

# Improving Student Performance in Introductory Accounting – Raising Minimum Grade Standards is Not the Answer

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## Abstract

An ongoing debate continues at universities surrounding whether or not to raise minimum grade standards. Because of an inherent risk that enrollments may decline as a result, it is important to examine whether minimum grade policies are associated with improved student performance. To address this issue, the current study examines the relationship between higher minimum grade requirements in introductory accounting and student grades. The new minimum grade requirement of “C” was established beginning with the fall 2015 semester for introductory accounting to strengthen the quality of the program for an AACSB application. The research design included modeling introductory accounting grades over a ten-year period to examine any effect of the increase in the minimum grade on students’ grades in the course. The multivariate regression equation considered variables previously found associated with introductory accounting grades (i.e., status as accounting major, grade point average, mathematics preparedness and previous experience taking the course). An additional dichotomous variable was introduced to capture the impact of students on the new program. All students were taught by the same professor, using the same textbook, teaching philosophy and examination format to enhance the comparison. Results suggest average grades in introductory accounting did not improve as expected.

**Keywords:** minimum grade standards, introductory accounting, grade inflation, AACSB application, student quality, accounting grades, academic progress

## Introduction

The debate on how to best deliver academic accounting knowledge as a necessary foundation to becoming a Certified Public Accountant has origins back to the early years of the 20<sup>th</sup> century. Various studies and resulting opinions continued through the “White Paper” in 1989, the Accounting Education Change Commission in the 1990s and the Albrecht and Sack highly regarded monograph in the early 21<sup>st</sup> century (Black, 2012). In a post Sarbanes-Oxley environment, the Pathways Commission established in 2010 recommended transformation of the first course in accounting as a subset of their 5<sup>th</sup> of 7 recommendations intent on improvement of the ability to attract high-potential, diverse entrants into the profession (Behn et al., 2012).

Introductory accounting is in fact the cornerstone of any academic accounting program designed to lay the underpinning for a working knowledge of the language of business. This is necessary for all business majors but especially important to attract and retain students enrolling in the class with a preference towards becoming an accounting major. Yet improving the often-dismal grades earned by students in the introductory accounting courses has baffled educators and practitioners alike throughout the time frame of these studies.

As a result, the current study was designed to examine whether raising minimum grade standards, an approach to strengthen academic progression standards and overall program quality, is in fact effective. The establishment of minimum grades is employed to motivate students to improve their performance and intuitively raise the quality of academic programs. To increase quality, many business schools do set minimum grades in the introductory

accounting course. The motivation for establishment of these policies is often to comply with accreditation standards.

The Association to Advance Collegiate Schools of Business (AACSB) does require business programs to establish policies for admission and minimum standards of performance (AACSB, 2019). Standard 4 states “Policies and procedures for student admissions, as well as those that ensure academic progression toward degree completion, and supporting career development, are clear, effective, consistently applied, and aligned with the school’s mission, expected outcomes, and strategies.”

To document improvement in academic progression standards, a minimum grade of “C” in the introductory accounting course was established for the course to count towards graduation *and* for students to progress to additional accounting course. Previous standards allowed students to receive credit towards graduation for earning only a passing grade. While students not earning, the minimum grade had to retake the course; they were not required to do so prior to taking the next course.

### **Motivation**

Universities frequently shy away from increasing academic progression policies, specifically minimum grade requirements. This is because they fear such policies may decrease student enrollment if students withdraw from programs because they have to continually retake classes. For example, a previous study projected the impact on student enrollment for a potential change in policy proposed to limit student attempts at a course to a total of two attempts including any course withdrawals as one attempt (Davis & Jones, 2014). As a result of this analysis, the university chose not to implement the change as it would have resulted in the loss of an additional 2% of total students.

To explore the impact of increases in minimum grade requirement, the current study provides an empirical investigation of the association between increased minimum standards and introductory accounting grades. Improved grades in introductory accounting would be a favorable outcome associated with increased minimum grade standards. Because introductory accounting is the backbone of business programs introducing foundational concepts used in many subsequent business courses, any evidence contributing to a solution of the long-standing dilemma of how to improve performance would be ground-breaking.

