



## Main article

## Soft skill change perceptions of accounting majors: Current practitioner views versus their own reality



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## ARTICLE INFO

## Article history:

Received 6 January 2020

Received in revised form 19 August 2020

Accepted 22 August 2020

## Keywords:

Accounting education

Technical skills

Soft skills

## ABSTRACT

Calls for greater inclusion of both soft and technical skills exist within the field of accounting education. Yet, what skills do students perceive they are gaining? Rebele and St. Pierre (2019), in the lead paper for this special issue, argue that greater soft skills development may be difficult to achieve within accounting classes. We provide a unique contribution for this discussion by examining whether the professionals calling for increased soft skills development actually believe they developed these soft skills along with technical skills during completion of their own accounting education. We analyzed a sample of over 440,000 students from more than 600 American colleges and universities to investigate the skills graduates perceive they acquired during pursuit of a bachelor's degree in accounting. To determine if those calling for skill development actually achieved this development during their own college careers, we examined data from 1994 to 2006, which corresponds to students who are now mid-career professionals. We found that the majority of accounting majors reported increased skills in 14 of 15 categories analyzed. However, after holding constant relevant student, collegiate experience, and institutional characteristics, accounting majors' skill gains only outperformed those of other business majors in 2 of 15 categories, mathematics and "knowledge of your field," and outperformed non-business majors in only 3 of 15 categories, mathematics, "knowledge of your field," and computer skills. Overall, findings were positive in that accounting students reported significant gains in most skill categories. Conversely, the findings also suggest accounting educators should remain vigilant in developing curriculum content and determine whether they are still being outpaced by other business fields and non-business majors, especially given our efforts in the area of soft skill development.

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## 1. Introduction

Undoubtedly, a career in accounting requires the acquisition of relevant skills. However, educators and practitioners debate which skills are being acquired and which are desired for those seeking a career in accounting (e.g., (Andersen et al., 1989; Ballou, Heitger, & Stoel, 2018; Cloete, 2018; Cook, Bay, Visser, Myburgh, & Njoroge, 2011; Jackling & De Lange, 2009; Kavanagh & Drennan, 2008; Pathways Commission, 2012; Tan and Laswad, 2018)). As a contribution to this debate, our study is focused on examination of the skills that accounting majors perceive they have acquired during completion of a bachelor's degree.

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To perform this examination, we conducted a large sample empirical analysis, which provides unique evidence, as few large sample empirical studies exist in accounting education research (Rebele & St. Pierre, 2015). We utilized survey data from a sample of more than 440,000 students from over 600 colleges and universities in the United States. This sample is comprised of accounting majors and non-accounting majors who earned a bachelor's degree between 1994 and 2006, which means these graduates are now the mid-career professionals who are driving the current accounting skills debate. These former undergraduates were asked about their perceived changes in skill and knowledge across 15 categories to determine if they acquired the skills in college that they are now requiring of current graduates.

In 14 of the 15 categories, the majority of accounting students reported that their skills have grown stronger due to undergraduate education. The exception is the category of foreign languages, where 54% reported no change and about 19% reported a weakening of skill. Sample restriction allows for comparison of accounting students to other business majors and regression analysis allows potential confounders to be held constant. Such an analysis indicates accounting majors were significantly more likely to perceive gains in both "knowledge of your field" (45.7% more likely) and mathematics (31.8%), when compared to other business majors. The knowledge of the field area is exactly what we as faculty are trained to teach. In the remaining 13 categories available for analysis, accounting students were less likely than other business majors to report gains, ranging from 4% less likely (computer skills) to 31.4% (leadership skills). Interestingly, additional analysis supports that these gains and deficits held relatively constant for more than a decade, our sample period, which suggests these results may still be relevant for current accounting students.

The remainder of this article is organized as follows. First, background information and research questions are presented. Next, research methods are explained, followed by an interpretation of results. We conclude with a discussion of findings.

## 2. Background information and research questions

Scholars have made predictions about what the future may hold for the accounting profession. One prediction is that accountants will need to take action in order to remain a 'key profession' in society (Barth, 2018). Another is that accountants are in a 'battle for talent' which will continue into the foreseeable future (Lee, 2015) Yet another prediction calls upon future accountants to solve problems that will benefit all business disciplines on a global scale (Kaplan, 2011).

These predictions have been coupled with emphatic urgings on ways to propel the profession into the future. Cooperative interactions among academic and practicing accountants are one urging (Beaver, 1987), while the call for accountants of all types to work together with users of accounting information and communication of accounting insights to the public are other recommendations (Barth, 2018). Deployment of problem-solving techniques for relevant issues facing not only the field of accounting, but the broader business community including the areas of finance and management is yet another suggestion (Kaplan, 2011). Further, a belief exists that information technology can be leveraged to improve disparities in professional resources that accountants may face (Hiramatsu, 2018).

These arguments center on the effective utilization of skills, such as communication, teamwork, problem solving, and technology use. Essentially, scholars are promoting the idea that accountants must effectively utilize key skills to remain a relevant profession. However, the current debate about the skills accounting professionals need is not entirely novel, but is also, in part, a continuation of debates that have persisted for several decades among scholars and practitioners with two major debaters being the Accounting Education Change Commission and the Pathways Commission.

