Using the CPA/CMA Competencies to Enhance Learning Objectives for Accounting Courses

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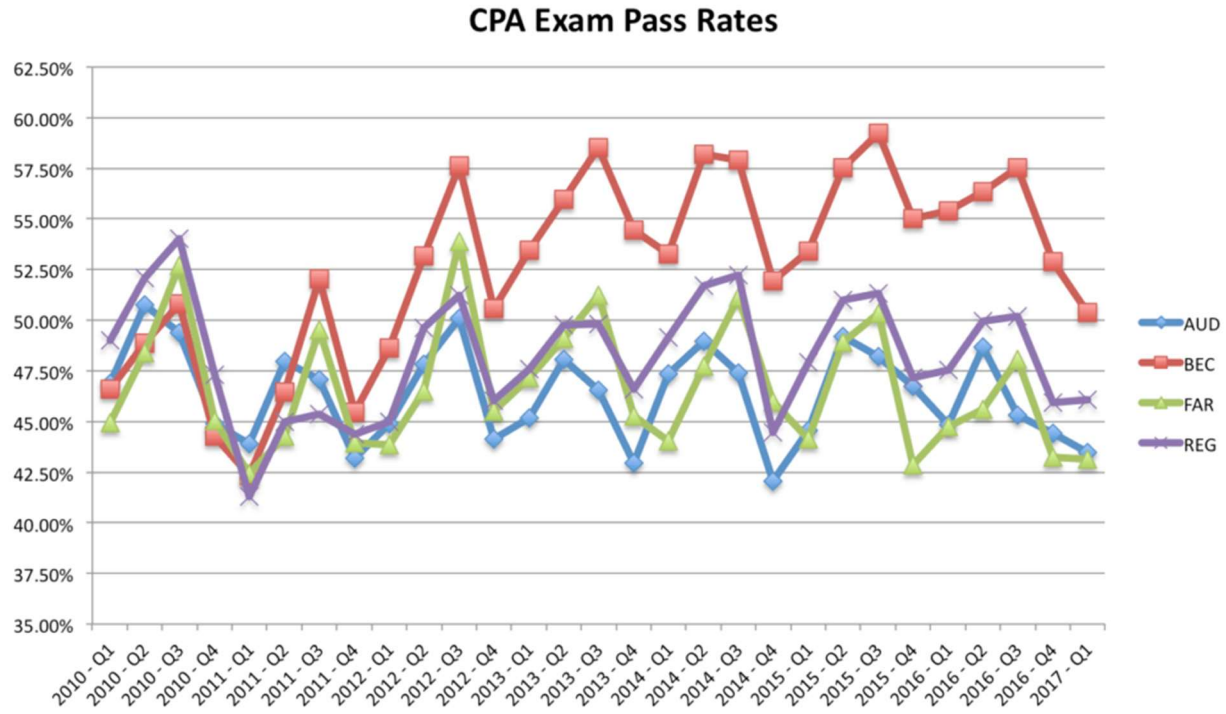
Accounting knowledge evolves over time. This study uses textual analysis and word frequencies to demonstrate how Certified Public Accounting (CPA) Examination competencies have evolved. An investigation utilizes a spreadsheet-based process based on word frequencies to compare CPA Examination Blueprints and CMA Examination competencies with accounting program syllabi objectives. Because of internal curriculum review and the demands of external stakeholders, accounting faculty must keep their course content current with regard to recent business practices. Also, the analysis approach provides a constructive, rigorous, and efficient manner to address Association to Advance Collegiate Schools of Business (AACSB) factors (e.g. continuous improvement). Corpus comparisons provide a useful tool for these purposes. In this study, a university accounting program is analyzed with a pilot study and a second university accounting department serves as a beta test. Sensitivity/validation analyses are conducted utilizing revised Bloom's Taxonomy and CPA exam results from several other schools. Results provide guidance for changes needed in curricula.

INTRODUCTION

Accounting is the language of business and, as does any language, it evolves in response to changes in the environment. Thus, accounting curriculum content must evolve to effectively educate students. Faculty design courses and syllabi with keywords indicating the curriculum coverage. The Pathways Commission (2012) identifies attaining competency as an important objective for accounting programs. The CPA Examination Blueprints (Board of Examiners American Institute of CPAs, 2018) offer independent industry/government guideposts for professional accounting knowledge content (specifically: audit, financial, information systems, tax and government accounting). The CMA Competencies (Institute of Management Accountants, 2019) focus on managerial accounting content. Further, both sets of these

competencies list specific topics that are addressed on the CPA and CMA Examinations with the approximate extents to which these topics will be covered; this implies the needs of professionals in these areas. Accounting regulations change because Generally Accepted Accounting Principles (GAAP) are revised in response to market failures (e.g., The Securities Exchange Commission was a result of the 1929 stock market crash.) and evolving business requirements. Therefore, these exam competencies provide benchmarks for accounting knowledge that make them relevant for current university accounting curriculum and syllabi. Surveys of faculty indicate that they do make modifications to their curriculum according to professional exam changes (Freeman, 2018) (Kulesza & Weaver, 2018). This issue is of continuing importance as evidenced by the curriculum/instructional article coverage in the *Journal of Accounting Education* literature review series (e.g., (Apostolou, Dominey, Hassell, & Hickey, 2019)). Figure 1 provides graphic indication that the CPA pass rates change over time as new information is added and changes are made to the examination format (e.g., the introduction of task-based simulations) and examinees' responses to these changes (CPA Accounting Institute for Success, 2019).

FIGURE 1
CPA EXAM PERFORMANCE OVER TIME



https://www.ais-cpa.com/cpa-exam-pass-rate/

The CPA exam is going to have a significant format change in 2024 (Tysiac, 2020). Applicants will have to demonstrate in-depth knowledge in one of three areas: 1) tax compliance and planning, 2) business reporting and analysis, and 3) information systems and controls. This format will require academic programs to coordinate curriculum in a more complex environment. A motivation for the current study is to help academics facilitate the handling of their curriculum, both in the transition and routine management (including accreditation reporting) with the development of a spreadsheet tool.

An overall purpose of the current study is to propose a means of facilitating the communication (e.g. Bloom's Taxonomy analysis) about accounting curriculum and competencies/objectives appropriate in the work environment. The AACSB monitors the competencies for accreditation purposes with regard to continuous improvement. This study's worksheet procedures facilitate efficient identification of topical coverage in course syllabi that should be modified to keep pace with changes in the accounting

environment. The ultimate outcome is an efficient means to evaluate course syllabi and satisfy a portion of accreditation requirements.

The current study has two phases of investigation. First, the current CPA Blueprint Competencies corpus is compared with the previous CPA Exam Specification Outlines from 2013 in order to determine the extent of change in accounting knowledge (language). Second, word frequency analyses compare current competencies with university syllabi, in order discover if the university curriculum changes correlate with CPA/CMA exam current content. There are reasons to suspect a lack of correlation. In particular, the development of big data is impacting the character of audit practice. Management information systems are changing with new tools (e.g., Tableau). Finally, accounting regulations have changed and have become more complex (e.g., revenue recognition and leases). These factors may contribute to information overload in accounting departments. A contribution of this study is the groundbreaking use of word frequency in accounting research. Major motivations for this proposed technique include objectivity and ease of implementation. These contributions are discussed further later in the article.