Notwithstanding significant concerns of student retention, our School of Business increased the minimum required grade in introductory accounting to a “C” for students with a catalog term (i.e. entrance date into the university) of fall 2015 to improve policies for minimum standards and to demonstrate continuous improvement. This cutoff point of fall 2015 creates a unique opportunity to compare the outcome of student grades after the higher minimum grade standard to results before fall 2015. Since the minimum grade of “C” does not exist as a requirement for students *before* fall 2015 and it is an established required minimum for students taking the class *after* fall 2015, a significant and positive impact on introductory accounting grades, considering relevant student descriptive factors, would suggest a favorable association between increased minimum grades and student grades in introductory accounting. The impact of the minimum grade change is isolated as all sections included in the comparison were taught by the same professor, using the same textbook, teaching philosophy and examination format

Improved grades could be explained by the premise that a newly established minimum grade incents students to push themselves to earn higher grades to prevent having to repeat the class. Previously, students may have been satisfied with just a passing grade in introductory accounting which is perceived as one of the more difficult courses in any business core program. Students could plan to cross subsidize unfavorable grades in introductory accounting by earning higher grades in other classes to maintain the minimum overall GPA of 2.0.

One confounding factor that must be considered is low-end grade inflation; a natural consequence of increases in required minimum grades. A potential downside of increased minimum grade requirements is the very real possibility that professors may be more likely to issue the minimum grade required to avoid requiring the student to

retake the class. This could be apparent from a sudden concentration of grades at the minimum level required after the new program was instituted. The occurrence of such a phenomenon at the cutoff date could be explained by grade inflation.

Myriad studies examining introductory accounting performance are examined for relevance to the current study. Results of relevant studies together with all the aforementioned conjectures motivating the current study will be incorporated into the research design to examine the impact of increased minimum grade requirements on grades in introductory accounting.

## Literature Review

### *Precursor Study*

A precursor study to the current research was accomplished to identify factors related to successful completion of the introductory accounting course (Phillips, 2015). The study included an empirical investigation conducted on a sample of 398 students exposed to the same professor, text, teaching and examination format over five-years. Results suggested accounting major status (MAJOR), grade point average (GPA), mathematical ability (MATH), and having repeated introductory accounting (PREV) consistently emerged as relevant variables to describe the grade students earned in introductory accounting. These variables, explained in detail below and summarized in Table 1, were found empirically significant in predicting the grade students earned in introductory accounting (Phillips, 2015).

In addition to their relevance in explaining student grades in the 2015 study, a predecessor of the current study, these variables (i.e., MAJOR, GPA, MATH and PREV) were also supported in a series of previous research. Accounting major status was the focus of a 1991 study which suggested both accounting major status and GPA were associated with higher grades in introductory accounting (Doran, Boullon & Smith, 1991). Results of a 2010 study found GPA to be more a more significant predictor than mathematical ability with major and gender with significant but to a lesser extent. (Fedoryshyn, O'Brien, Hintz & Bosner, 2010). The importance of emphasizing mathematics in an accounting curriculum was also extolled in a 1962 informational article (Brown, 1962). Factors of intellectualism as well as overall GPA were examined with mixed results on predicting performance across all levels of accounting students (Triki, Nicholls, Wegener, Bay & Cook, 2012). GPA was found to be associated with successful performance in the introductory accounting course (Elias, 2005).

Results of a unique study comparing traditional to non-traditional students discovered some interesting differences between the two groups. Grade point average was found to be significant for traditional students (Wooten, 1998). A 1996 study focusing on minority student performance in accounting coursework found college GPA to be the strongest predictor of performance in the introductory accounting class; achieving a "B" or better in calculus was also significant (Gist & Ward, 1996).

Previous experience taking the introductory accounting class (PREV), was found associated to GRADE in the 2015 precursor study. PREV was included in the precursor study because it emerged as significant in an international study (du Plessis, Prinsloo & Muller, 2005). A profile developed to describe "at-risk" students included those required to repeat the course which was regarded as a demotivator. A subsequent study suggests a formal appraisal of risk assessment in the form of a questionnaire was effective in improving the performance of repeat students (Prinsloo, Muller & du Plessis, 2010). The emergence of a direct relationship between PREV and GRADE suggests that students with a previously unfavorable experience in the class tended to do less favorably in subsequent attempts.

Finally, results of a general study suggest assigning numerical grades does not enhance academic motivation; instead, grades create student anxiety and avoidance of challenging courses (Chamberlin, Yasue & Chiang, 2018).