Communication was noted as an important skill for business professionals in the 1960s (Fielden, 1964). Continuing into the 1970s, practitioners ranked written communication skills as a significant factor in hiring decisions (Endicott, 1976). In the 1980s, the AICPA and Big 8 accounting firms issued separate statements highlighting their desire for accounting schools to improve the writing skills of graduates (AICPA, 1988; Andersen et al., 1989). This statement by the Big 8 (Andersen et al., 1989) brought the Accounting Education Change Commission to the forefront of the debate. Additionally, the needs for analytical thinking, problem-solving, mathematics, computer and technology skills, and accounting knowledge were emphasized (AICPA, 1988). These needs continued to be highlighted in the 1990s, with writing (Scofield & Combes, 1993; Stocks, Stoddard, & Waters, 1992) and problem-solving skills (Johnstone & Biggs, 1998) receiving particular focus, but the reality that these skills must coincide with technical accounting knowledge (Johnstone & Biggs, 1998) was also recognized. In 2012, the Pathways Commission, a partnership between the American Accounting Association and the AICPA, released their report containing strategies and recommendations for the future of accounting higher education (Pathways Commission, 2012). This report was the result of years of work by the partnership, and is a seminal reference for accounting higher education and the profession. Although many areas are covered by the report, the linking of education to the profession and the revamping of accounting higher education curriculum are highlighted (Pathways Commission, 2012). These highlights emphasize the importance of accounting students gaining the skills they need to be successful professionals through their education.

Considering the lengthy duration of the debate regarding the skills accountants need, examination of skills that accountants embody is warranted because, in order to effectively utilize key skills, accountants must first obtain them. Therefore, exploring skill acquisition is paramount. Clearly, accountants could acquire skills from various sources such as work experience or personal life, but formal education must play an important role in skills development, which aligns with the positions of major debaters such as the Accounting Education Change Commission and the Pathways Commission. Accordingly, we focus on the skills acquired by accountants from their higher education programs of study.

We are not the first to delve into analysis of higher education accounting curriculum and the skills required by the accounting profession. Some researchers have focused on developing cases to be implemented in the classroom with the hopes of imparting technical knowledge and professional skills (Ashbaugh & Johnstone, 2000). Others have provided scholarly commentary on perceived gaps between accounting education and the skills required for success in the business environment (Mohamed & Lashine, 2003), but while such commentary is poignant and necessary for the promotion of new ideas, empirical analysis is not utilized, which results in an absence of statistics to be relied upon for evidence-based decision making with regard to accounting higher education.

However, empirical analysis has been used to examine various aspects of accounting student skills. For example, Jackling & De Lange, 2009 focus on accounting graduates' perceptions of the skills that were emphasized in their course work. Similarly, Kavanagh and Drennan (2008) provide evidence related to which skills accounting students think are important compared to which skills were emphasized in their course work. Both studies were conducted in Australia with sample sizes of 174 and 322 students, respectively.

Our study differs in that we provide evidence on the skills accounting students perceive to have gained, in contrast to perception of the importance of skills or emphasis during course work. Further, our sample is derived from a different setting, the United States, and is comprised of over 440,000 students, of which over 14,000 majored in accounting. Therefore, our large sample empirical study fills an important gap and contributes to the reduction in stagnation of accounting education research (Rebele & St. Pierre, 2015).

We focus on the time period 1994–2006 for two reasons. First, accounting graduates from this period should now be mid-career professional accountants. Therefore, these individuals are in positions of influence to drive the current skill debates, and their personal collegiate experiences likely heavily shape their opinions about any perceived skill gaps between education and professional needs. Second, this time period is a bridge between statements issued by major debaters, the Accounting Education Change Commission in the late 1980s and the Pathways Commission in the early 2010s.

Our research questions are threefold. First, as judged by accounting majors themselves, how much have their various soft and technical skills changed as a result of their higher education? Our data allow for examination of 15 unique skill categories. These absolute changes are important, but their relativity may impart even more information. Therefore, our second question is: how do these skill changes compare to non-accounting students? Since business majors of any concentration take very similar core courses, we make comparisons to two groups of students, business majors who were not accounting majors and non-business majors. Average student characteristics and collegiate experiences are thought, or in many cases have been shown in prior research, to vary across major of study, sometimes substantially (Arcidiacono, 2004; Ma, 2011). Thus, we make use of multivariate techniques which control for these relevant differences when answering our final research question: what is the estimated causal impact of an accounting degree on changes in each of the 15 skill categories?

### 3. Research methods

Data used in this analysis come from the Higher Education Research Institute, which runs the Cooperative Institutional Research Program (CIRP) housed at The University of California – Los Angeles. Among others, the CIRP administers two surveys known as The Freshman Survey (TFS) and the College Senior Survey (CSS). The TFS is administered very near a student's matriculation, most often as an entrance survey, while the CSS is administered very near graduation, most often as an exit survey as part of the student's exit exams. TFS data contain a wealth of demographic information, which we utilize as controls in our study, while CSS data contain answers to questions that are the primary interest of our study. We collect, merge, and make use of all freely available data at the time of writing on students who took both surveys. This merged data set includes a large number of American undergraduate students who earned their bachelor's degree in the time period of 1994–2006.