In the second phase, this study investigates syllabi objectives from two different universities and compares the word content from these syllabi objectives with the word content from the Uniform CPA Examination Blueprints (Board of Examiners American Institute of CPAs, 2018). This efficient technique facilitates a general review of university curriculum with regard to career direction where some may see no alternative except teaching to the test. The pilot school empirical analyses include the syllabi of all accounting classes and address the four individual CPA topic areas: Financial Accounting and Reporting (FAR), Auditing (AUD), Regulation (REG), and Business Environment and Concepts (BEC). The CMA competencies are also compared. Then, the beta school empirical analysis combines all topic areas and compares that data with a total word frequency list of the CPA competencies. Thus, accounting educators may see both applicability approaches for their particular education situation and choose the approach that best suits their needs.

There is a need to see how language evolves with knowledge content changes. This issue is addressed by the Pathways Commission Report (2012) which states that curriculum should reflect the demands made upon accounting students after graduation. The current project created an EXCEL spreadsheet to organize the data, a statistical program for comparison, and information visualization graphs to identify similar terms and dissimilarities. In our opinion, academic curriculum development is challenged by several factors. One is that any comparison of syllabi with competencies is a time-consuming data analytics task. Faculty may have neither the time nor resources available to do so. Syllabi may be created by individual faculty and have to be coordinated collectively by the accounting department as a whole. Also, the Business (BEC) topic may have course content covered by a department(s) other than accounting. Finally, an anchoring heuristic (Tversky & Kahneman, 1974) may be a psychological factor affecting any curriculum change. In simple terms, faculty tend to do what they have always done.

The following discussion provides additional motivations for this approach. First, this project creates an EXCEL spreadsheet system to do the introductory analytic work and presents statistical/ graphical output for guidance. Additionally, AACSB accreditation requires curriculum assessment which can be a time-consuming task that can be facilitated with this study's software intelligent design. To address the question of whether competencies have changed over time, the study compares content of recent CPA Examination Blueprints with that of 2008 CPA Exam Content Specification Outlines. The word frequency results indicate that competency content has changed over the last ten years; this attribution provides further reason for this study's approach.

This project presents accounting competencies in the context of a complete educational process which starts with introductory classes and carries through the completion of a degree to potentially passing the CPA exam and/or other professional examinations. Competencies are factor in successful careers (Lawson, et al., 2014), a feature which is further discussed in the literature review. Contrary to the proposition of Musov (2017) that "It Does Not Matter How We Assess Competencies in Accounting Education", we take the position that accounting education is a continual learning process that can use competencies (i.e., CPA

Examination Blueprints) as guideposts for assessment purposes. Thus, our study into curriculum design as it relates to competencies provides a vehicle for university accounting educational management.

With regard to the pilot sample institution, the findings do not indicate a strong correlation of the CPA exam competencies with syllabi objectives. Strengths and weaknesses are indicated with the intent of suggesting to other schools how they might incorporate CPA/CMA competencies into the context of their accounting curriculum design.

The next section presents a literature review related to the need for career-based competency curriculum design and the use of corpus word frequency analyses to analyze textual data. Following that, the data organization and research design are presented. Finally, a section discusses the findings with a subsequent summary section containing conclusions and implementation issues.

LINKING CORPUS ANALYSIS AND ACCOUNTING COMPETENCIES

Corpus Key Concept

"A corpus is defined as 'a collection of texts assumed to be representative of a given language collated so that it can be used for linguistic analysis' (Tognini-Bonelli, 2001). Corpus linguistics thereby enables the researcher to describe language phenomena by working across vast sets of electronic data, taking into account the context of situation "(Lijffijit et al., 2016). This study joins a large body of research measuring corpus differences. In order to compare one corpus to another, Lijffijit et. al. (2016) use statistics including parametric tests (e.g., t-tests) and nonparametric tests (e.g., Wilcoxon rank-sum tests).

Word Frequency Application

While there have been numerous expressions of the need for accounting curriculum to reflect competency demands (e.g., The Pathways Commission, 2012), it is not a simple task to analyze individual accounting curriculums to determine the extent to which they accomplish this. The present study uses word frequency, which is often used in textual analysis. In addition to being a straightforward and unbiased method of facilitating of the current study, a reason for selecting textual analysis is to show an example of a time efficient technique that faculty may use in their own school. Lijffijit et. al. (2016) state: "Comparison of word frequencies is among the core methods in corpus linguistics and is frequently employed as a tool for different tasks, including generating hypotheses and identifying a basis for further analysis."

There is word frequency research that is applicable to the current study's issues. For example, Kilgarriff (2001) poses key corpus linguistic questions of "How are corpora similar?" and "How are corpora dissimilar?". The general corpora have a wide range of words (including simple words like "the") and clustering according to meaning. We elect to filter out simple words like "the", because the purpose of our analysis is to determine if CPA Examination concepts are covered sufficiently in university classes. Other filtering details are identified in the Data Selection section. While dimensions of knowledge are a possibility for organizing words in a corpus, we elected not to do so because of the subjectivity (e.g., optimism vs pessimism) involved (for further details see (Biber, 1988) and (Biber, 1995). With respect to clustering, all words are simply made plural in the current study.

As a starting point, Kilgarriff (2001) investigates a variety of statistical approaches to compare corpus linguistics including non-parametric Mann-Whitney and Chi-Square tests, and determined that Chi-Square tests are appropriate. However, Kilgarriff (2005) subsequently decides that there is a potential statistical issue if word usage is not independent within a text. This issue may be particularly relevant here, because accounting with its specific terminology is the language of business. Thus, Lijffijit et. al (2016) also recommend the use of non-parametric tests (e.g., Wilcoxon rank-sum).

In summary, the textual analysis is presented in a pro vs. con manner in Table 1. There is also coverage comparison with content analysis. The advantages of textual analysis appear to outweigh the disadvantages in this situation.

TABLE 1
PRO VS. CON TEXTUAL ANALYSIS AND CONTENT STUDIES

	Textual Analysis	Content Studies
Pro	1. Simple use of complete sample 2. Unbiased word independent usage 3. Time efficient	1. Investigators can select key words to focus research on specific priorities. 2. A wide range of statistical techniques/designs can be employed.
Con	1. Limited statistical analysis methods to word frequency 2. Normal probability distributions of variables are not a given	1. Subject to differences in observer opinion 2. Potentially biases may occur in sample selections/constructions 3. Heavy time consumption in selection of sample and methodological process

Accounting Curriculum Competencies

Two previous articles thoroughly review and analyze competency-based curriculum design for accounting. Lawson et.al. (2014) develop a general curriculum design which focuses on the integration of all aspects of an accounting program. The article provides motivation for using their approach and for the current study. In particular, it argues that long-term career needs should be considered in designing course work; further, it integrates all attributes of an accounting degree program. Note, one positive career factor is passing the CPA exam, and business school accreditation (which validates curriculum quality) associates with CPA exam success (Nagle, Bryan, & Stephen, 2018). Lawson et.al. (2014) also emphasize the changing nature of the business environment and how accounting programs should adapt accordingly. The authors' framework covers much of the same material that is specified in the CPA Exam Blueprint Competencies.

A follow-up paper by Lawson et.al. (2015) presents an example for an accounting competency-based program curriculum. It also addresses implementation difficulties with an incremental approach noting that "We acknowledge the inevitable administrative issues that arise whenever any organization seeks to change how it operates". The subject of our study presents a relatively simple technological means of facilitating modification and/or monitoring/documenting accounting program curriculum with an example.