### *Minimum Grade Requirement Effect*

Little direct research focuses on the impact of the establishment of minimum grades in accounting programs. Davis and DiGregorio (2014) tracked students earning a "C" in Introductory Accounting through the remainder of their

college career. Their results suggest these students that completed the accounting program had lower grades, repeated more classes and took longer to complete the program than students earning an A or B. The University decided not to increase the minimum grade requirement to “B” because it was feared that enrollments in the accounting program would drop 22%.

While the intuitive purpose of the higher minimum grade is to inspire students to work harder and learn the material more effectively; a natural consequence of the establishment of any sort of minimum grade is the possibility of grade inflation. Grade inflation is defined as an increase in assigned grades without a corresponding improvement in achievement (Cluskey, Griffin & Ehlen, 1997).

Grade inflation could occur because the process of grading is inherently subjective and better grades may have positive implications for programs and professors. Programs may be pressured to increase enrollments if resources are tied to numbers of students. In addition, since higher grades could be intuitively linked to more positive teaching evaluations, professors may be inclined to issue favorable grades to boost course evaluation results or limit student complaints. This can be significant because course evaluations are usually an important source of information used to support tenure, promotion and hiring decisions. In addition, professors may feel pressured by students to give the minimum grade for students on the borderline to avoid making them retake the class.

Previous research efforts examining changes in grade standards have primarily focused on detecting grade inflation. A study comparing the grades of a pre-period group of students to a post-period group where a 2.5 GPA has recently been established looking for evidence of grade inflation (Addy & Herring, 1996). Results did not suggest grade inflation in higher-performing students but grade inflation was suggested in lower performing students. A 15-year study examined grade distributions of overall university and business courses in comparison to four senior level accounting classes (Cluskey, Griffin & Ehlen, 1997). Results suggested grade inflation but not in accounting courses. A study over two years at a small public university discovered adjunct professors were more likely to inflate grades than full time professors (Sonner, 2000). In addition, previous studies have suggested research be designed to include a sample of one professor for the consistent application of teaching style and enforcement of course policies (Wooten, 1998; Mattar & El Khoury, 2013).

### **Research Design**

An increase in academic progression standards, the minimum grade required in introductory accounting in this case, are intuitively to result in higher grades. To explore the association between the increase in the required minimum grade in introductory accounting and student grades actually earned in the course, a multivariate regression model was estimated explaining student grades in the introductory accounting class. This model included student data points both before and after the increase in the minimum grade requirement with the grade in introductory accounting, GRADE as the dependent variable.

In order to isolate the impact of the increase in minimum grade, the equation contains independent variables found expected significant in a related precursor study (i.e., accounting major status, grade point average, mathematics background and previous experience in the course related the grade received) (Phillips, 2015). A dichotomous variable “NEW” was added to capture the effect of the increase in minimum grade with “1” assigned to students on the revised program and “0” to those still on the original program.

### ***Estimation of Independent Variables***

Estimation of the independent variables previously found to be associated with the dependent variable of GRADE are included in the equation explained below. The independent variables are GPA, MAJOR, MATH, and PREV. GPA is measured by the grade point average of the student at the conclusion of the semester before the student in enrolled in introductory accounting. The effect of a student being an accounting major on the grade in introductory accounting or MAJOR, is represented by “1” for accounting majors and “0” for non-accounting majors.

A mathematical score or MATH, was developed to represent the mathematical preparation of students considering both the level of class taken previously as well as the grade received. Mathematical ability was suggested to be associated with higher grades in introductory accounting (Gist & Ward, 1996; Fedoryshyn, O'Brien, Hintz & Bosner, 2010; Brown, 1992). The score was calculated by assigning a factor to represent the level of the most recent mathematics class taken from 0.50 to 2.0 and then multiplying this by the quality points received as a grade in the class. The grade range was a 4.3 for an A+ through a 0 for an F. As a result, the maximum MATH variable would be 8.6, and the minimum would be 0.

A continuous independent variable or PREV, was included to represent students' experience in previously taking introductory accounting. Students repeating introductory accounting were found to earn lower grades than their counterparts taking the course for the first time (Prinsloo, Muller & du Plessis, 2010; du Plessis, Prinsloo & Muller, 2005).