Specifically, our sample is comprised of 442,250 students from 619 different institutions of higher education in the United States. One hundred percent of these students are college graduates, otherwise they would not have been administered the CSS. While rich, these data are not without limitations. Notably, only 24 percent of the students attended a university (an institution which additionally grants graduate degrees), while the remainder attended a college (those which only grant bachelor's [four-year] degrees). More importantly, 79 percent attended a private institution, as these colleges and universities more often participate in the CIRP than do public institutions. Thus, while our sample is quite large, it is not nationally representative in these two regards. CIRP data have been previously used in empirical studies of other college majors, including the business disciplines of economics (e.g., Hammock, Routon, & Walker, 2016), marketing (e.g., Hartley, Routon, & Torres, 2019), and international business (e.g., Torres, Routon, & Hartley, 2019), but to the authors' knowledge, this constitutes the first time these data have been used to study skill acquisition from accounting programs.

Of primary interest here are responses to a set of 15 questions asked of students on the CSS conducted very near their graduation date: How do you feel your skills in [category] have changed during your college tenure? Students could respond to each of these questions with one of five options: Much weaker, Weaker, No change, Stronger, and Much stronger. In very select cases, the CIRP has inquired about other skill categories, but there are 15 which have been persistently captured throughout the lifespan of the CSS: getting along with dissimilar people; critical thinking; working cooperatively; analytical and problem solving skills; computer skills; foreign languages; general knowledge; interpersonal skills; knowledge of your

field; knowledge of other races and cultures; leadership ability; mathematical skills; public speaking; reading speed and comprehension; and writing skills.

While the questions prompt the student to reflect on the impact of their collegiate experience, the responses may capture, to a lesser extent, the impact of any maturity due to aging of the student. However, some skills are likely not impacted by aging; for example, it is unlikely that a student will suddenly begin speaking a foreign language simply because they have grown a year older. Conversely, a student may rate themselves as a stronger public speaker in part, because their confidence has increased with age, but the student's collegiate experience has likely provided them with ample opportunity to practice their public speaking through oral project presentations and entire courses devoted to the skill such as 'business communications' and 'public speaking.' Accordingly, we further mitigate the impact of maturity by making comparisons of college students to other college students and including student age as a control, so our results reveal differences in skill gains and losses among different majors because, while all have grown older during their collegiate experience, not all have majored in the same discipline.

## 4. Results

### 4.1. Accounting students' perceptions of skill change

The 15 skills captured on the CSS are relevant for accounting professionals. For example, public accountants often work in teams to complete client engagements, and even in-house accountants such as internal auditors, work in teams or collaborate across departments to complete objectives. Therefore, soft skills related to teamwork such as working cooperatively, getting along with dissimilar people, interpersonal skills, leadership ability, and cultural/racial knowledge are of relevance to accountants. Further, technical skills are unquestionably relevant to the accounting profession as accountants are expected to understand standards and guidance such as Generally Accepted Accounting Principles (GAAP), Generally Accepted Auditing Standards (GAAS), and the Internal Revenue Code (IRC), and then analyze client information against these applicable standards and guidance, and finally communicate the results of that analysis. Accordingly, skills that represent technical knowledge and the ability to communicate are relevant to accountants such as critical thinking, analytics and problem solving, computer skills, general knowledge, knowledge of field, mathematical skills, reading speed and comprehension, public speaking, and writing skills. Lastly, foreign languages are relevant to accountants who are working in a global environment, such as international accounting teams utilized by the Big 4 firms, but other accountants may be working in a local or national environment and may not utilize foreign language skills.

Of the 442,250 students surveyed, 14,691 majored in accounting. [Table 1](#) presents the proportion of accounting majors who chose each response option for each of the 15 skill categories. The majority of accounting majors reported skill improvements in 14 categories, as indicated by the proportions responding that their skills became either stronger or much stronger. These findings have positive implications for accounting students as these 14 categories include the skills related to teamwork, technical knowledge, and communication which are important for accounting professionals. However, for foreign languages, the majority of accounting majors did not report improvement. No change in foreign language skills was the most frequently occurring response at 54% of respondents, while 14.2% and 4.6% of accounting students reported that their foreign language skills had become weaker and much weaker, respectively.

One possible explanation for this finding is that perhaps foreign language skills are perceived as unimportant for accounting curriculums in our study setting, the United States, particularly if working at the local or national level is a goal for accounting graduates. Prior survey research shows that U.S. accounting practitioners, faculty, and students perceive foreign language to be the least important professional skill ([Albrecht & Sack, 2000](#); [Lin, Xiong, & Liu, 2005](#)). Therefore, foreign language may be deemphasized in accounting curriculums in the United States.

In contrast, accounting students and faculty in China rank foreign language as the first and third most important professional skill, respectively, yet accounting practitioners in China perceive foreign language to be much less important with a rank of ninth out of a total of eighteen skills ([Lin et al., 2005](#)). Similar perceptions may exist for accounting practitioners from other countries. Therefore, if accounting practitioners from other countries, particularly large, powerful countries like China, do not perceive foreign language as important to the field of accounting, then interactions between global accounting practitioners and members of the U.S. accounting community likely reinforce the perceived unimportance of foreign language for each group.

