

# **ONLINE ACCOUNTING EDUCATION AND CPA EXAM SUCCESS**

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## **Abstract**

The quality of online accounting education relative to more traditional classroom-based accounting education remains a contentious and poorly understood topic. The research presented here compares average CPA exam scores of first-time candidates who have earned accounting degrees from online universities to average CPA exam scores of first-time candidates who have earned accounting degrees from (primarily) traditional classroom-based universities. Our findings indicate that graduates of online universities, on average, score considerably lower on the CPA exam than do the graduates of traditional, classroom-based universities.

## INTRODUCTION

Over the past decade there has been rapid expansion of online accounting classes (and also of online business education more generally) (Bryant, Kahle, and Schafer, 2005). Furthermore, the demand for, and growth of, online education is expected to accelerate in the future (Ng, 2011).

Improvements in computer technology, as well as the ubiquity of high-speed internet access, make these changes in delivery mode much more feasible than in the past. Convenience, flexibility, and cost savings to students are thought to be among the several advantages of online education. Nontraditional students with already busy work lives, limited budgets, and expanding family obligations are especially likely to find the advantages of online education most beneficial (Ng, 2011).

In spite of its growth, there continues to be a perception by some that online education is of generally inferior quality to traditional classroom based education (Drago, Peltier, Hay, and Hodgkinson, 2005). Additionally, drop rates in distance education, especially for undergraduate students, are known to be higher than those for traditional classes (Diaz, 2000; Phipps and Merisotis, 1999).

In spite of concerns about the quality of online education, existing research shows student *perceptions* about the quality of courses completed online are that they are either roughly the same quality or even better than the quality of traditional courses (Ward, Peters, and Shelley, 2010). And though the issue of quality of online education remains contentious and unsettled, surprisingly little *empirical* research has been published that compares the quality of these two types of education in terms of learning outcomes.

Several things may explain this. First, no universally accepted definition of *quality* in business education exists in academe or elsewhere. Definitions of *quality* are necessarily subjective, often multi-faceted, and always contain elements that

are inherently difficult to measure. The various facets of educational quality are thought to include student mastery of course content, development of higher-order intellectual skills (e.g. critical thinking/problem-solving), creativity in thinking, development of oral and written communication skills, and development of the desire to seek additional scholarship and life-long learning.

Many of these qualities are extremely difficult to measure objectively. The particular combination and weightings of the various facets that might comprise the overall quality of business education unavoidably involve value judgments on the part of the person doing the defining (Pascarella, 2001; McKeachie, 1997).

A second possible reason for the relative paucity of empirical research investigating quality differences in learning outcomes between online and traditional educational delivery relates to difficulties in establishing proper research designs that provide a basis for causal inference. Fully randomized experimental research designs are necessary if one is to form unambiguous causal inferences about relationships between delivery mode (online or traditional) and the resultant learning outcomes from accounting education (however defined and measured).

Experimental research designs are based on active manipulation of an independent variable (i.e. educational delivery mode in this case) across two or more randomly assigned groups for the purpose of unambiguously distinguishing the differences in outcomes across groups. It is only through random assignment of subjects to groups that a researcher is able to isolate and observe the systematic effects of the experimental treatment on each group, and at the same time assume other systematic differences between groups do not exist (Bryman and Cramer, 2005).

When assessing the relative efficacy of online versus traditional education, it is impossible for researchers to assign students to educational delivery modes, online or traditional classrooms. Students make these choices for themselves. And

because random assignment is missing, researchers cannot unambiguously infer precisely why differences in educational outcomes may occur when they do occur. They may result from selection biases (e.g. perhaps a better quality student self-selects into online classes) and thus better outcomes naturally result unrelated to delivery mode (Anstine and Skidmore, 2005).

### PREVIOUS STUDIES

In an extensive 2009 literature review of online distance learning in accounting education, Arbaugh, Godfrey, Johnson, Pollack, Niendorf and Wresch, (2009) identified nineteen published research studies on distance learning in accounting. Two of the nineteen were earlier literature reviews (i.e. Bryant, Kahle, and Schafer, 2005; and Watson, Apostolou, Hassell, and Webber, 2003). All three literature reviews note the surprising paucity of *empirical* research which investigates the comparative quality of online and traditional accounting education.

Most of the studies summarized by Arbaugh's 2009 literature review were surveys asking about student satisfaction with online courses. Findings have been mixed. For example, Ponzurick, France, and Logar (2000) concluded, overall, student satisfaction with online education has generally been lower than satisfaction with traditional face-to-face education.