The independent variable PREV ranges from -1.0 to 2.0. Students taking the class for the first time were assigned a neutral variable of "0". Students who successfully completed an introductory accounting class at another university which did not meet our university requirements were assigned "2.0". The remaining scenarios of either withdrawal or failure, both found to have an unfavorable impact on introductory accounting grades, were represented by variables with negative signs. Students withdrawing from the class were assigned a "-0.50" to represent an unfavorable experience to a lesser degree than actually failing. Students receiving an "F" were assigned a "-1.0" to represent the least favorable outcome in a previous attempt. A positive sign or a direct relationship was expected between GRADE and PREV as the less favorable the previous experience, the lower the current expected grade.

### Hypothesis Development

The current study is designed to explore new ground to examine if the imposition of a higher minimum grade requirement for the introductory accounting course is associated with improvements in introductory accounting grades. Since previous studies focusing specifically on this issue are scant and concentrate primarily on grade inflation, the first hypothesis is based on the expected intuitive direct relationship between an increase in minimum grade standards and introductory accounting grades.

To explore the association between the increase in the required minimum grade in introductory accounting, a multivariate regression model was estimated explaining student grades in the introductory accounting class. This model included student data points both before and after the increase in the minimum grade requirement with the grade in introductory accounting as the dependent variable; GRADE. The equation includes all independent variables found significant in the precursor study (i.e., accounting major status MAJOR, grade point average GPA, mathematics background MATH and previous experience in the course PREV related the grade received) to isolate the impact of the minimum grade increase (Phillips, 2015). Since it was intuitively expected that grades would increase as a result of the increase in the minimum standard, the following hypothesis (stated in the alternative) was created:

**H1:** Students on the revised program were more likely to earn a higher grade than students on the original program considering differences in GPA, mathematics ability, accounting major status and previous experience in the course.

While strengthening academic progression standards with increased minimum grade standards are intended to improve student performance, a potential downside is the very real possibility that professors may practice low-end grade inflation; issuing the minimum grade even when the student earns a lower grade to meet the requirement and avoid requiring students to retake the class. Lower-end grade inflation could be apparent if there were a sudden concentration of grades at the minimum level required after the new program was instituted. The occurrence of such a phenomenon at and beyond Fall 2015 could be explained by grade inflation.

Previous research results are inconclusive but indicate the potential for grade inflation. A study on performance in upper division accounting courses found grade inflation on lower level students (Addy & Herring, 1996). Another study examined GPAs for all subjects and found upper division accounting classes *not* to have inflated grades

(Clusky, Griffin & Ehlen, 1997). Finally, a study discovered that adjunct professors were more likely to inflate grades than full time professors (Sonner, 2000). To test for the existence of any grade inflation in the current study, the following hypotheses (stated in the alternative) was created:

**H2:** Instructors practice low-end grade inflation under the revised program when standards were increased and students need to earn a grade of C as compared to a sample of students on the original program where students pass with a minimum grade of D-. To test this hypothesis, the grade distributions of the revised and original samples were compared on an anecdotal basis.

### *Sample Selection*

All data were hand collected from student transcripts. Institutional Research Board approval was received and has been renewed currently. Data gathered included the variable of GRADE along with the independent variables of MAJOR, GPA, PREVIOUS and MATH found empirically significant in relation to GRADE in a precursor study (Phillips, 2015). Catalog term was captured for each student; those with catalog terms before Fall 2015 were assigned a “0” for the variable of NEW and those with catalog terms of Fall 2015 or later were assigned a “1” for this categorical variable.

Observations chosen for this regression sample were done so on an impartial basis using all available items. The sample began with the data points from the precursor study including 398 observations registered in the researcher’s introductory accounting classes beginning with the fall semester of 2008 and continuing through the spring semester of 2013. The final sample was expanded until the current time frame of fall 2018 including a collective total of 706 students over 20 semesters or 10 calendar years. The semester-based sample was drawn to examine the impact of the revised program on student performance in introductory accounting building on the results of a precursor study.

The sample was standardized as the same professor, textbook, teaching and examination format was used for the duration of the study. The consistent application of teaching style and enforcement of course policies inherent on a sample with one professor was considered an advantage in research design (Wooten 1998) (Mattar & El Khoury 2013).