DATA SELECTION / METHODOLOGY

General

First, this study first compares recent (2018) CPA Examination Blueprints' accounting competencies with that of the 2008 CPA Examination Content Specification Outlines. Next, course objectives extracted from the 2017-18 school year syllabi of two universities are compared with 2018 CPA and CMA competencies. Every course by every teacher in the accounting major is used. School policy requires faculty specify course objectives in each syllabus. For example, the intermediate accounting class unique words are 15 percent of the total accounting curriculum. The methodology has the advantage of maximizing word coverage from different faculty syllabi against the potential disadvantage that the lower-level introductory course material frequencies may be over-weighted. Given that each course in the major is unique, the advantages outweigh the disadvantages. We use a word processing program to copy the course objectives from each syllabus into an EXCEL spreadsheet word frequency module analysis according to the four exam categories (e.g., REG, FAR, BEC and AUD). Then, the unique syllabi words are compared statistically with the professional competencies.

Aggregation of data is a key part of the current project. In this study, we will focus upon the CPA Blueprint Competencies. In the Audit section alone, there are over 500 concepts. Many schools may only have one or two audit classes whose syllabi will generate a much smaller number of words. We want to focus on the important differences. Therefore, a set of procedures are followed for each CPA exam

Blueprint category. Nouns are aggregated as singular. The following type of words not related to accounting principles are eliminated (See Appendix 1 for complete list.):

1. Simple adjectives (e.g., "a" or "the"),
2. Prepositions (e.g., "with"),
3. Simple verbs (e.g., "can" or "could"), and
4. Single letters (e.g., "S").

Hypotheses

The first phase research question is: "Did the CPA Blueprint Competencies change?" In other words, "Has accounting knowledge evolved as reflected in competency changes?" This question is represented by the following hypothesis:

H1: *The CPA Exam Blueprint Competencies changed from 2008 to 2018.*

The second phase of analysis focuses on the following research issue: "Do accounting syllabi objectives address the CPA exam competencies?" The issue is applicable to all of the four individual CPA exam areas (Audit, BEC, Financial, and Regulation) and forms the basis for the following hypotheses:

H2: *The text for syllabi objectives and the CPA exam Competencies (e.g., Audit, BEC, Financial and Regulation) correlate.*

In keeping with the statistical analysis cited in the literature review, the summary word frequency data are placed in three categories: (1) CPA Exam Blueprint only, (2) University curriculum only and (3) both CPA Exam Blueprint and University curriculum. Ideally, Category 3 should have all the observations, because this indicates a congruency of practice and academia.

ANALYSES AND RESULTS

In the first phase, the findings comparing the most recent CPA Examination Blueprint Competencies and the 2008 Content Specification Outlines are presented. In the second phase university course analyses are presented. The data analysis steps are: 1) collect the data from CPA competencies and syllabi objectives, 2) organize the corpus into lists of frequencies by word, and 3) create graphs and statistical analysis for comparison purposes.

2018 vs 2008 CPA Blueprint Competencies

Figure 2 presents an overall Venn diagram of word frequencies from 2018 and 2008. There was a significant overall shift in competencies tested according to a Chi-Square statistic shown in Table 2. Detailed statistics according to category are presented in Table 2. In every category except for Financial, there was a decline in the word frequencies from 2008 to 2018. Although not shown, statistics indicate all four competencies individually exhibit statistically significant changes from 2008 to 2018. Thus, the alternative of Hypothesis One is supported. Faculty should review their syllabi to determine if a school's overall accounting course content has progressed over the past ten years in order to be relevant to current issues (e.g. big data).

FIGURE 2
VENN DIAGRAM OF 2008 AND 2018 BLUEPRINT COMPETENCIES

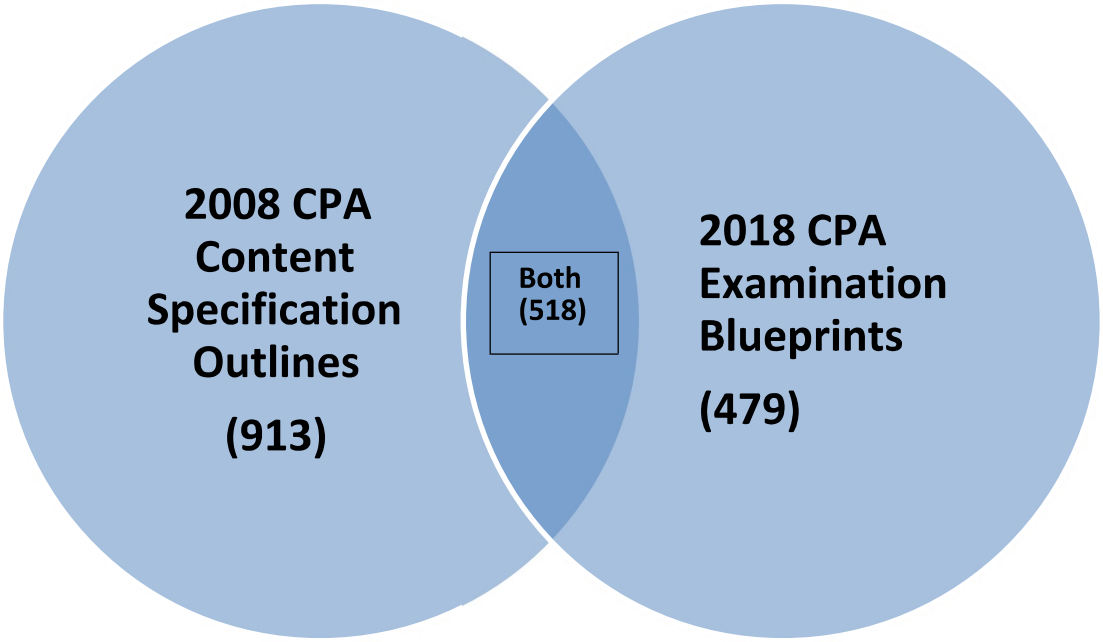


TABLE 2
A COMPARISON OF 2008 AND 2018 CPA COMPETENCIES

Instance		Audit	BEC	Financial	Regulatory	Total
2008 only						
	Frequency	321	238	90	264	913
	Percent	16.97	12.58	4.76	13.95	48.26
	Row Pct.	35.16	26.07	9.86	28.92	
	Col Pct.	54.87	53.48	29.22	47.65	
2018 only						
	Frequency	97	103	156	123	479
	Percent	5.13	5.44	8.25	6.50	25.32
	Row Pct.	20.25	21.50	32.57	25.68	
	Col Pct.	16.58	23.15	50.65	22.20	
Both 2008 and 2018						
	Frequency	167	104	62	167	500
	Percent	8.83	5.50	3.28	8.83	26.43
	Row Pct.	33.40	20.80	12.40	33.40	
	Col Pct.	28.55	23.37	20.13	30.14	
Total						
	Frequency	585	445	308	554	1892
	Percent	30.92	23.52	16.28	29.28	100.00

Pilot School Findings

Information visualization is a key tool that is often used to demonstrate a project's big picture (particularly with regard to big data). Figure 3 is an overall Venn diagram of the relevant word content of 1) accounting courses from the Pilot School only, 2) CPA Blueprints only, and 3) the intersection of the Pilot and CPA Blueprint. The Venn diagram indicates a fairly large number of similar words; however, the word count in CPA Examination Blueprints alone is approximately double that of the Pilot School alone. As with any corpus comparison (e.g., British vs American) the culture and individuals drive similarities and differences. In this case, accounting standards promulgated by governing bodies such as the Financial Accounting Standards Board (FASB) and the American Institute of Certified Public Accountants (AICPA) drive the content of the corpus. The present analysis provides a starting-validation point for syllabi objective empirical test design. The implications are obvious that there are statistical differences over time (see Figure 1) and that the accounting department should consider appropriately modifying course curriculum to incorporate up-to-date practice definitions. Also, a school's CPA pass rates are relevant information for curriculum maintenance (i.e., If it is not broken, then don't fix it.). An information cross check reveals that the Pilot University had pass rates of 30.4% in 2015, 38.4% in 2016, and 44.1% in 2017. Figure 1 indicates that national pass rates were falling over the same time frame.