Kleesius, Homan, and Thompson (1997) based on similar survey-type research concluded the two forms of course delivery were roughly commensurate in terms of student satisfaction. Drago, Peltier, Hay, and Hodgkinson (2005) concluded, also from student survey results, that quality of online education is perceived by students as similar to, if not superior to, traditional education.

Other student survey research has aimed at comparing student perceptions of their *online learning* rather than their satisfaction with online courses. Watters and Robertson (2009) report that 75% of students in two different online accounting courses (one undergraduate and one graduate) self-reported their

online learning was believed to be at least as effective, if not more so, than the learning they might have obtained from traditional-format courses not actually taken. Findings in two other studies of this type also show students self-reported the *self-perception* that they had learned as much in the online course as they would have learned from a more traditional classroom setting (Ward, Peters, and Shelley, 2010; (Chen and Jones, 2007).

From this type of survey research, it has been concluded by some that the quality of online education appears to be equal or better than the quality of traditional classroom-based education. However it should be remembered that self-assessment survey research is well known to be highly unreliable. First, students do not actually know what would have been learned in a traditional course format because they have not experienced it.

Second, in a wide variety of contexts, methodology research has shown self-assessments are generally biased, self-justifying, and overly optimistic; furthermore self-assessments have been shown to be poorly correlated with actual outcomes in many contexts (Dunning, Heath, and Suls, 2004). It seems plausible to us that students completing online courses would naturally want to believe that they had learned as much as students who completed the same course in a more traditional format, whether or not this actually was the case.

Only a few existing empirical studies have directly observed the comparative outcomes of online course sections with traditional classroom sections in a single multi-sectioned course based on comparing scores earned on a common final examination. No studies of this type have been conducted in accounting courses. Studies of this type, however, do exist in economics and management education.

Interpreting the results of empirical studies of this sort has been somewhat muddled by the fact that students enrolling in online sections are known to differ systematically from those who enroll in traditional classroom sections. Differences include the variables of age, gender, marital status, and cumulative GPA

(Schell, 2001). In fact Gratton-Lavoie and Stanley (2009) found that not only do online and traditional sections differ significantly in terms of average age, gender, marital status, GPA, number of courses previously taken, and planned major, but go on to show these same factors are correlated with educational success generally making it difficult to discern and separate the effects of delivery mode (online or traditional) from the effects of other pre-existing factors differing across groups.

Nevertheless these types of studies comparing learning outcomes of online and traditional classroom-based sections in a multi-sectioned course using a common final examination consistently show that online sections fare poorly. For example, Brown and Liedholm (2002) found that students in virtual sections of principles of microeconomics, while having better student characteristics going into the course (e.g. higher ACT's, higher GPA's, more credits earned, etc.), performed significantly worse on a common final examination than students who completed the same course in a traditional classroom setting.

Anstine and Skidmore (2005) found that M.B.A. students in several online sections of a management course scored approximately the same as students in traditional face-to-face sections on a common final examination, but after controlling for factors known to affect learning outcomes (e.g. age, GPA, GMAT scores), the online students actually scored an average of five points lower on the final examination than did students in traditional sections.

From this they concluded the online learning environment is less effective than the traditional learning environment for mastery of both concepts and applications in management. Gratton-Lavoie and Stanley (2009) found, after removing the effects of several known self-selection biases from their sample, that online delivery resulted in negative outcomes or was insignificant when compared to traditional delivery in terms scores on a common final examination.

The issue of *quality* of learning outcomes from online courses remains contentious and unsettled. Past research suggests that *survey studies* tend to show students are generally satisfied with online courses and believe they have learned as much or more than they would have learned in traditional classrooms. *Empirical (non-survey) research* using a common final exam as the measure of student learning outcomes tends to show they have not learned as much.

### **THE CPA EXAM AS A PROXY FOR ACCOUNTING EDUCATION QUALITY**

Accounting programs, as do many other kinds of educational programs, typically employ multiple measures to assess quality. Multiple measures often include measures of student mastery of content, student ability to apply knowledge in problem contexts, student development of higher-order problem solving skills, student creativity in thinking, student communication skills, and the desire of students to continue scholarship in their field and to engage in life-long learning.

Arguably in accounting programs, one way to measure many of these facets at once is through measuring the success of a program's graduates on the uniform CPA exam. Many business schools consider success on the uniform CPA exam to be the single best indicator of quality since the CPA exam has been expressly designed to measure among other things, communication skills, knowledge of accounting, auditing, general business concepts, problem-solving skills, and applications skills.