The sample categorized on a **by-semester** basis resulted in the total group of 20 semesters divided in two; before and after Fall 2015 (i.e., the semester when the increased minimum grade standard became effective). Initially, this classification results in seven semesters (i.e., Fall 2015 through Fall 2018) or 186 students taking the course when the revised minimum grade standard was in effect in comparison to thirteen semesters (i.e., Fall 2008 through Spring 2015) or 520 students on the original program.

It was discovered, however, that a significant complement of students registered for introductory accounting during Fall 2015 or later are “grandfathered” into the original standard. Since students’ catalog term is established when they enter the university many students taking introductory accounting in Fall 2015 were not required to earn a minimum grade of “C” if their catalog term predates Fall 2015. This was the case for a few different reasons. Introductory accounting carries a prerequisite of sophomore status so students enrolling Fall 2014, for example, are under the original program despite the fact they are taking the course Fall 2015. In addition, part time students frequently take longer than four years to complete their program and many business students postpone introductory accounting until as late as their second semester junior year. This is always a consideration with the introduction of any new academic program as universities must honor the program in place on the date students enter the university according to their catalog term but difficult to quantify until the data is actually scrutinized.

An examination of the sample categorized based on a **by-catalog term** basis revealed more than one third or a total of 68 students taking introductory accounting within the revised time frame were actually still grandfathered on the original program because their catalog term was pre-fall 2015. As a result, the final sample classified on a **by-catalog term** basis characterized the 706-total sample of students into 118 students measured by the revised minimum grade standard in comparison to 588 students on the original program.

## Results

In order to empirically investigate the association between student grades and the imposition of a higher minimum grade requirement for the introductory accounting course, the following first hypotheses was tested using the **by-catalog term** sample of data:

**H1:** Students on the revised program were more likely to earn a higher grade than students on the original program considering differences in GPA, mathematics ability, accounting major status and previous experience in the course (stated in the alternative).

A first step in examining this hypothesis was to determine whether or not grades in introductory accounting actually increased between the original and revised samples by calculating descriptive statistics for students included in the final sample **by-catalog term**. Table 2 shows that the mean GRADE over the total sample is 2.479. The mean GRADE for students in the revised and original programs were calculated; and the results are included in Table 3. From the descriptive statistics, it can be seen that the mean grade of 2.34 based on students included in the revised program is actually *lower* as compared to the mean of 2.50 based on students included in the original program. To further investigate the impact of the revised program on a larger available sample of students in introductory accounting, a regression model was estimated including an extended data base of students under the original program including independent variables found significant in an aforementioned study (i.e., accounting major status, grade point average, mathematics background and previous experience in the course related the grade received) (Phillips, 2015). A dichotomous independent variable NEW was introduced to a regression model to explain the dependent variable GRADE; representing the impact of the change in programs; 1= revised and 0 = original. Bivariate correlations in Table 4 show independent variables of GPA, MATH, and MAJOR are suggested to have a statistically significant relationship to GRADE at .01; PREV was significant at 0.05. NEW was not shown to have a statistically significant relationship to GRADE.

To continue to examine the impact of the new minimum grade standard on students' grades, two regression models were estimated. The first, Model 1, includes independent variables found significant in the previous study and does not include the variable to capture the impact of the new program. Model 2, the second equation adds NEW to capture the effect of the new minimum grade standard. Shown in Table 5, the initial results of the regression suggest the additional independent variable NEW does in fact improve the explanatory power of the equation. Notice that Model 2 results show an improvement of 0.009 in the adjusted  $r^2$  after introducing NEW. In addition, an ANOVA table of the same two models shown in Table 6 suggests Model 2 which added the additional independent variable of NEW is statistically significant

A closer examination of the regression coefficients shown in Table 7 indicates that while NEW is significant, it does have a negative sign. From the results of this empirical analysis, the conclusion is reached that there is a failure to reject the null hypothesis that grades were higher the original catalog term sample as compared to the revised.

To examine the existence of grade inflation in the current study, the following hypotheses (stated in the alternative) was created:

**H2:** Instructors practice "low-end grade inflation" under the revised program when standards were increased and students need to earn a grade of C as compared to a sample of students on the original program where students pass with a minimum grade of D-.

To test this hypothesis, the grade distributions of the revised and original samples were compared on an anecdotal basis in Table 8. Results do not suggest the appearance of any grade inflation whatsoever. In fact, a nearly identical percentage of students earned a "C" grade on the revised program as compared to the original program (i.e., 34% versus 33%) expressed as a percentage of the total. From this analysis, the conclusion is that there is no significant low-end grade inflation in the revised sample so there is a failure to reject this null hypothesis as well.

