohort was 64.7%. Although these rates have improved over the past decade, they remain relatively low. Gender and racial differences were also noted. In 2024, at all four-year colleges, about 64.6% of women students graduated versus 57.6% of men. White and Asian students have above-average graduation rates, while Black, Hispanic, Native American, and Native Hawaiian students have below-average graduation rates (NSCRC, 2024).

Improving timely graduation rates reduces student education costs and allows them to achieve financial independence by entering the workforce earlier. It also helps higher education institutions attract prospective students through improved rankings and strengthens alumni engagement, leading to increased

donations. Hence, institutions must develop effective methods to predict graduation rates and implement strategies that promote timely completion. Su, Chen, Yur-Austin, and Liu (2020) highlight the alarming nature of prolonged time to graduation and low graduation rates within the California State University system, proposing clear degree completion roadmaps as a solution for students. Much of the prior research (Allensworth and Clark, 2020; Geiser & Santelices, 2007; Hiss & Franks, 2014; Jackson & Kurlaender, 2014; Tierney et al., 2009; Tucker & McKnight, 2019) on predicting graduation rates has focused on students' overall grade point average (GPA) but largely overlooked discipline specific course performance. Recently Demeter et al. (2022) develop machine learning algorithms to accurately predict if and when first-time-in-college undergraduates will graduate based on admissions, academic, and financial aid records two to six semesters after matriculation. They report that credit hours earned, college and high school GPA, estimated family financial contribution, enrollment and grades in required gateway courses within a student's major are all important predictors of graduation outcome. The main contribution of our study is assessing the impact of students' performance in gateway courses on graduation rates. Gateway courses provide foundational knowledge and serve as critical entry points into academic disciplines. By analyzing their predictive value, our research offers insights into how early academic success influences degree completion. One such gateway course in a business college is Introduction to Financial Accounting (IFA). Business majors are required to complete the IFA class as part of the entrance requirement for the college of business.

As the first accounting course required for all business majors and minors, IFA usually presents a significant learning curve. The course combines learning the jargon of business transactions with relatively subjective rules. Not only do students need to remember these terms and transactional guidelines, but they must also be able to analyze and apply these rules across several types of transactions. Mere memory of rules or sample problems will not likely result in good performance. Therefore, performance in this course captures student conceptual understanding, quantitative analysis, and critical thinking skills. These foundational skills are all imperative for their success in other, especially advanced, business courses. As such, the IFA gateway course is often a pre-requisite to other business major courses, hence taken by students early in their college careers (Krishnan, Landa, Lin & Yur-Austin, 2023). We are therefore interested in examining the effect of student performance in this course on individual graduation status, time to degree, and term GPAs.

Furthermore, due to the critical nature of student success in the IFA gateway course, the university tested embedded tutoring in several sections of this course. Prior research shows that embedded tutors can significantly impact academic success (Krishnan, et al, 2023). We therefore examine the lasting impact of embedded tutors on student graduation rates and time to degree completion.

Our analysis finds that the student GPA in their first term and their performance on the final exam in the IFA course are significant predictors of graduation rates. We also find that first term GPA remains significant in predicting the time it takes for students to graduate while the final exam is less significant. As reported in prior research, embedded tutors are still significantly correlated to the first exam in IFA class where students demonstrate their knowledge of foundational topics in financial accounting, but the presence of embedded tutors in the IFA gateway course does not seem to have a significant effect on graduation rates (Krishnan, et al, 2023).

The remainder of the study is organized as follows. Section 2 reviews the literature and develops the hypotheses. Section 3 identifies the research design. Section 4 presents descriptive empirical evidence, and hypothesis test results. Section 5 provides the conclusion to the study.