### 4.2. Relative levels of skill change for accounting majors

While the absolute perceived levels of skill change are important, relative levels may impart the most information. In [Table 2](#), we present the percent of accounting majors, other business majors, and non-business majors who reported "much stronger" skills in each of the 15 categories. For those who wish to make very quick comparisons, up (down) arrows indicate when the proportion is larger (smaller) than that of accounting majors. We choose to make our primary comparisons around the response category of "much stronger" since, from an educational standpoint, it is the ideal answer. Other methodologies are, of course, possible and impart additional information. Therefore, in [Appendix A](#), we present the results from an alternate

**Table 1**  
Reported skill changes of graduating accounting majors.

Rank	Skill category	Percent of students reporting their skills have become:				
		Much weaker	Weaker	No change	Stronger	Much stronger
1	Knowledge of your field	0.1	0.2	2.8	33.0	63.9
2	General knowledge	0.1	0.3	2.8	54.0	42.7
3	Computers	0.1	0.4	9.4	52.2	37.9
4	Analytics & problem solving	0.1	0.4	6.9	61.0	31.6
5	Critical thinking	0.1	0.4	8.3	61.4	29.9
6	Interpersonal skills	0.1	0.9	13.0	57.7	28.2
7	Public speaking	0.2	1.4	20.3	55.1	23.0
8	Working cooperatively	0.1	0.4	19.0	58.7	21.8
9	Leadership	0.1	1.3	24.7	53.1	20.8
10	Writing	0.2	2.3	17.9	59.8	19.8
11	Getting along w/dissimilar people	0.3	1.3	41.7	40.7	16.0
12	Mathematics	0.3	4.0	28.1	52.8	14.8
13	Cultural & racial knowledge	0.6	2.6	36.6	46.2	14.0
14	Reading	0.1	1.4	32.3	53.6	12.6
15	Foreign languages	4.6	14.2	54.0	20.6	6.5

Notes: Number of accounting majors = 14,691. Number of schools in survey = 619. Proportions may not necessarily sum to 100.0 due to rounding. Categories are ranked by the percent of accounting students who reported their skills have become much stronger.

**Table 2**  
Percent of students reporting "much stronger" skills.

Rank	Skill category	Major		
		Accounting	Other business	Not business
1	Knowledge of your field	63.9	53.3↓	64.9↑
2	General knowledge	42.7	45.9↑	48.1↑
3	Computers	37.9	40.4↑	31.5↓
4	Analytics & problem solving	31.6	33.1↑	34.3↑
5	Critical thinking	29.9	33.6↑	38.7↑
6	Interpersonal skills	28.2	34.3↑	30.6↑
7	Public speaking	23.0	31.6↑	24.4↓
8	Working cooperatively	21.8	27.5↑	20.4↓
9	Leadership	20.8	29.0↑	24.1↑
10	Writing	19.8	25.2↑	29.3↑
11	Getting along w/dissimilar people	16.0	21.2↑	19.2↓
12	Mathematics	14.8	12.0↓	12.4↓
13	Cultural & racial knowledge	14.0	18.5↑	20.1↑
14	Reading	12.6	14.9↑	16.2↑
15	Foreign languages	6.5	9.7↑	11.1↑
	<i>Observations</i>	14,691	53,399	374,160

Notes: Data come from the CIRP. Number of schools in survey = 619. ↑(↓) means higher (lower) than accounting majors. The skills are ranked by the percent of accounting majors who reported much stronger skills at graduation.

comparison method based on the percent of students who reported that their skill *at all* increased (became either "stronger" or "much stronger").

A majority of accounting majors (63.9%) reported that their field knowledge is much stronger. A similar percentage of non-business majors (64.9%) reported that their field knowledge is much stronger. Interestingly, fewer non-accounting business majors (53.3%) reported that their field knowledge is much stronger.

A small percentage of accounting majors (6.5%) reported a much stronger improvement in foreign language skills. In contrast, 9.7% of other business majors and 11.1% of other majors reported a much stronger improvement in foreign language skills. This contrast may be partially explained by curricular differences. For example, international business majors and foreign language majors, which would fall under the other business and non-business major categories respectively, would undoubtedly have greater coverage of foreign language through course requirements than accounting majors.

Several of the skill categories tend to represent abilities that would be utilized in teamwork, and for these categories, a smaller percentage of accounting majors report a much stronger improvement compared to both other business majors and non-business majors. These categories are interpersonal skills, leadership ability, getting along with dissimilar people, and cultural/racial knowledge. Another aspect of teamwork is working cooperatively, and accounting majors again lagged behind other business majors with 21.8% reporting a much stronger improvement compared to 27.5% for other business majors, yet 20.4% of non-business majors reported a much stronger improvement, which indicates that accounting majors and non-business majors reported similar changes for working cooperatively. One possible explanation for these results is perhaps that accounting educators deemphasized teamwork in order to cover technical accounting knowledge through individual

learning methods. This potential explanation is supported by the high percentage of accounting majors (63.9%) who perceived a much stronger improvement in knowledge of field.