Whether success on the CPA exam by itself represents a complete measure of quality in accounting education is not universally agreed. Some think it is not. For example, Poneman (1998) argues the CPA exam, while an important measure, is not the sole measure of all accounting knowledge and points out that some high quality accounting programs focus on managerial accounting and controllership rather than public accounting, areas not well tested by the CPA exam. Secondly, Poneman points out

that a majority of accounting graduates never work for public accounting firms and do not require the “CPA” designation for their job duties.

He also notes that in recent years some of the bigger public accounting firms are shifting their recruiting efforts away from hiring trained CPAs to hiring other specialties as well such as IT specialists, marketing specialists, and management consultants. Ponemon believes that if accounting curriculums are designed solely to meet CPA exam content specifications, the onus of curriculum design shifts away from university faculty to the AICPA and the state boards of accountancy, a circumstance he believes is inappropriate. In spite of his several stated reservations about the CPA exam as a proxy for overall accounting program quality, Ponemon concedes the CPA exam is a useful measure of mastery of a large body of technical accounting, financial reporting, and auditing knowledge indicative of quality in accounting education (Ponemon, 1998).

Others argue that the CPA exam is a highly appropriate measure of quality in accounting education. Schick (1998), a long time business school academic, suggests the CPA exam is an appropriate measure of accounting program quality. He says:

*“Since students and/or their parents are paying a significant amount of money for the education that students are receiving, you think of students and parents as customers for a university’s services. Therefore, you think it appropriate for accounting departments to provide the education desired by their paying customers, students and parents. If students want to become CPAs, then accounting departments should seek to help them do so. The success of accounting departments in satisfying their customers’ wants, as indicated by first-time candidates’ performance on CPA exams, should be information that is widely disseminated and easily obtainable.”* (Schick, 1998: 417).

Even assuming the CPA exam is not by itself a complete measure of accounting program quality it is nevertheless considered a good approximation and is often used by business schools to justify claims of quality in their accounting programs. The *National Association of State Boards of Accountancy (NASBA)* annually publishes aggregate institutional data about the performance of college and university graduates on each of the four parts of the CPA exam by institution attended.

Colleges and universities whose graduates have higher than average scores and success rates on the CPA exam often publicize these results in student recruiting materials and other promotional materials. Additionally, some state CPA societies use *NASBA's* CPA exam results to determine which colleges and universities within their jurisdictions will be awarded the most student scholarships. De facto, CPA exam scores and success rates are being used as a key measure of quality in accounting education.

According to the official website of the *American Institute of Certified Public Accountants*, the central purpose of the CPA examination is “to admit individuals into the accounting profession only after they have demonstrated the entry-level knowledge and skills necessary to protect the public interest in a rapidly changing business and financial environment.” (AICPA, 2011). Most accounting majors understand the importance of passing the CPA exam both for the personal prestige it brings to them and for the career advancement opportunities it provides. This is true even for those having little intention of working as licensed public auditors in the future.

The *NASBA* says this about the CPA exam: “since 1917, the Uniform CPA Examination has proven to be a highly valid and reliable measure of candidate abilities. This focus on quality has made it possible for all United States jurisdictions to rely on the results in determining who is competent to practice public accounting in order to protect the public.” (NASBA, AICPA, and Thomson Prometric, 2007: p. i).

The prestige that accompanies passing the CPA exam (a fourteen hour test) is partially a function of the high degree of difficulty in passing it. Only after successfully completing a four year business degree that includes a concentration or major in accounting, are candidates allowed to sit for the exam. And even then pass rates for first-time candidates on each of the four part exam averages only about 48% in recent years. This is much lower than for other professional entrance exams such as medical and bar exams (NASBA, 2011).

We have chosen, for purposes of this research, to employ average CPA exam scores of a program's graduates as our dependent variable, intending them to represent an approximation of the quality of accounting education received prior to taking the CPA exam. CPA success rates, though perhaps less than a full measure of accounting education quality, are nevertheless a useful operational definition. Large numbers of accounting majors from thousands of schools take the uniform CPA exam annually. Importantly, the CPA exam itself is graded uniformly from a central location for all candidates in all jurisdictions and from all alma maters. Candidate scores by institution are published annually by NASBA.

Thus scores on the CPA exam can be employed as a common and objective measure of quality in accounting education for accounting programs across the United States. And by using CPA exam scores as our dependent variable (and as proxy for quality in accounting education), we are able to compare the CPA exam outcomes of students who have received their undergraduate accounting education from *online universities* to those who have received their undergraduate accounting education from *traditional classroom-based universities*.