FIGURE 3
VENN DIAGRAM OF CPA BLUEPRINT COMPETENCIES AND PILOT UNIVERSITY SYLLABI OBJECTIVES

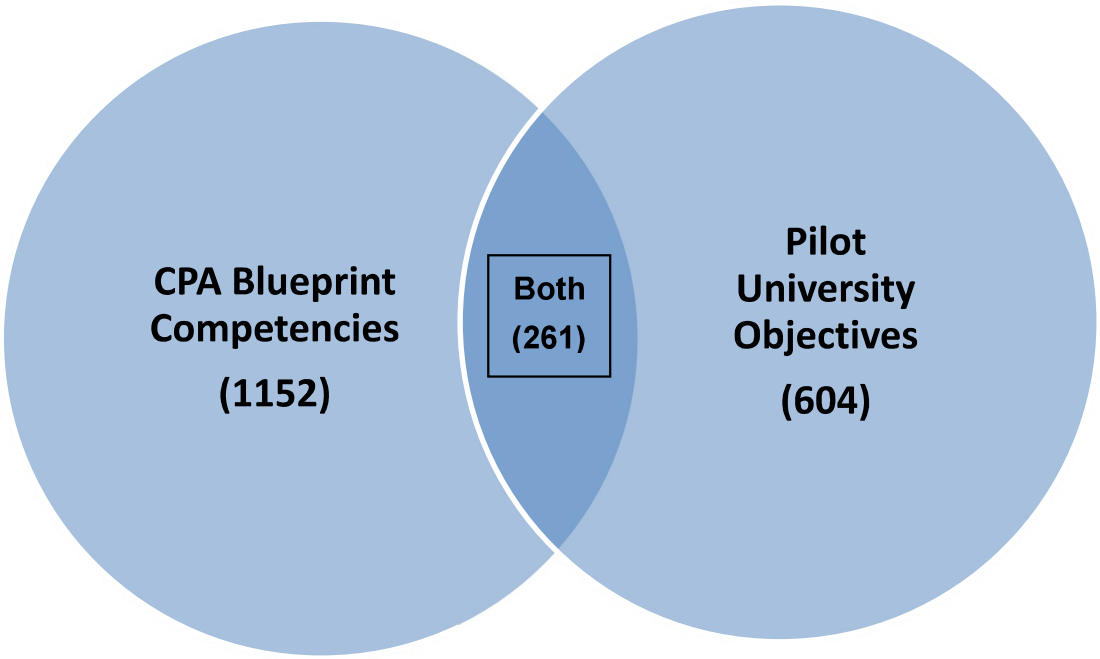


Figure 4A has data by exam categories of word counts for the pilot university versus the CPA Blueprints. What is notable is the smaller word count of the pilot university audit[1] and regulatory categories versus the CPA Blueprint for the Audit section. This finding suggests that the pilot audit and tax classes should increase the detailed coverage of CPA exam material. Figure 4B shows the word counts (size). When both words are present in both the pilot and the CPA samples, there is a similarity across the categories, which indicates an even treatment.

FIGURE 4A
CPA VS PILOT UNIVERSITY BY EXAM CATEGORY

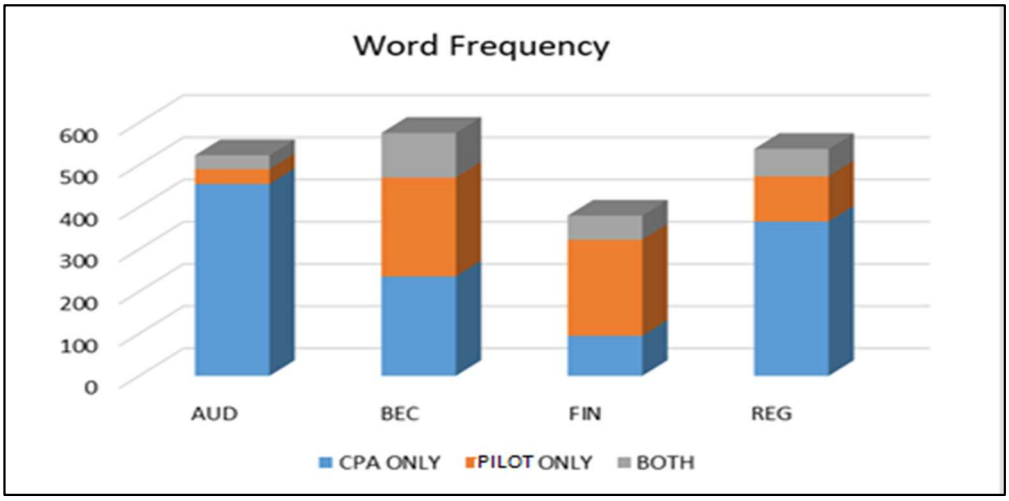


FIGURE 4B
CPA VS PILOT UNIVERSITY BY PARTICIPANT

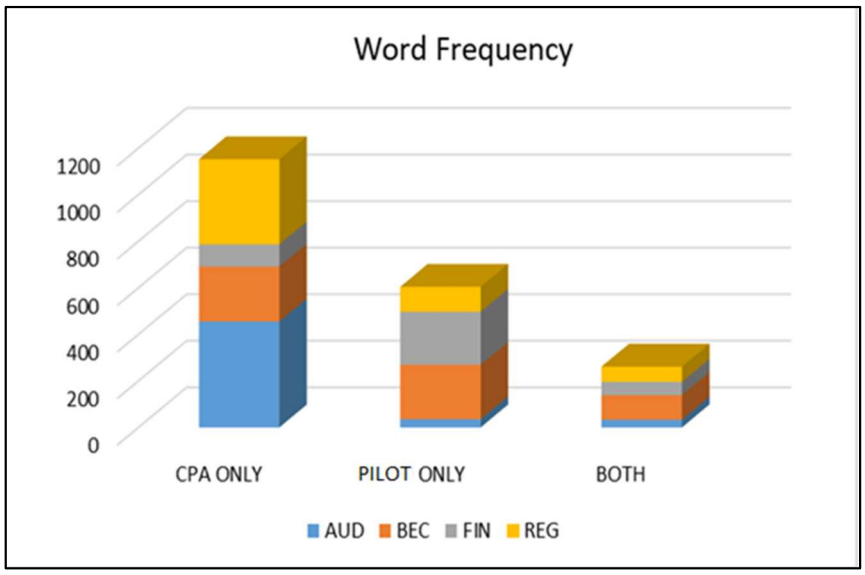


Table 3 shows a comparison of word frequencies from accounting syllabi from the pilot university with the CPA Examination Blueprints for each of the CPA exam categories and a summary of all sections. The findings indicate a range across the sections. It will be a matter of faculty judgment about the degree of correlation. With regard to commonly accepted statistical practice terms, the pilot university syllabi objective word frequencies are different from the CPA Blueprint competencies as indicated by Table 3. For purposes of a cross reference note, the 261 overlapping observations show in Figure 3 are identified in detail by category in Table 3.