#### 4.3. Estimated impacts of an accounting degree

To directly estimate the impact of an accounting degree on skill change, we turn to multivariate techniques. Specifically, we estimate regression models of the form

$$\Delta y_{i,s,t} = \alpha + \beta \text{accounting}_i + \gamma \mathbf{C}_i + \delta \mathbf{X}_i + S_s + T_t + \epsilon_{i,s,t}$$

where  $\Delta y_{i,s,t}$  is student  $i$ 's change in 1 of the 15 skills captured through these surveys;  $\alpha$  a constant term; accounting, an indicator for accounting majors, with  $\beta$  its corresponding coefficient;  $\mathbf{C}_i$  a vector of variables describing students' other collegiate experiences, with  $\gamma$  its corresponding vector of coefficients;  $\mathbf{X}_i$  a vector of individual-specific control variables, with  $\delta$  its corresponding vector of coefficients;  $S_s$  school fixed effects;  $T_t$  time (graduating year) fixed effects; and  $\epsilon_{i,s,t}$  the usual error term. Here, we are particularly interested in  $\beta$ , the estimated average effect of accounting education on perceived change in the skill in question.

Controlling for differences across students ( $\mathbf{X}_i$ ) and their non-major collegiate experiences ( $\mathbf{C}_i$ ) helps ensure our estimated impacts of accounting education are not being biased by these confounding factors. The inclusion of time fixed effects ( $T_t$ ) allows us to control for time-specific heterogeneity, such as any national trends in higher education or specifically the field of accounting during the sample period. School fixed effects ( $S_s$ ) allow us to control for heterogeneity at the institution level, including all time-invariant institutional characteristics (e.g., general size, location, public/private status, mission).<sup>1</sup>

The skill change variables are ordinal indices with five values, which could be labeled one for "much weaker" through five for "much stronger." We therefore estimate models of the above equation using ordered logistic regression, the regression technique specifically designed for use with ordinal dependent variables.<sup>2</sup> We estimate 30 total models of the above equation, 2 versions for each of the 15 skills investigated. In the first version, we make use of our full sample. Estimates of  $\beta$  from this version may therefore be interpreted as the average effect of an accounting degree, when these majors are compared to all other college graduates. In the second version, we sub-sample to business majors. Estimates of  $\beta$  from the second version may be interpreted as the average effect of an accounting degree, when such majors are compared to business students not fielding in accounting. We feel both sets of estimates are needed to understand the skill impacts of an accounting degree. In all 30 models, we cluster the standard errors at the institution level for additional control.

In the interest of data disclosure, Tables 3 and 4 present summary statistics for all control variables in  $\mathbf{X}_i$  and  $\mathbf{C}_i$ . Table 3 contains the continuous control variables, while Table 4 the binary variables. Importantly, there are several variables which allow us to hold students' academic prowess constant: high school grade point average (GPA), college GPA, several variables related to remedial course participation, and the presence of one or more failing grades. Further there are several variables for the students' self-rated hard and soft skills at matriculation, which are measured on a five-point scale. These self-rated skills at matriculation are general academic ability, writing, mathematics, public speaking, understanding others, cooperativeness, ability with computers, and leadership. Also included are general demographics: gender, race (four categories, omitted category White), age, and whether English is a first language. This last variable is particularly important here, since reading and writing skill change are two of the outcomes analyzed. Household characteristic variables included are an indicator for a two-parent household, each parent's education level, an indicator for first-generation college students, and combined parental (real) income. Since these surveys come from multiple years, incomes from each survey year were first adjusted for inflation by transforming them all into May 2017 dollars. The remaining variables in these two control variable sets, which may be thought "college experiences," are distance between the institution and the student's prior home; the number of colleges applied to; typical hours per week devoted to student clubs and organizations; and indicators for students who became married during their undergraduate program, held a full-time job, held a part-time job, transferred colleges, attended part-time, are an international student, those wanting a graduate degree each at matriculation and graduation, those who joined a fraternity or sorority, intercollegiate athletes, intramural athletes, those reporting they frequently studied with others, student tutors, student office holders, those who took a leadership course(s) and/or training, and internship participants.

Key results from all 30 models are presented in Table 5. Values are odds ratios calculated from  $\beta$ , alongside their standard errors. Here, values greater than (less than) one imply an accounting degree increases (decreases) a student's probability of reporting a larger increase in the skill in question, on average. The distance from one discloses the odds, the magnitude of the average impact. For example, the odds ratio of 1.063 in the first model implies, all else equal, a student majoring in accounting was 6.3 percent more likely ( $1.063 - 1 = 0.063 = 6.3\%$ ), to report higher skill gains in field knowledge when compared to all other college majors.

Compared to other business majors, accounting students were more likely to report skill gains in the two categories of field knowledge and mathematics. Specifically, accounting majors were 45.7% more likely to report gains in field knowledge

<sup>1</sup> For those with further interest in fixed effect methodology, we direct the reader to Wooldridge (2010), Kennedy (2008), Angrist & Pischke, 2008, or most any advanced statistics textbook, particularly those focusing on panel data statistics.

<sup>2</sup> For those with further interest in ordered logistic regression, we direct them to Borooah (2002), Long, (1997), Wooldridge (2010), or most any statistics text dealing with categorical and ordinal data.