The overall results of the current study suggest no evidence of significant positive impact on student performance associated with raising minimum standards of performance (i.e., the minimum grade in introductory accounting). The study was carefully designed to consider effects of variables found significant in a previous study to impact introductory accounting grades. The results are actually ironic because students on the revised program had *lower* overall grades after the minimum grade was increased than those before the minimum standard was raised to C. An anecdotal analysis of the grade distributions confirmed no evidence of a higher concentration of grades at the margin which may have been explained by grade inflation.

The regression of an extended sample including more than 700 data points over a ten-year period confirmed the factors of GPA, Accounting Major, MATH preparedness and PREV previous experience in the course all have the expected impact on the grades earned in introductory accounting. However, results comparing the impact of raising minimum standards of performance on a by-catalog term basis suggest grades actually decreased.

### Conclusions

Collective consideration of the results and analyses included in this study do not support that raising the minimum standard grade required in the course has the expected and intuitive impact of grade improvement in the introductory accounting course. While initially this outcome could be characterized as disappointing, instead results could suggest that while it is important to establish and maintain high standards for student performance – *just* establishing these standards cannot be relied upon to improve grades in the introductory accounting class. This argument would tend to support the intuitive contention that universities may avoid minimum grade requirement increases to avoid decreased in student enrollment.

One potential reason for the decrease in grades in the revised group is that the overall average GPAs of the students in this group were suggested to be lower shown by the Descriptive Statistics in Table 2. GPA was one of the factors proven significant in a previous study in the explanation of student grade in the class (Phillips, 2015).

The reason(s) for the lack of improvement in grades could actually be confounded in multiple factors that cannot be readily captured in measurable independent variables including any one or all of the a possible number of factors. These could include: declines in overall student preparedness for college, lack of parental encouragement and aid, and lower student motivation.

Another consideration could actually be that students were unaware or perhaps undaunted regarding the minimum grade standard. Reflecting back on the years our school was under the original program, it was obviously never widely advertised by professors to students or published on course syllabi that the minimum passing grade was sufficient for the introductory accounting course to count towards graduation. This conversation was largely reserved for those end of the semester one-on-one student appeals. Perhaps publicizing the minimum grade was not commonly done because the minimum passing grade was definitely an undesirable outcome. It might seem that posting this minimum was a tacit implication that it was acceptable or in some way legitimate. Impossible at this point to say but extremely interesting to consider.

Or could it be that a minimum grade standard at any level is not a significant motivational factor to improve performance? Generally, the grade of “C” is typically viewed as a mediocre, undesirable, or average. Here, the minimum grade is set up in a punishment format, not perceived as a goal students strive for; just a penalty to avoid.

Coming full circle, there is a need to tie in these results with all the previous research results to explore how best to enhance student performance in accounting courses to improve accounting education. Accrediting bodies are expected to continue to require a focus on curricula improvement efforts in order to maintain quality programs (Trapnell & Williams, 2012). Increases in minimum grade requirements, an example of such improvement efforts, are woven into a current AACSB application by our school of business which is still ongoing. These results, should not be interpreted as evidence against strengthening improvement in academic progression standards and requiring students adhere in improved standards going forward.

These results, could however, be used to advocate that universities instead develop a more broadly applied qualitative set of measures to motivate students and improve program quality. Perhaps offering rewards for students earning excellent grades would be more effective. For example, in addition to requiring a lower end standard of requiring students retake the course if they earn less than a “C”, perhaps it would incentivize students to do well if instead those earning an “A” in the course were exempt from one general education course. Other possibilities include awarding internships to CPA firms, discounts on tuition, free books or a coupon for a meal plan if they earn an “A” in the introductory accounting course. While it is extremely unlikely that universities will completely eradicate grades, there may be specific courses or programs where fostering deep learning and motivation with narrative feedback may be more effective than standardized grade assignment (Chamberlin, Yasue & Chiang, 2018).

### Limitations and Opportunities for Future Research

The current study has some limitations which must be considered in interpreting results. First, there were very limited number of data points available to analyze for students on the “revised” program. As mentioned previously, all obtainable data points were used. However, due to uncontrollable circumstances, the **by-catalog term** samples were extremely uneven with only 118 students in comparison to the 706 total students on the revised program.