TABLE 3
CPA BLUEPRINTS VS PILOT UNIVERSITY SYLLABI OBJECTIVES

Instance		Audit	BEC	Financial	Regulatory	Total
CPA only						
	Frequency	455	236	95	366	1152
	Percent	22.56	11.70	4.71	18.15	57.11
	Row Pct.	39.50	20.49	8.25	31.77	
	Col Pct.	87.00	40.97	25.00	68.03	
Pilot only						
	Frequency	35	234	228	107	604
	Percent	1.74	11.60	11.30	5.30	29.95
	Row Pct.	5.79	38.74	37.75	17.72	
	Col Pct.	6.69	40.63	60.00	19.89	
Both CPA and Pilot						
	Frequency	33	106	57	65	261
	Percent	1.64	5.26	2.83	3.22	12.94
	Row Pct.	12.64	40.61	21.84	24.90	
	Col Pct.	6.31	18.40	15.00	12.08	
Total						
	Frequency	523	576	380	538	2017
	Percent	25.93	28.56	18.84	26.67	100.00

Statistics for Table of Row by Column

Statistic	DF	Value	Prob
Chi-Square	6	469.6674	<.0001
Likelihood Ratio Chi-Square	6	499.5718	<.0001
Mantel-Haenszel Chi-Square	1	28.4146	<.0001
Phi Coefficient		0.4825	
Contingency Coefficient		0.4346	
Cramer's V		0.3412	

Beta School Findings

The beta school test incorporates all syllabi objectives versus a complete listing of the 2018 CPA Examination Blueprint Competency areas. The results shown in Table 4 indicate differences between the beta school objectives and the CPA Examination Blueprint Competencies. These different findings between the pilot and the beta statistics suggest that each school should evaluate its own statistics and should not assume one school is like another. Also, the beta school administrator did review the syllabi content before the analyses and modified objectives increasing the coverage of the competencies. Note, the beta school had CPA pass rates of 33.3% in 2015, 33.3% in 2016, and 54.2% in 2017; these results are not that much different from those from the pilot school.

TABLE 4
CPA BLUEPRINT COMPETENCIES VS BETA UNIVERSITY SYLLABI OBJECTIVES

Instance		Total	Mu0=0	
			Sign M	Signed Rank S
CPA only				
	Frequency	695	M=347.5	S=120,930
	Percent	58	Pr>=|M|<.0001	Pr>=|S|<.0001
Beta only				
	Frequency	12	M=6	S=39
	Percent	1	Pr>=|M|<.0001	Pr>=|S|<.0001
Both CPA and Beta				
	Frequency	499	M=596.5	S=356,110.5
	Percent	41	Pr>=|M|<.0001	Pr>=|S|<.0001
Total				
	Frequency	1205		
	Percent	100.00		

Because cost and managerial accounting courses have specific objectives that are not addressed extensively by any financial accounting regulations , it is necessary to address these objectives separately . Figure 5 shows an additional Venn diagram analysis that incorporates the Certified Management Accounting (i.e., CMA) competencies (Institute of Management Accountants, 2019). The number of CMA competencies is much smaller than the CPA competencies. Therefore, one might want to focus the CMA competencies for their applicability on cost and/or managerial accounting course objectives. Table 5 contains CMA word frequency data.