LITERATURE REVIEW AND HYPOTHESES

Timely Graduation

A few prior studies have investigated student first semester of first year GPA on retention and timely graduation. For example, by investigating data from Georgia State University, Gayles (2012) reports students' first year GPAs positively affect their graduating GPAs, honors graduation, and six-year graduation rates. Gershenfeld et al. (2016) analyze 1,947 students at a public flagship university in the

Midwest. Low first-semester GPA is a statistically significant factor in explaining why underrepresented minority (URM) students do not graduate within the 6-year time frame. As first semester GPA can be an indicator of student ability to handle university level courses and adjustment to university experience, it is likely to be positively correlated with their overall college success such as timely graduation. Similar findings regarding first-term GPA as a predictor of timely graduation are shown in a study on 1330 students at a Thai university suggesting global evidence of the importance of first term GPA (Tentsho, McNeil, Tongkumchum, 2019). However, mooring & Mooring (2016) find that GPA's impact on timely transfer and graduation varies by ethnicity. GPA is a strong predictor of timely graduation for Asian and White transfer students while enrollment at a 4-year institution or prior credentialing were the largest predictors for Black and Hispanic transfer students respectively. Yue and Fu (2017) however, indicate that beyond the 10th academic term GPA no longer effects graduation rates suggesting heavier emphasis should be given to early GPA. Hence, we predict:

H1: Students with higher first semester GPAs are more likely to (a) graduate within 3 years after they take the IFA course; and (b) graduate sooner.

Core Courses Performance

Research on the effect of discipline specific gateway course GPA or performance on graduation rate is very limited. Truell and Woosely (2008) study college of business admission criteria and other variables that predict undergraduate college of business student graduation. They find that GPAs of various business courses such as accounting, economics, required English and math courses, business statistics are positively associated with high graduation probabilities. Al-Nassar, Alhajjaj, and Bleady (2022) similarly find that higher performance in quantitative gateway courses such as mathematics, statistics, and economics lead to timely degree completion within their review of a Saudi Arabian public business school. Offenstein, Moore and Shulock (2010) also mention the importance of early completion of gateway math and science courses to indicate timely graduation. In our study, we collect detailed exam performance throughout the IFA course, providing more information on student conceptual understanding and critical thinking than overall GPA. We posit that performance in the IFA course has additional predictive value in forecasting student graduation rates and time, after controlling for first semester GPAs.

H2: Students with better performance in IFA are more likely to (a) graduate within 3 years after they take the course, (b) and graduate sooner.

Embedded Tutor

For students to be successful in business education, faculty and administrators aim to prevent high failure rates in gateway courses such as IFA. Students who fail to pass gateway courses in business will find their options for advancement to be very limited as this includes core knowledge needed for advancement (Alanzi and Alfraih, 2017). Faculty are therefore challenged to be innovative in supporting students who struggle with these early concepts to prevent failure. A solution available on some college campuses is offering embedded tutoring directly in the classroom before, during, or after live instruction (Krishnan et al, 2023). This tutoring model ensures students receive real-time support with problem-solving and clarifying questions to aid in their success compared to traditional tutoring, which is disconnected from the classroom experience. Embedded tutoring also differs from offering a teaching assistant to support with office hours, supplemental instruction, and exam preparation as the model offers just-in-time support alongside faculty in the classroom (Channing and Okada, 2020). Similar to related studies on embedded tutoring in STEM subjects and high failure rate gateway classes (Krishnan, et al, 2023), we expect that when embedded tutors are offered in the IFA course there will be a significant impact on student outcomes, and in the long run, student graduation rates. Embedded tutors in IFA also expose students to the tutoring services offered outside of class through the university. Those who benefit from embedded tutoring in the course would (1) gain better studying skills; (2) look for similar services when taking other difficult courses

(student center tutoring and supplemental services); (3) build lasting studying partnerships due to the active and collaborative nature of the embedded tutor study team.