This study could be replicated in a 5-year time frame to provide further information on the effect of improving academic progression standards on student grades in introductory accounting. The inclusion of an additional campus within the state university system would also provide a richer analysis. The addition of some demographic data to capture some additional description of students might also capture some meaningful information to explain student grades in introductory accounting (e.g., student age, gender, ethnic group, high school categorization). Future data gathering efforts should be facilitated by a data download as opposed to the arduous hand collection of data which consumed countless hours of valuable time. This would shorten the lead time between actual grade assignment and published results making the study much more meaningful.

In retrospect, some additional ideas for new studies emerged from the analysis and data gathering. It would be interesting to examine the improvement in academic progression standards, such as minimum grade requirements, on student enrollment.

**TABLE 1**  
**Variable Definition**

<b>Name</b>	<b>Description</b>	<b>Explanation</b>
NEW	Students required to earn a “C” in introductory accounting because their entry date into the university or catalog term is Fall 2015 or later. “1” was used to designate revised program, “0” original program.	Increased minimum standards of performance is intuitively expected to result in higher introductory accounting grades.
MAJOR*	Accounting Majors assigned a “1”, non-accounting majors a “0”.	(Doran, Boullon & Smith, 1991; Fedoryshyn, O’Brien, Hintz & Bo, 2010)
GPA*	Overall grade point average (GPA) of student at conclusion of semester immediately preceding semester of enrollment in introductory accounting.	(Gist & Ward, 1996; Elias, 2005; Fedoryshyn, O’Brien, Hintz & Bo, 2010; Doran, Boullon & Smith, 1991; Wooten, 1998; Triki, Nicholls, Wegener, Bay & Cook, 2012).
MATH*	A mathematics score calculated using a factor to represent the level of the most recent mathematics class from 0.50 to 2.0 multiplied by the quality points of the grade received for the class. The grade range was a 4.3 for an A+ through a 0 for an F. As a result, the maximum “MATH” variable was equal to 8.6, and the minimum was 0. (Classes transferred in were assigned a 2.0.)	(Gist & Ward, 1996; Fedoryshyn, O’Brien, Hintz & Bo, 2010; Brown, 1992).
PREV*	The following variables were assigned to capture the impact of repeating the introductory accounting course: <input type="checkbox"/> First time students = 0; <input type="checkbox"/> Transferred class from a previous university <sup>1</sup> = 2.0 <input type="checkbox"/> Received a “D” = 1.0 <input type="checkbox"/> Withdrew from the class = “-0.50” <input type="checkbox"/> Received an “F” = “-1.0” <sup>1</sup> Students who successfully completed an introductory accounting class at another university which did not meet our university requirements were assigned “2.0”.	(Prinsloo, Muller & du Plessis, 2010; du Plessis, Prinsloo & Muller, 2005)

\* Variables were suggested to be significant in relation to introductory accounting grades in an empirical investigation of a sample of 398 students exposed to the same professor, text, teaching and examination format over five-years (Phillips, 2015).

**TABLE 2**  
**Descriptive Statistics – Total Sample**

<b>Variable</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Standard Deviation</b>
Grade	0.00	4.30	2.4790	1.054
GPA	0.00	4.00	2.7071	0.840
MATH	0.00	15.48	2.2841	1.944
MAJOR	0	1	0.180	0.386
PREV	-1.0	2.0	0.084	0.521
NEW	0	1	0.170	0.373

n=706

**TABLE 3**  
**Descriptive Statistics “By-Catalog Term” Sample**  
**(Revised vs Original Program)**

Variable	Revised = 1 Original = 0	N	Mean	Standard Deviation	Standard Error of the Mean
Grade	1	118	2.34	1.156	0.106
	0	588	2.50	1.031	0.043
GPA	1	118	2.65	1.083	0.100
	0	588	2.72	0.783	0.032
MATH	1	118	3.32	3.148	0.290
	0	588	2.08	1.518	0.063
MAJOR	1	118	0.19	0.398	0.037
	0	588	0.18	0.383	0.016
PREV	1	118	0.06	0.335	0.031
	0	588	0.09	0.551	0.038