## **MOTIVATION FOR THIS RESEARCH**

The motivation for this research is to directly compare the quality of accounting education offered by *online universities* with the quality of accounting education offered by *traditional*

*classroom-based universities*. Our measure of “*quality*” has been operationalized as average success rates of graduates from each type of university on the most recent year’s uniform CPA exam.

To our knowledge there has been no other research making this comparison. Other studies have compared online sections with face-to-face sections in a single business course at a single university; our study more broadly compares a vastly larger sample of the CPA scores of graduates from *online universities* to the CPA exam scores of graduates from traditional classroom-based universities.

Table 1 below provides descriptive information about the sample evaluated in our study in terms of the number and sizes of U.S. institutions characterized as *online universities* and characterized as *traditional classroom-based universities*. The dichotomy itself was not always as easy to make as it might at first seem. Universities offering complete online bachelor’s degree programs in accounting also, in some cases, provide some traditional classroom education to some students as well. Traditional classroom-based universities sometimes also offer one or more online courses or sections of courses along with the more widely employed classroom-based education.

For purposes of this research, we classified institutions as *online universities* whenever they offer a complete accounting degree to students online (i.e. students can earn their entire bachelor’s degree in accounting without ever attending a traditional classroom). The majority of the universities classified as *online universities* in this study in fact provide only online education with no traditional classroom education; however, a few do provide some traditional classroom-based education at some locations in addition to offering the majority of their students a full program online (e.g. Devry University and Golden Gate University).

For purposes of this research, we classified institutions as *traditional classroom-based universities* whenever they did not offer a complete accounting degree online. Many of these universities, while offering nearly all of their classes in a traditional

classroom setting, also offered one or two online accounting or business classes to students.

It should be noted about Table 1 below that NASBA does not report institutional data for institutions whose graduates engaged in fewer than 20 first-time CPA exam testing events during the calendar year. Very small accounting programs, whether traditional or online, do not get listed in NASBA data by name. And although we were able to identify a total of 92 *online universities* offering an entire bachelor's degree in accounting online, only 37 of the 92 had graduates with sufficient first-time CPA exam events to qualify for separate identification in NASBA's 2011 *Candidate Performance on the Uniform CPA Exam, 2011 edition (appendix F)*.

Thus our research sample for *online universities* includes only the 37 *online universities* separately identified by NASBA in their reported CPA exam results. These 37 *online universities*, many with undergraduate enrollments in excess of 20,000 students, had graduates with a combined total of 2,983 first-time testing events completed for the calendar year 2010, the year examined in this study.

**Table 1**  
**Traditional and Online U.S. Colleges and Universities (By Size)**  
**With at Least 20+ First Time CPA Testing Events\***

<b>Undergraduate Enrollment*</b>	<b>Total Number of Schools</b>	<b>Number (%) Identified As Traditional Classroom-Based Universities</b>	<b>Number (%) Identified As Online Universities</b>
> 15,000	<b>147</b> (100%)	<b>137</b> (93.2%)	<b>10</b> (6.8%)
10,001 – 15,000	<b>89</b> (100%)	<b>84</b> (94.4%)	<b>5</b> (5.6%)

5,001 – 10,000	<b>183</b> (100%)	<b>176</b> (96.2%)	<b>7</b> (3.8%)
0 – 5,000	<b>286</b> (100%)	<b>271</b> (94.8%)	<b>15</b> (5.2%)
Totals	<b>705</b> (100%)	<b>668</b> (94.8%)	<b>37</b> (5.2%)

\*-- A first-time testing event refers to a candidate taking any one of the 4 parts of the CPA exam for the very first time during the calendar year.

*The source of data included in this table is the intersection of NASBA's 2011 edition, Candidate Performance on the Uniform CPA Examination (Appendix F) with 4 year schools listed in the U.S. Department of Education, Institute for Education Sciences, National Center for Education Statistics (2011). Institutions offering a complete bachelor's degree in accounting were classified as "online universities". Others institutions were categorized as "traditional classroom-based universities".*

Table 1 makes evident that there are presently a great many more traditional universities in the U.S. than online universities. The predominance of traditional universities is the case at all enrollment levels, and exceeds 90% at all enrollment levels.

## **DATA AND RESEARCH DESIGN**

Schools selected for our analyses were those listed both of two separate databases. The first database is the *Institute of Education Sciences, National Center for Education Statistics* (NCES, 2011), an online database maintained by the U.S. Department of Education. From the U.S. Department of Education database we selected all four-year colleges and universities located within the United States and the District of Columbia in 2011. The same database was also used as our source for undergraduate enrollments found in Tables 1 and 4. We selected only those colleges and universities listed in U.S. Department of Education

statistics as “*four-year undergraduate colleges and universities*”. Two-year colleges and graduate universities (i.e. universities having more graduate students than undergraduate) were not included in our sample.