H3: *Students with embedded tutors are more likely than those without embedded tutors to (1) graduate within 3 years after taking IFA course and (2) graduate sooner.*

RESEARCH DESIGN

We follow students in 4 sections of the IFA class in the Fall of 2019. The students are from a large university in western USA identified as a Hispanic Serving Institution (HSI). Two sections are conducted with embedded tutors while the other two did not have embedded tutors. All four sections are taught by the same instructor with an active learning method in which the instructor lectures one third of the class time and engages students in active learning activities during the rest of the class time. These activities include workbook problem solving in mandatory teams and individual pre- and post-chapter quizzes. Students are assigned to teams of four at the beginning of the semester and are informed that they must undertake the individualized pre-chapter quiz (pooled and algorithmic questions) for each chapter before lecture to ensure students to ensure preparedness. During the lecture, they are instructed to work in teams for guided problem solving. After coverage of a chapter is complete, they must take the individual post chapter quiz.

Two tutors are embedded in each section for students in the embedded tutor sections. These two tutors are present in every class since the start of the semester. They lead small groups and answer student questions during the class's active learning activity. All four tutors are accounting seniors who have completed both Introduction to Financial Accounting and Intermediate Accounting courses with grades A. They are chosen through interviews to ensure they know the course concepts, communicate well, and are approachable. Student-embedded tutors provide feedback to faculty and additional help to students. They are fully informed about the course teaching plan and under the close supervision of the instructor.

We control each of the four sections to be taught by the same instructor, with a class enrollment limit of 40, and to be held either in the morning or early afternoon to avoid the confounding factor of the evening class time. We collect student scores for two midterms and one cumulative final as the measure of performance (Exam1, Exam2 and Exam3). Each exam contains 10 multiple-choice questions and 5 short-answer or computational problems, with Exam3 being cumulative. We also collect data on student term GPA and units earned since they join the university, along with whether students graduate within three years of taking the Introduction to Financial Accounting course and if they do, the number of semesters students take to graduate. Finally, we also collect information on students' declared major on entering the university and at graduation (as students can make changes to their final degree), race, gender, and which term in which the first financial accounting was taken at the university.

RESULTS

Demographics and Correlations
After excluding students who withdrew from the course and those with missing data, there were 129 participants in the study. Among these participants, 41.1% are underrepresented minorities, 55.0% are women, 32.6% are of quantitative majors such as accounting or finance, and 48.8% have embedded tutors in their IFA course.

TABLE 1
DEMOGRAPHIC STATISTICS

Race	Freq.	%	Gender	Freq.	%	Major	Freq.	%	Embedded Tutor (ET)	Freq.	%
URM[1]	53	41.1	Female	71	55.0	Qualitative[3]	87	67.4	No ET[5]	66	51.2
Other[2]	76	58.9	Male	58	45.0	Quantitative[4]	42	32.6	With ET[6]	63	48.8
Total	129	100.0	Total	129	100.0	Total	129	100.0	Total	129	100.0

[1] Underrepresented Minorities (URM)
[2] Non-URM
[3] Qualitative majors: management; marketing; hospitality management; international business; healthcare administration
[4] Quantitative majors: accounting, finance, economics, management information system; supply chain management
[5] No embedded tutors
[6] With embedded tutors

TABLE 2
CORRELATION ANALYSIS[1]