FIGURE 5
VENN DIAGRAM OF BETA UNIVERSITY COMPETENCIES VS CPA AND CMA COMPETENCIES

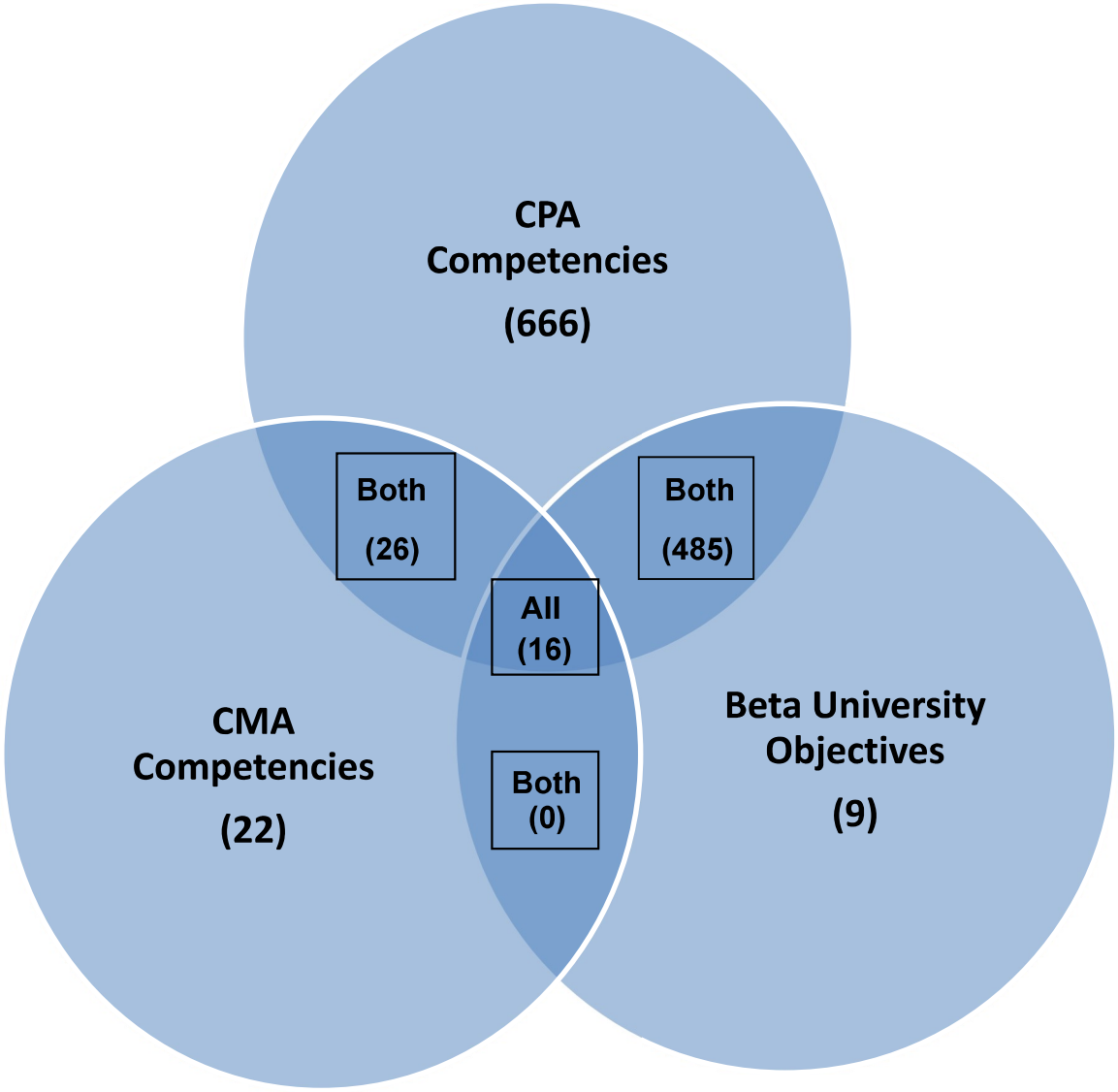


TABLE 5
CMA EXAM COMPETENCY FREQUENCIES

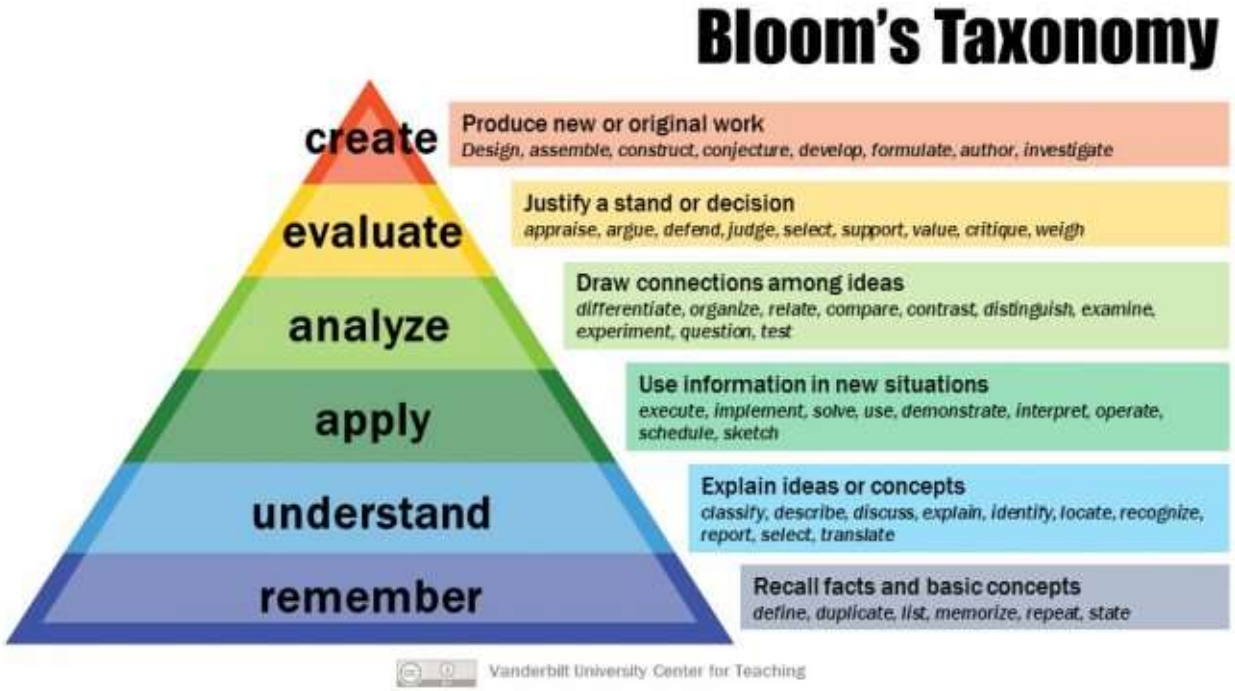
Term	Frequency	Term	Frequency
ACCOUNTING	1	INVESTMENT	1
ANALYSIS	2	KNOWLEDGE	2
ANALYTICS	1	LEGAL	1
AND	8	MANAGEMENT	8
BEHAVIOR	2	MOTIVATING	1
BUDGETING	1	NEGOTIATION	1

CAPITAL	1	OPERATIONAL	1
CHANGE	1	OTHERS	1
CMA	1	PERFORMANCE	1
COLLABORATION	1	PLANNING	2
COMMUNICATION	1	PREPARATION	1
COMPETENCIES	1	PROFESSIONAL	1
COMPLIANCE	1	PROJECT	1
CONFLICT	1	QUALITY	1
CONTINUOUS	1	RECOGNIZING	1
CONTROL	1	RECORDKEEPING	1
CORPORATE	1	REGULATORY	1
COST	2	RELATIONSHIP	1
DATA	3	REPORTING	1
DECISION	1	REQUIREMENTS	1
DECISIONS	1	RESOLVING	1
ENTERPRISE	1	RISK	1
ETHICAL	1	SKILLS	1
FINANCE	1	STATEMENT	2
FINANCIAL	1	STRATEGIC	2
FORECASTING	1	SYSTEMS	1
GOVERNANCE	1	TACTICAL	1
IMPROVEMENT	1	TALENT	1
INDUSTRY-SPECIFIC	1	TAX	1
INFORMATION	1	TEAMWORK	1
INSPIRING	1	UNETHICAL	1
INTEGRATED	1	VISUALIZATION	1
INTERNAL	1		

Sensitivity Analyses

The CPA Blueprints provide an opportunity for sensitivity analyses utilizing Bloom's revised taxonomy[2]. The revised taxonomy (Anderson & Krathworth, 2001) was designed to improve the communication of the relation of exams and curriculum (See Figure 6.). The CPA Blueprint Competencies are classified according to four subject categories. This study created application and analysis subsamples consistent with the Bloom's Revised Taxonomy. The subsamples are presented vis-à-vis the pilot school sample in Figure 7A (Application) and Figure 7B (Analysis). In the application subsample, unique word percentages are 49.2 % for the CPA Blueprint, 26.1% for the pilot school, and 24.71% for both. These percentages differ between the application subsample and the analysis subsample. The word frequencies for the CPA Blueprint are 25.8%, those of the pilot school are 55.1%, but the frequencies are only 6.7% for both in combination. One's interpretation of the findings may vary. However, it appears that the pilot school does not address upper level Bloom Taxonomy as thoroughly as it does at the lower level.