**Table 3**  
Summary statistics of continuous control variables.

Variable	Mean	SD	Min.	Max.
High school GPA	3.371	0.267	1	4
College GPA	3.241	0.465	1	4
SAT score	1,159.036	103.710	400	1,600
Self-rated general academic ability	3.962	0.707	1	5
Self-rated writing ability	3.295	0.685	1	5
Self-rated mathematical ability	3.250	0.766	1	5
Self-rated public speaking ability	3.112	0.756	1	5
Self-rated ability for "understanding of others"	3.486	0.708	1	5
Self-rated cooperativeness ability	3.541	0.726	1	5
Self-rated ability with computers	3.023	0.296	1	5
Self-rated leadership ability	3.408	0.751	1	5
Age at matriculation	18.206	1.035	16	55
Father's years of schooling	15.386	2.869	0	20
Mother's years of schooling	15.038	2.597	0	20
Combined parental income (2017 USD)	115,268.090	53,701.890	0	374,473
Distance from home (miles)	140.629	165.479	5	500
Num. colleges applied to	4.110	1.894	1	12
Hours/week studying during high school	7.981	4.274	0	20
Hours/week devoted to student clubs	1.555	3.331	0	20

Notes: Observations = 442,250. SD = standard deviation. Minimums and maximums rounded to the integer. Self-rated abilities refer to student perceptions at college matriculation and are all on 1–5 increasing scales. For students who took the ACT but not SAT, their ACT scores were converted to SAT scores using the official conversion chart on the ACT website.

**Table 4**  
Percent frequencies of binary control variables.

Indicator variable	Percent frequency
Took one or more remedial courses	7.1
Failed one or more courses	9.3
Male	37.5
African-American	6.3
Hispanic	3.4
Other non-white race	10.1
Not a native English speaker	7.6
Two-parent household	88.5
First generation college student	9.4
Became married during college	3.5
Full-time job during college	42.9
Part-time job during college	23.0
Transferred schools	19.1
Part-time student	6.1
International student	1.2
Wanted graduate degree at matriculation	35.8
Wants graduate degree at graduation	22.2
Joined fraternity or sorority	16.8
Played intercollegiate sports	11.3
Played intramural sports	16.4
Told they need remedial reading course(s)	1.0
Told they need remedial writing course(s)	1.2
Told they need remedial math course(s)	6.4
Frequently studied with other students	40.6
Tutored other students	3.0
Student office (club, student gov't, etc.)	7.3
Leadership class(es) &/or training	17.9
Internship participant	2.8

Notes: Observations = 442,250. Percent frequencies rounded to the first decimal place.

and 31.8% more likely to report gains in mathematics. In the remaining 13 categories, accounting majors perceived smaller average gains than other business majors. However, the likelihood of accounting majors perceiving a reduced gain in skill in some categories was relatively small, such as the two categories of computer skills (4% less likely to report gains) and analytics and problem solving (5.2% less likely). In terms of relative skill gains, the worst category for accounting majors was leadership (31.4% less likely), which was followed closely by public speaking (30.4% less likely). The other 9 differences range between 7.4% less likely (reading) and 23.4% less likely (writing). Even with our relatively high level of control, the estimated

**Table 5**  
Key regression results, skill effects of an accounting degree.

Rank	Skill category	Full sample models		Business major models	
		Odds ratio	Std. error	Odds ratio	Std. error
1	Knowledge of your field	1.063***	0.019	1.457***	0.030
2	Mathematics	1.478***	0.023	1.318***	0.024
3	Computers	1.257***	0.026	0.960*	0.023
4	Analytics & problem solving	0.918***	0.015	0.948***	0.019
5	Reading	0.888***	0.017	0.926***	0.020
6	Critical thinking	0.754***	0.013	0.883***	0.017
7	General knowledge	0.823***	0.014	0.877***	0.017
8	Working cooperatively	1.094***	0.021	0.842***	0.019
9	Getting along w/dissimilar people	0.859***	0.014	0.823***	0.016
10	Foreign languages	0.752***	0.012	0.819***	0.016
11	Cultural & racial knowledge	0.723***	0.011	0.796***	0.014
12	Interpersonal skills	0.961***	0.015	0.786***	0.015
13	Writing	0.759***	0.012	0.766***	0.015
14	Public speaking	1.012	0.016	0.696***	0.013
15	Leadership	0.936***	0.015	0.686***	0.013
	Observations	442,250		68,090	

Notes: See Section 3 for model description. \* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ . Skills are ranked by the estimated odds ratio in the business major models.

differences across accounting and other business majors are statistically significant at the 99% confidence level in 14 of 15 cases, and at the 90% level in the outstanding case (computer skills).

Although comparisons between accounting majors and other business majors are arguably most salient, comparisons between accounting majors and all other college students are also of note. Accounting is a business discipline and as such, accounting programs seek to prepare students for professional careers in business; therefore, understanding how accounting programs compare to the programs of other business disciplines is important. In fact, one view is that accounting is 'central to all activities in business schools' (Christensen, 2018). Yet, there is also value in understanding how accounting programs compare to other areas of study outside of business; after all, accounting programs compete with other areas of study to attract new students and to obtain funding.