Correlations

		Graduate	Time_to_degree	GPA01Term	Term_course	Exam1	Exam2	Exam3	ET	Race	Gender	Major
Graduate	Pearson Correlation	1	.a	.151	.506**	.135	.122	.279**	.056	.056	-.077	.107
	Sig. (2-tailed)		.	.087	<.001	.127	.167	.001	.525	.531	.384	.229
	N	129	70	129	129	129	129	129	129	129	129	129
Time_to_degree	Pearson Correlation	.a	1	-.387**	.700**	-.317**	-.248*	-.296*	.129	-.128	.069	-.148
	Sig. (2-tailed)	.		<.001	<.001	.007	.038	.013	.288	.292	.571	.221
	N	70	70	70	70	70	70	70	70	70	70	70
GPA01Term	Pearson Correlation	.151	-.387**	1	-.131	.438**	.428**	.528**	.003	.252**	-.338**	-.054
	Sig. (2-tailed)	.087	<.001		.140	<.001	<.001	<.001	.973	.004	<.001	.545
	N	129	70	129	129	129	129	129	129	129	129	129
Term_course	Pearson Correlation	.506**	.700**	-.131	1	-.115	-.168	.033	.127	-.017	.048	.086
	Sig. (2-tailed)	<.001	<.001	.140		.193	.058	.708	.151	.851	.586	.331
	N	129	70	129	129	129	129	129	129	129	129	129
Exam1	Pearson Correlation	.135	-.317**	.438**	-.115	1	.560**	.489**	.204*	.177*	-.008	.087
	Sig. (2-tailed)	.127	.007	<.001	.193		<.001	<.001	.020	.045	.926	.328
	N	129	70	129	129	129	129	129	129	129	129	129
Exam2	Pearson Correlation	.122	-.248*	.428**	-.168	.560**	1	.510**	.111	.143	.023	.175*
	Sig. (2-tailed)	.167	.038	<.001	.058	<.001		<.001	.209	.107	.799	.047
	N	129	70	129	129	129	129	129	129	129	129	129
Exam3	Pearson Correlation	.279**	-.296*	.528**	.033	.489**	.510**	1	.083	.223*	-.107	.115
	Sig. (2-tailed)	.001	.013	<.001	.708	<.001	<.001		.350	.011	.226	.196
	N	129	70	129	129	129	129	129	129	129	129	129
ET	Pearson Correlation	.056	.129	.003	.127	.204*	.111	.083	1	.122	.115	.182*
	Sig. (2-tailed)	.525	.288	.973	.151	.020	.209	.350		.167	.196	.039
	N	129	70	129	129	129	129	129	129	129	129	129
Race	Pearson Correlation	.056	-.128	.252**	-.017	.177*	.143	.223*	.122	1	-.069	.042
	Sig. (2-tailed)	.531	.292	.004	.851	.045	.107	.011	.167		.439	.635
	N	129	70	129	129	129	129	129	129	129	129	129
Gender	Pearson Correlation	-.077	.069	-.338**	.048	-.008	.023	-.107	.115	-.069	1	.336**
	Sig. (2-tailed)	.384	.571	<.001	.586	.926	.799	.226	.196	.439		<.001
	N	129	70	129	129	129	129	129	129	129	129	129
Major	Pearson Correlation	.107	-.148	-.054	.086	.087	.175*	.115	.182*	.042	.336**	1
	Sig. (2-tailed)	.229	.221	.545	.331	.328	.047	.196	.039	.635	<.001	
	N	129	70	129	129	129	129	129	129	129	129	129

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).
a. Cannot be computed because at least one of the variables is constant.

[1]The definitions of the various variables found in the results tables are provided in Appendix A.

The above analysis shows that student GPA in their first semester of college (GPA01Term), the semester they take the IFA course (Term_course), and their IFA final exam scores (Exam3) are positively correlated on student graduation status three years after taking IFA course (Graduate). The correlation between Term_course and Graduate is well expected, as the later students take the course, the closer they should be towards graduation. Therefore, Term_course is included as a controlling covariate. On examining the correlations between how long it takes to graduate (Time_to_degree) and other variables, we find that GPA01Term and exam performance in IFA (Exams 1, 2, and 3) have significant negative impact, suggesting the better students perform, the shorter time it takes to graduate. This is in line with our hypotheses 1b and 2b. However, embedded tutors (ET) and Graduate, or ET and Time_to_degree are not significantly correlated, not supporting hypothesis 3b.

We also analyze the correlations among Race, Gender, Major and other variables. Although there is no significant correlation among these demographic variables with Graduate or Time_to_degree, we find that underrepresented minorities (URM) students tend to perform worse than other students (Other). Earlier research (Gershenfeld et al. 2016) shows that URM students have poor graduation rates. We also observe similar findings where URM students perform poorer in terms of GPA01Term and Exam1 and 3 in the IFA course. As to the effect of gender, we notice that women students perform better in GPA01Term. Female students also tend to self-select into qualitative majors rather than quantitative majors.