FIGURE 6
BLOOM'S REVISED TAXONOMY



Attribute to Vanderbilt University Center for Teaching

FIGURE 7A
APPLICATION COMPETENCIES VENN DIAGRAM

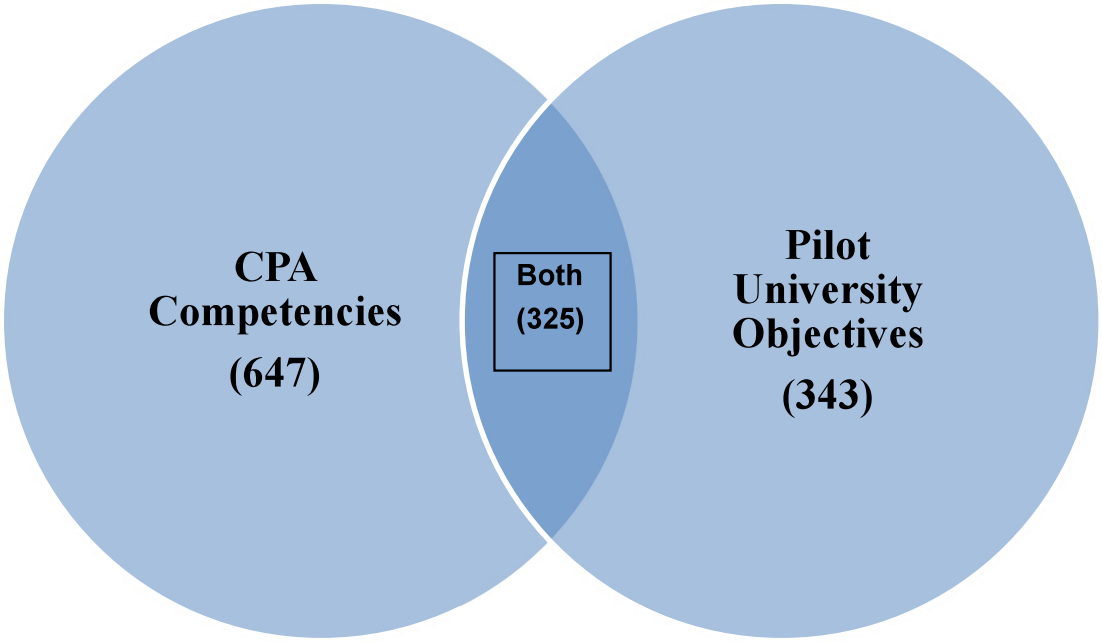
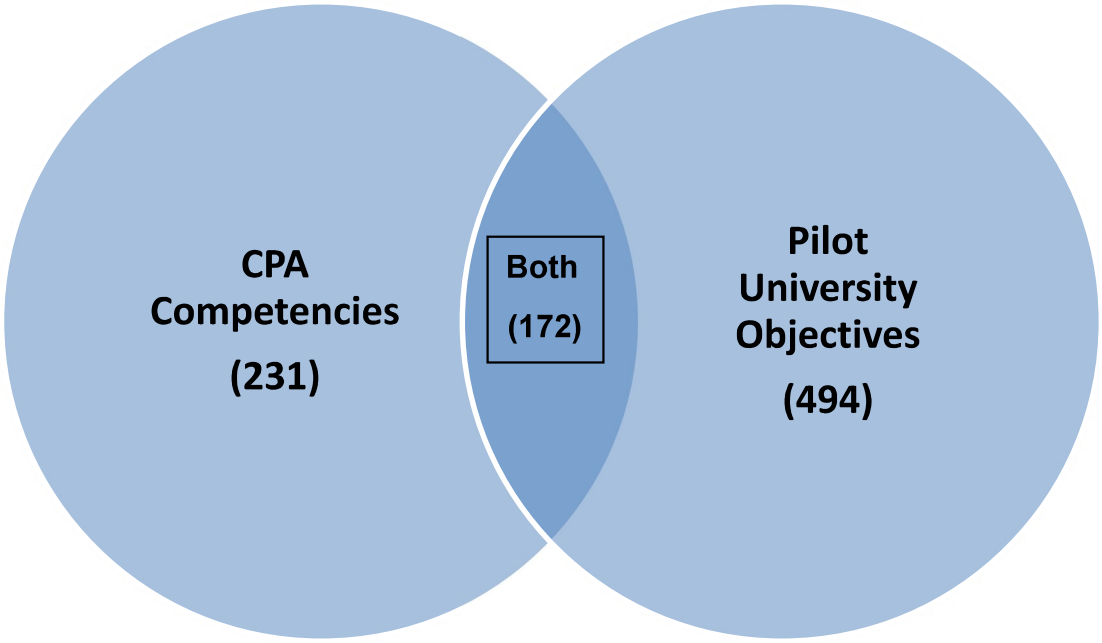


FIGURE 7B
ANALYSIS COMPETENCIES



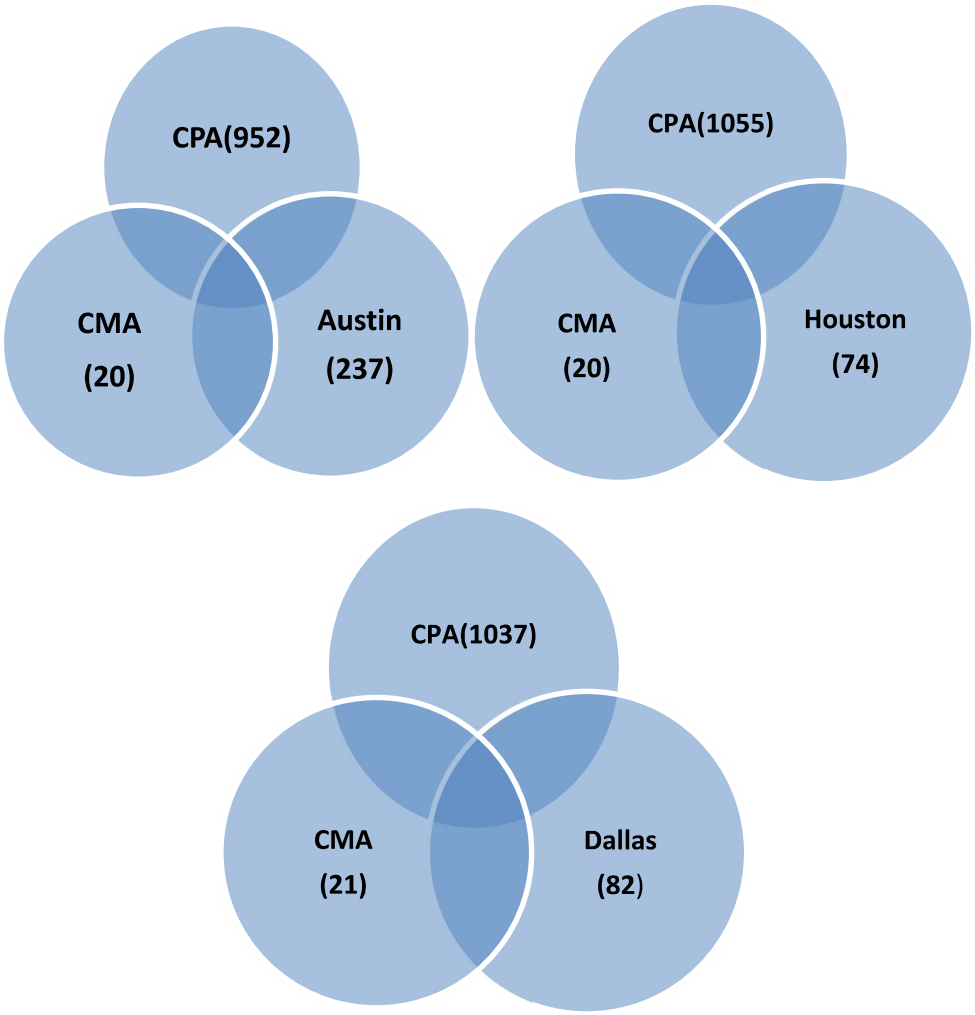
Sensitivity Analyses of Data from Three Additional Universities

The State of Texas requires universities to post their syllabi to a publicly accessible web site. This study expanded the analysis to include three larger universities. Figure 8 has Venn diagrams of the data which is similar across all three universities. These institutions are relatively large, (2018 Accounting majors at Austin 12,937; Dallas 8,200 and Houston 5,200), which suggests they will have similar curriculum characteristics. Audit exam average pass rates of the three schools were: Austin 2015: 72.6%, 2016: 71.6 %, and 2017: 71.2%; Dallas 2015: 49.1%, 2016: 46.5%, and 2017: 48.7%; and Houston 2015: 47.7%, 2016: 42.4%, and 2017: 46.7%. Table 6 indicates a consistency across the pass rates for each particular school. While the three Texas schools have somewhat higher CPA pass rates, there is little appreciable difference between the results of the pilot school shown in Figure 4 and those of the other schools shown in Figure 8. Thus, the data further validates this study's results.