Compared to all majors, accounting students were more likely to report gains in the four categories of mathematics, computer skills, working cooperatively, and field knowledge. They are statistically indistinguishable from the average college student in terms of public speaking. Accounting majors were less likely to report gains in the remaining ten categories when compared to the general pool of college students; however, for a few categories, such as leadership and interpersonal skills, accounting majors perceive their skill to be only slightly less improved than average. Cultural and racial knowledge represents the worst category for accounting majors when compared to all non-accounting students, which is perhaps not surprising given there are majors with a much higher focus on these topics, such as sociology, anthropology, and geography.

While the sample period of our data is ideal for understanding those currently in the profession, it may be too old to be generalizable to today's accounting students, perhaps unless one believes little has changed between the sample period and today. With this in mind, we re-estimate all 30 of our regression models within each sampled year, 1994 through 2006. We also calculate the proportions of accounting students who chose each response option for all 15 categories within each sampled year. Example estimates from these additional analyses are presented in Appendix A. In short, we find that both accounting students' responses to these survey questions and the estimated impacts of accounting education remain very near constant in all cases between 1994 and 2006. If these flat trends persisted beyond 2006, then our results may be indicative of today's students. However, if there have been structural changes in accounting education between 2006 and present, then our results should only be considered relevant for today's professionals. Without more recent data, it is impossible to estimate which is correct, and we advise the reader to take this into account when interpreting our findings.

## 5. Discussion and conclusions

Our findings provide unique evidence because we capture the perception of accounting majors at the time of graduation. The sampled individuals are now mid-career professional accountants influencing the debate on the skills necessary for a career in accounting. An example of this influence is the Pre-certification Core Competency Framework of the AICPA (2019a).

Accounting majors perceived larger gains in the categories of field knowledge and mathematics during undergraduate tenure when compared to both other business majors and the average college student. Therefore, accounting programs seem to be noticeably better at imparting this kind of technical knowledge to students than other areas of study. This supports the contention that accounting faculty should continue to focus on their area of expertise – technical accounting issues – as noted by Rebele & St. Pierre, 2019. This is also a positive finding for accounting students since current professional accountants view technical accounting knowledge as a necessity for accounting graduates (AICPA, 2019a), which aligns with the historical views of the Accounting Education Change Commission and the Pathways Commission.



Our results shown in [Table 5](#) demonstrate that compared to other business majors, accounting majors did not feel their programs of study improved their leadership abilities, more so than any other of the skills available for analysis. Yet, research has found that leadership skills are deemed important by accounting students ([Bautista-Mesa, Molina Sánchez, & Ramírez Sobrino, 2018](#)). Further, leadership is deemed important by current professionals, as evidenced by the inclusion of leadership as one of the professional competencies in the Pre-certification Core Competency Framework of the [AICPA \(2019a\)](#). This means that a skills gap potentially exists between what current professional accountants perceived to have gained and what they feel is necessary for a career in accounting. Therefore, accounting educators may want to consider redesigning parts of their programs of study in an effort to develop and increase the leadership skills of accounting students. Presuming that accounting programs are positioned to develop leadership skills, this aligns with the expectations of both students and professionals.

Similarly, accounting majors perceived significantly less improvement in the skill of public speaking when compared to other business majors. As with leadership, public speaking has been identified as an important skill by the profession, which means a potential skills gap exists between what current professionals find necessary and what they perceived they learned in college. Communication is one of the professional competencies of the Pre-certification Core Competency Framework ([AICPA, 2019a](#)), and is defined as being able to “actively listen and effectively deliver information in multiple formats tailored to the intended audience.” Speaking to the public is clearly the delivery of information to an audience. Therefore, public speaking is a relevant and important skill for accounting professionals to embody, if time permits, and accounting educators should attempt to provide increased opportunities for public speaking so that graduates are prepared to be effective accounting professionals.

Computer skills and analytics and problem solving are areas where accounting programs may arguably be providing adequate skill coverage with minor room for improvement. Computer and technology proficiency have been identified as important skills for accountants for quite some time ([Boyce, 1999](#); [Brink & Stoel, 2019](#); [Kavanagh & Drennan, 2008](#)), and even a potentially disruptive force for the profession if the technology skills of accountants do not keep pace with rapidly evolving technology ([Pincus, Stout, Sorensen, Stocks, & Lawson, 2017](#); [Fogarty, 2018](#)). Although accounting programs within our sample may adequately impart computer skills to graduates, programs should continue to monitor the incorporation of such skills and address any impediments such as faculty resistance to new technology ([Watty, McKay, & Ngo, 2016](#)). Double majors or minors in Information Technology or Analytics would allow for the continuing coverage of technical issues in accounting while meeting the demands for these additional skills by the profession.