Hypothesis Testing

Based on the correlation analysis, we conduct a logistic regression to examine the impact of GPA01Term, IFA Exam 3, Race, Gender and Major on Graduate, controlling for Term_course (Table 3A). Out of 129 students, 59 graduated 3 years after taking the IFA; 70 are still in progress of their degrees. The model correctly predicts 63 out of 70 graduates, and 46 of 59 in progress. The correct prediction percentage of the overall model is, therefore 84.5%. The Cox & Snell R square is 37.4%. In this full model, GPA01Term is not a significant predictor in graduation rates, inconsistent with H1(a). However, Exam 3 is significant, supporting H2(a).

TABLE 3A
LOGISTIC REGRESSION ON GRADUATION STATUS-FULL MODEL

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	GPA01Term	.801	.521	2.361	1	.124	2.227
	Term_course	1.517	.300	25.585	1	<.001	4.557
	Exam3	.043	.022	3.790	1	.052	1.044
	ET	-.139	.472	.087	1	.768	.870
	Race	.120	.477	.063	1	.801	1.127
	Gender	-.497	.529	.883	1	.347	.608
	Major	.799	.542	2.174	1	.140	2.224
	Constant	-8.331	2.225	14.024	1	<.001	.000

a. Variable(s) entered on step 1: GPA01Term, Term_course, Exam3, ET, Race, Gender, Major.

As Race, Gender, Major, and ET are not significantly correlated with Graduate (Table 2), we also repeat the analysis with only GPA01Term, Exam3 and Term_course as the independent variables (Table 3B). This revised model correct prediction rate drops to 82.9%, with Cox & Snell R-square of 36.1%. Our results confirm prior studies that GPA01Term is significant in predicting student graduate rates (Gayles 2012), supporting H1(a). In addition, Exam 3 remains significant, suggesting additional predictive value of IFA performance on graduation and supporting H1(a).

TABLE 3B
LOGISTIC REGRESSION ON GRADUATION STATUS-REVISED MODEL

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	GPA01Term	.844	.473	3.182	1	.074	2.325
	Term_course	1.462	.290	25.450	1	<.001	4.316
	Exam3	.042	.021	3.851	1	.050	1.043
	Constant	-7.859	1.808	18.900	1	<.001	.000

a. Variable(s) entered on step 1: GPA01Term, Term_course, Exam3.

We also conduct regression analysis to test H1(b) and H2(b) with Time_to_degree as the dependent variable. We present the full model regression results in Table 4A. The overall model is statistically significant (F=14.0, Sig.<.001), with adjusted R-square of 56.9%. Other than Term_course, GPA01Term is the only significant predictor of Time_to_degree in this analysis (t=-3.199; sig.<0.002), indicating the better the first term GPA, the sooner students will graduate after taking the IFA course. Exam3 is not significant. These results support H1(b), but not H2(b).

TABLE 4A
REGRESSION ANALYSIS ON TIME TO DEGREE-FULL MODEL

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	5.649	.633		8.927	<.001
	Exam3	-.008	.007	-.105	-1.235	.221
	GPA01Term	-.433	.135	-.292	-3.199	.002
	Term_course	.428	.056	.640	7.695	<.001
	ET	-.001	.128	-.001	-.007	.995
	Race	-.050	.130	-.031	-.382	.704
	Gender	-.083	.162	-.053	-.514	.609
	Major	-.219	.157	-.137	-1.398	.167

Dependent Variable: Time_to_degree

Given the fact that none of the demographic variables are significantly correlated with Time_to_degree as reported in Table 2, we also conduct linear regression without these variables and present results in Table 4B. The revised model remains significant (F=30.85, sig. <0.001), with the adjusted R-square of 56.5%. In it, the effect of Exam3 becomes marginally significant (t=-1.664, sig. < 0.101), while GPA01Term remains significant (t=-2.869, sig.<0.006). These results support both H1(b) and H2(b).