TABLE 6
ADDITIONAL TEXAS UNIVERSITY PASS RATE DATA

University Location	Number of Accounting Majors	Average Audit Exam Pass Rates 2015	Average Audit Exam Pass Rates 2016	Average Audit Exam Pass Rates 2017
Austin	12,937	72.6%	71.6%	71.2%
Dallas	8,200	49.1%	46.5%	48.7%
Houston	5,200	47.7%	42.4%	46.7%

FIGURE 8
VENN DIAGRAM OF ADDITIONAL TEXAS UNIVERSITYCOMPETENCIES VS CPA AND CMA COMPETENCIES



CONCLUSIONS

This study demonstrates that requisite accounting knowledge for the CPA Examination does evolve over time as measured by word frequencies in the CPA Examination Blueprint Competencies (Competencies). Further, it develops a spreadsheet-based technique to compare the word content of accounting syllabi with these competencies. This methodology is relatively straight-forward, objective, and is not very time-consuming. The pilot study compares the Competencies for the four areas of the CPA Examination with syllabi objectives. Findings indicate a significant (supported by nonparametric statistics) lack of Blueprint coverage in all areas. The pilot study's methods are replicated at a second college for a beta test that compares the Blueprint Competencies for all four CPA Examination areas with the syllabi objectives for with all of the college's accounting syllabi. A similar lack of congruence is detected. Similar results are also found in an analysis of the syllabi of three Texas public colleges. Results of this nature should provide an impetus for revision of existing curriculum to be more competency-based in response to the demands of end users.

This study presents an example how to address curriculum content which is important in terms of AACSB accreditation. This textual analysis methodology complements the "assurance of learning" process

and continuous-improvement efforts which are key attributes of the accreditation process. The study's main objective is to provide a means to address the time-consuming aspect and organization difficulty of analysis and coverage of curriculum. There is also a wide difference in colleges and the intellectual communities across the United States. Thus, it is acknowledged that the schools presented in this particular study may not represent a particular school's environment. It is also acknowledged that CPA review course content material is particularly applicable for exam takers, because the for-profit entities are only successful to the extent that students find them useful for the exam purposes. With regard to future implementation[3], other schools may elect to use and/or include other competency standards or variables. The CPA/CMA pass rates are of great importance to faculty. Therefore, future research may investigate relationships with curriculum in order to enhance educational value. The word frequency EXCEL spreadsheet software is available upon request and the related statistical analyses presented in this study are adaptable to a wide variety of competency standards and Bloom's taxonomy categorizations.

The next step for any college should be to review the syllabi for individual accounting courses. Topics where the CPA Examination Blueprint Competencies are addressed by the syllabi objectives should be identified. Through this process, an accounting department can efficiently identify which curriculum areas may need to be revised. Only the financial category will be discussed in this study as an example, because the analyses are potentially large. See Table 7 for financial specialty comparisons. In Panel A, CPA Blueprint concept words are identified where the pilot university does not have them. These words are sorted according to frequency; which should indicate which courses may need revisions. Panel B has observations which have both CPA Exam and Pilot university data. The difference (CPA minus pilot university) between the word frequency of each entity is presented and sorted according to magnitude. Based upon such data, faculty may elect to change the emphasis of course material.

TABLE 7
FINANCIAL PANEL A

PRESENT ON CPA BLUEPRINT AND NOT ON PILOT DATA TERM	Frequency	Term	Frequency	Term	Frequency
DOCUMENTATION	21	FLUCTUATIONS	2	FOLLOWED	1
SUPPORTING	21	GENERAL-PURPOSE	2	INCLUDING	1
CORRECT	19	GOING	2	LOSS	1
NONGOVERNMENTAL	14	INCONSISTENCIES	2	MULTIPLE-STEP	1
IDENTIFIED	13	INTERPRET	2	OMISSIONS	1
ADJUST	12	MODIFIED	2	OWNED	1
ERRORS	12	NET	2	PORTION	1
FLOWS	11	NONBUSINESS	2	PREPARED	1
RECALL	10	OPERATIONS	2	PRIMARY	1
TRIAL	10	RATIOS	2	PROFIT	1
COMPREHENSIVE	9	RECLASSIFICATION	2	PUBLIC	1
INVESTIGATE	8	RESULTS	2	REGISTRANT	1
AGREEING	7	REVIEWING	2	REPORTABLE	1
AMOUNTS	7	SPECIAL	2	SIGNIFICANT	1
DETECT	7	STANDARD-SETTING	2	SINGLE-STEP	1
DISCREPANCIES	7	1934	1	SUBSIDIARIES	1
PLAN	7	8-K	1	TERMS	1
BENEFIT	6	ABILITY	1	TITLES	1
DEFINED	6	ACT	1	TOPICS	1
DISCLOSURES	5	BENEFICIARY	1	UNCERTAINTIES	1
POSITION	5	CALCULATIONS	1	WHOLLY	1
FUNCTIONAL	4	CLASSIFIED	1		

NOTE	4	COMPANY	1		
OBJECTIVES	4	COMPONENTS	1		
U	4	CONCEPTS	1		
ADJUSTMENTS	3	CONTINUE	1		
EXCHANGE	3	CONTROLLING	1		
FORM	3	CONVERT	1		
NONCONTROLLING	3	DERIVE	1		
10-K	2	DILUTED	1		
10-Q	2	DISCLOSING	1		
ASSETS	2	ELIMINATIONS	1		
AVAILABLE	2	EMPLOYEE	1		
COMMISSION	2	ESTABLISH	1		
COMPARATIVE	2	FASB	1		
CONCERN	2	FILE	1		
DISCONTINUED	2	FILED	1		

FINANCIAL PANEL B
CPA BLUEPRINT COMPETENCIES MINUS PILOT UNIVERSITY FREQUENCY
DIFFERENCE WHEN BOTH HAVE AN OBSERVATION

Term	Difference	Term	Difference
ACCOUNTING	-33	TAX	0
IDENTIFY	-23	VARIABLE	0
APPROPRIATE	-15	DIRECT	1
PROCESS	-7	EARNINGS	1
OTHER	-5	INDIRECT	1
COMPARE	-4	ITEMS	1
CONCEPTUAL	-4	SEGMENT	1
FRAMEWORK	-3	ACTIVITIES	2
METHOD	-3	CHANGES	2
SHEET	-3	CONTRIBUTION	2
STANDARDS	-3	EXPENSES	2
BUSINESS	-2	PER	2
EQUITY	-2	SHARE	2
PERFORM	-2	CONSOLIDATED	3
STEPS	-2	BASIS	4
CONSOLIDATION	-1	INTEREST	4
IMPACT	-1	CALCULATE	5
REQUIREMENTS	-1	PENSION	5
SECURITIES	-1	REQUIRED	5
TRANSACTIONS	-1	BALANCE	7
ACCRUAL	0	PURPOSE	7
BASIC	0	INCOME	10
CHARACTERISTICS	0	CASH	11
DUE	0	NOT-FOR-PROFIT	12
ENTITIES	0	ENTITY	14
FOR-PROFIT	0	FINANCIAL	14
INCLUDES	0		
REPORTING	0		
SEC	0		

ENDNOTES

1. As means of corroboration, a word frequency analysis of the audit text chapter learning objectives indicates significant differences at the .01 with the CPA audit Blueprint Competencies. A check of the beta school finds similar results.
2. Bloom's taxonomy (Bloom, Englehart, Furst, & Krathwohl, 1956) continues to be a de facto standard of classifying knowledge according to a six-tier categorization.
3. Depending upon publication final procedures, the EXCEL program may be available on the web.

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APPENDIX

/* Remove Simple Modifiers */
A, AN, AS, THE, THOSE, THAN, THAT, THEIR, THOSE
/* Remove Common Conjunctions */
AND, OR
/* Remove Prepositions */
ABOUT, AFTER, AMONG, BETWEEN, FOR, INTO, OF, UNDER, WHEN, WITH, WITHIN
/* Remove Pronouns */
ALL, ANOTHER, IT
/* Remove short common words <5 letters */
ARE, ASK, BEEN, COULD, DO, NO, NOT, MADE, SHOULD, USE, WERE, WOULD
/* Remove Single Letters */
E, G, I, S