n=706

**TABLE 4**  
**Bivariate Correlations**

		GRADE	GPA	MATH	MAJOR	PREV	New = 1
GRADE	Pearson Correlation	1	0.391**	0.315**	0.367**	0.083*	-0.061
	Sig. (2-tailed)		.000	0.000	0.000	0.028	0.107
	N	706	706	706	706	703	706
GPA	Pearson Correlation	0.391**	1	0.331**	0.100**	-0.079*	-0.031
	Sig. (2-tailed)	0.000		0.000	0.008	0.036	0.412
	N	706	706	706	706	703	706
MATH	Pearson Correlation	0.315**	0.331**	1	0.199**	-0.022	0.240**
	Sig. (2-tailed)	0.000	.000		0.000	0.564	0.000
	N	706	706	706	706	703	706
MAJOR	Pearson Correlation	0.367**	0.100**	0.199**	1	0.150**	0.016
	Sig. (2-tailed)	0.000	.008	0.000		0.000	0.675
	N	706	706	706	706	703	706
PREV	Pearson Correlation	0.083*	-0.079*	-0.022	0.150**	1	-0.023
	Sig. (2-tailed)	0.028	0.036	0.564	0.000		0.538
	N	703	703	703	703	703	703
New = 1	Pearson Correlation	-0.061	-0.031	0.240**	0.016	-0.023	1
	Sig. (2-tailed)	0.107	0.412	0.000	0.675	0.538	
	N	706	706	706	706	703	706

\*\* indicates  $p < 0.01$ . \* indicates  $p < .05$

TABLE 5

## Model Summary – Dependent Variable Grade

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig F. Change
						F Change	df1	df2	
1	.534 <sup>a</sup>	0.286	0.282	0.8935	0.286	69.778	4	698	0.000
2	.543 <sup>b</sup>	0.295	0.289	0.8886	0.009	8.755	1	697	0.003

a. Predictors: (Constant), MAJOR, GPA, PREV, MATH

b. Predictors: (Constant), MAJOR, GPA, PREV, MATH, New = 1

c. Dependent Variable: GRADE

**TABLE 6****ANOVA – Dependent Variable Grade**

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	222.829	4	55.707	69.778	0.000 <sup>b</sup>
	Residual	557.247	698	.798		
	Total	780.076	702			
2	Regression	229.742	5	45.948	58.194	0.000 <sup>c</sup>
	Residual	550.334	697	.790		
	Total	780.076	702			

a. Dependent Variable: GRADE

b. Predictors: (Constant), MAJOR, GPA, PREV, MATH

c. Predictors: (Constant), MAJOR, GPA, PREV, MATH, New = 1

**TABLE 7**  
**Coefficients – Dependent Variable Grade**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations Zero-order	Partial	Part	Tolerance	VIF	
	B	Std. Error	Beta								
1	(Constant)	1.057	.115		9.213	.000					
	GPA	.397	.043	.316	9.288	.000	.391	.332	.297	.883	1.132
	MATH	.083	.019	.153	4.445	.000	.315	.166	.142	.862	1.160
	PREV	.135	.066	.067	2.057	.040	.083	.078	.066	.968	1.033
	MAJOR	.807	.090	.295	8.915	.000	.367	.320	.285	.934	1.070
2	(Constant)	1.112	.116		9.617	.000					
	GPA	.382	.043	.304	8.914	.000	.391	.320	.284	.870	1.149
	MATH	.098	.019	.181	5.094	.000	.315	.189	.162	.802	1.247
	PREV	.131	.065	.065	1.998	.046	.083	.075	.064	.967	1.034
	MAJOR	.800	.090	.293	8.887	.000	.367	.319	.283	.934	1.071
	New = 1	-.276	.093	-.098	-2.959	.003	-.061	-.111	-.094	.928	1.078

Adjusted  $r^2 = 0.282$  and  $0.289$  for Model 1 and 2, respectively

**TABLE 8**  
**Grade Distribution**  
**by-Catalog Term Comparison**

DATA SAMPLE	A		B		C		D		F		Total
	N	% of total	N	% of total	N	% of total	N	% of total	N	% of total	
REVISED	20	17%	33	28%	39	33%	16	14%	10	8%	118
ORIGINAL	112	19%	192	32%	199	34%	63	11%	22	4%	588
Total	132	19%	225	32%	238	34%	79	11%	32	4%	706

Grade distributions were prepared by segregating total grade data into two categories on a by-catalog term basis.

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