TABLE 4B
REGRESSION ANALYSIS ON TIME TO DEGREE – REVISED MODEL

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	5.091	.554		9.185	<.001
	GPA01Term	-.357	.125	-.241	-2.869	.006
	Term_course	.430	.054	.642	7.942	<.001
	Exam3	-.011	.006	-.139	-1.664	.101

Dependent Variable: Time_to_degree

We also examine Table 3A and 4A for the effect of ET to check if our hypothesis 3 is supported by the analysis. The relationship, however, is not what we expected. Consistent with earlier research (Krishnan et al., 2023), embedded tutor continues to be highly correlated to Exam 1 of the IFA class, but not with Graduate or Time_to_degree.

CONCLUSION

This study aims to address the critical importance of timely graduation in four-year higher education institutions to enhance school reputation attracting students, faculty, and donors. Our primary contribution is in the assessment of whether performance in the IFA gateway course leads to predictive value on graduation as the first study of its kind. Successful completion of several gateway courses is a critical entrance requirement for college of business majors and minors across all disciplines. We focus primarily on the accounting course. We hypothesize that, in addition to the well-researched predictive value of first semester GPAs on timely graduation, student performance in their IFA course and support of embedded tutors in this gateway course will also add further predictive value. We specifically study the effect of student performance in this course on individual graduation status, time to degree, and whether there is a lasting impact of embedded tutors on student graduation rates and time to degree completion.

Our findings indicate that after revising our model to align with our correlation results, student GPA in their first term and the final exam performance in their IFA course are significant predictors of graduation rates. We also find that student GPA in their first term also helps to predict which students will graduate sooner while the final exam is less significant. Embedded tutors however provide no lasting effect on graduation rates. Since offering embedded tutoring was still relatively new and only offered in two sections of the IFA course, the lasting effect was likely lost in preparing students for timely graduation. However, since embedded tutoring has proven to support student success (Krishnan, et al, 2023), it is noteworthy to consider adding embedded tutoring to all gateway courses in the college of business to boost graduation-related results. A related challenge will be in securing lasting funding for these efforts. Our results are also limited to students in the college of business. Results may vary for non-business majors whose performance in the IFA course is not necessarily as critical to their overall graduation.

In summary, the overall results suggest that the final exam performance in the IFA class significantly impact the graduation rates even after controlling for GPA of the first term and the semester in which the class is taken. It is strongly recommended that students should get used to the rigor of the classes in their first year of college and classes should be scheduled accordingly. Embedded tutors remain significant for the first exam of IFA class. Exam one covers the fundamentals of the topics, indicating that the tutors play an important role in helping students build the foundation for the accounting class. More embedded tutoring can be allotted to other core courses to help improve students' success. Additional research is needed to further support successful graduation of a broader diversified student body, emphasizing first-generation

and other vulnerable students. Future studies can also focus on the impact of additional gateway courses toward identifying key resources that drive student success.

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APPENDIX: LIST OF VARIABLES

Graduate	Graduation status in 3 years after taking IFA course: (0-not graduated; 1-graduated)
GPA01Term	First semester GPA
Time_to_degree	Semesters taken to graduate
Term_course	The semester when the IFA class is taken
CREarned01	Number of Units earned in the first semester
ET	Embedded Tutor: (0-No ET; 1-ET)
Exam1	First exam of IFA class
Exam2	Second exam of the IFA class
Exam3	Cumulative final exam
Major	Major on graduation; declared major if not graduated: (1-Qualitative majors; 2-Quantitative majors)
Race	Under-represented minorities (URMs) and non-URMs (Other): (1-URM; 2-Other)
Gender	Male & Female: (1-Female; 2-Male)