For the skill of writing, a large gap potentially exists between what professional accountants feel is needed versus what they perceived to have gained in college. When comparing accounting graduates to all majors, writing is one of the weaker skills, meaning that, relatively speaking, accounting graduates did not feel that their programs of study improved their writing skills. Comparisons of writing skills across accounting graduates and other business majors are a little less dismal, but ultimately accounting graduates feel their writing skills were improved less than other business majors. Yet, writing is a necessary skill for the professional accountants as evidence by the inclusion of written communication tasks on the CPA exam ([AICPA, 2019b](#)) and the view that communicating in multiple formats is important for accountants ([AICPA, 2019a](#)). Research has focused on the importance of writing as part of accounting education ([Riley & Simons, 2013](#)). Further, calls in the literature and by large practitioner organizations to improve the writing skills of graduates have existed for decades alongside attempts by major universities to incorporate writing in the accounting curriculum ([AICPA, 1988](#); [Andersen et al., 1989](#); [May & Arevalo, 1983](#)). However, there is more work to be done by accounting educators regarding writing skills as our results support that accounting graduates perceived their writing skills to be weaker than both business and non-business graduates. The paper by [Huber, Leach-Lopez, Lee, & Mafi, 2020](#) in this special issue offers a potential aid in this endeavor.

Overall, our findings have positive implications for the field of accounting. Accounting majors during the period of our study perceived to have gained both technical skills and soft skills. Accounting educators can celebrate the level of technical skills students have gained, perhaps while working to improve the relative levels of soft skill gains. This assumes of course that it is deemed desirable to put accounting students more on par with other business majors in this regard and that these skills can be achieved in a college environment. However, increased focus on soft skills may mean a decreased focus on technical skills, which raises the concerns noted by [Rebele & St. Pierre, 2019](#). Our findings imply that accounting majors are technically prepared, with room for improvement in the soft skills area.

## Acknowledgements

The authors would like to acknowledge the helpful comments and advice of Dr. E. Kent St. Pierre.

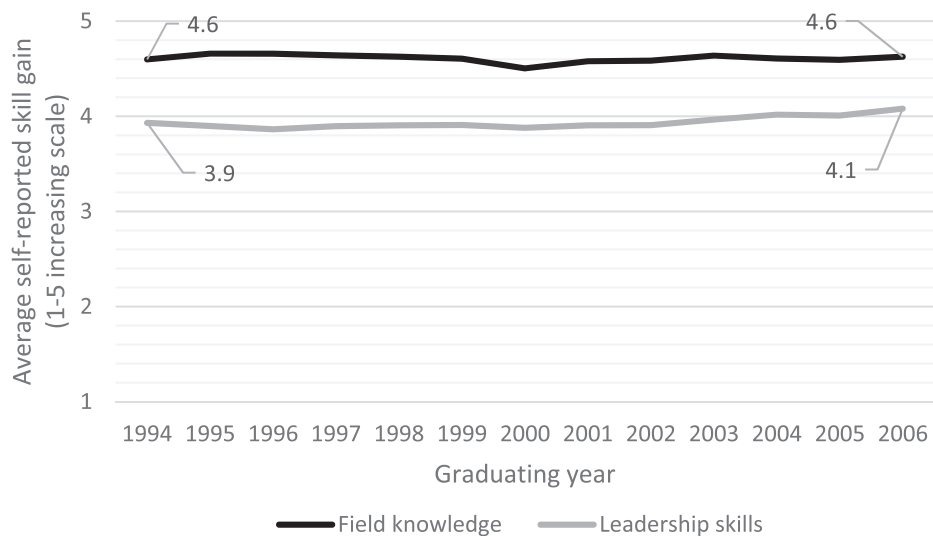
## Appendix A. Alternate comparisons

[Table A1.](#)  
[Figs. A1 and A2.](#)

**Table A1**  
Percent of students reporting “at all stronger” (stronger or much stronger) skills.

Rank	Skill category	Major		
		Accounting	Other business	Not business
1	Knowledge of your field	96.9	96.1↓	97.3↑
2	General knowledge	96.7	96.9↑	96.9↑
3	Analytics & problem solving	92.6	92.3↓	90.6↓
4	Critical thinking	91.3	91.3 –	91.7↑
5	Computers	90.1	89.2↓	82.7↓
6	Interpersonal skills	85.9	88.0↑	84.4↓
7	Working cooperatively	80.5	83.0↑	74.3↓
8	Writing	79.6	83.5↑	82.5↑
9	Public speaking	78.1	83.7↑	74.4↓
10	Leadership	73.9	80.9↑	72.3↓
11	Mathematics	67.6	60.3↓	47.2↓
12	Reading	66.2	69.1↑	67.6↑
13	Cultural & racial knowledge	60.2	65.4↑	68.2↑
14	Getting along w/dissimilar people	56.7	61.8↑	58.0↑
15	Foreign languages	27.1	31.7↑	36.7↑
	Observations	14,691	53,399	374,160

Notes: Data come from the CIRP. Number of schools in survey = 619. ↑(↓) means higher (lower) than accounting majors. The skills are ranked by the percent of accounting majors who reported at all stronger skills.



**Fig. A1.** Examples of change in accounting skill gain perceptions. Notes: Graphed here are example time plots of the annual mean self-reported skill change level for accounting graduates. Field knowledge and leadership skills are the categories estimated to be the most positively and negatively affected by accounting education, respectively.



**Fig. A2.** Examples of change in accounting education impact. Notes: Graphed here are example time plots of odds ratios from the fixed effect ordered logistic regressions run within each sample year. Field knowledge and leadership skills are the categories estimated to be the most positively and negatively affected by accounting education, respectively.

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