The second database, whose intersection with the first, ultimately determined our final sample is *Candidate Performance on the Uniform CPA Exam, 2011 Edition*. This data is published by the *National Association of State Boards of Accountancy* (NASBA, 2011) and includes 2010 CPA exam results of all institutions having graduates with 20 or more first-time testing events during the calendar year 2010.

Our research sample included only those schools included in both databases. That is to say our sample included all four-year U.S. colleges and universities listed in National Center for Education Statistics and also listed in the *Candidate Performance on the Uniform CPA Exam, 2011 Edition*, Appendix F. Our final sample was comprised of a grand total of 705 four-year undergraduate colleges and universities each having 20 or more first-time testing events on the 2010 CPA exam per NASBA data.

The 705 selected schools were next classified by size and by institution-type (see Table 1 above). “*Institution-type*” was one of two possible categories, either an *online university* or a *traditional classroom-based university*. All universities offering an entire accounting (bachelor’s) degree online, were classified in Table 1 as *online universities*. All other institutions (those not offering an entire program online) were classified as *traditional classroom-based universities*.

As Table 1 shows, this procedure resulted in 668 *traditional classroom-based universities* and 37 *online universities*. Some of the bigger and better known *online universities* included in our sample are Kaplan University, Strayer College, University of Phoenix, Grand Canyon University, Devry University, Liberty University, and Excelsior College. Surprisingly, two of the very largest online universities (both offering a complete online bachelor’s degree in accounting), ITT Institute of Technology and

Ashford University, did not meet the NASBA threshold of graduates having 20 or more first-time CPA exam testing events, and thus could not be included in our final sample.

Statistical analyses were conducted using one-way analysis of variance (ANOVA). ANOVA is a well-known test statistic employed for comparing the means of two or more groups for the purpose of rejecting a null hypothesis stating that no significant differences exist between groups. In the present situation we were able to *reject* the null hypothesis that average CPA exam scores of *online universities* and *traditional classroom-based universities* were no different. Upon successfully rejecting the null hypothesis, we then compared the size of the differences in average CPA scores of candidates from both groups and drew our conclusions.

The dependent variable in our ANOVA was weighted-average CPA exam scores received by candidates from each group (per the 2011 edition of *Candidate Performance on the Uniform CPA Exam, Appendix F*). The independent variable was educational type, *online university* or *traditional classroom-based university*. The ANOVA compared scores of 2,983 first-time testing events of graduates from *online universities* to scores of 86,173 first-time testing events of graduates from *traditional classroom-based universities*.

## RESULTS

Table 2 shows the results of the one-way ANOVA performed. The null hypothesis has been rejected in the sample of 89,156 test takers ( $p < .001$ ). Average CPA exam scores of candidates in the two groups were not statistically identical. The CPA exam scores of candidates who received their accounting education at *online universities* are found to be significantly lower. Table 3 shows the means and standard deviations in the two groups.

**Table 2**  
**ANOVA To Reject the Null Hypothesis (n = 89,156 total first-time testing events)**

Dependent Variable	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	153915	1	153915.904	5038.780	.000*
Within Groups	2723321	89154	30.546		
Total	2877237	89155			

\*-statistically significant difference between groups; p. < 001

**Table 3**  
**CPA Exam Average Scores and Standard Deviation By Condition (n = 89,156)**

School Type	First-Time Events N	Mean	Std. Deviation	Std. Error
Online University	2983	64.974	6.3368	.1160
Traditional classroom-based university	86173	72.280	5.4967	.0187
Total	89156	72.036	5.6809	.0190

CPA exam scores of graduates from *online universities* average 64.9%. The CPA exam scores of graduates from traditional classroom-based universities average 72.3%. Graduates from online universities average 7.3% lower than graduates of more traditional universities.

## IMPLICATIONS AND CONCLUSIONS

Our results demonstrate a significant and negative association between online accounting degrees and average first-time CPA exam scores of graduates. This result is not merely statistically significant; it appears to be of a magnitude suggesting considerable practical importance as well. An average 7% difference in a candidate's CPA exam score is of major importance to the lives of thousands of candidates in a world in which 75% is deemed a passing grade and allows one enter the profession as a CPA; whereas a score of less than 75% is a deemed failing and requires candidates to continue study and retake the exam at a later test window and at considerable cost in time and money.

Our findings appear to be similar to those of earlier empirical studies comparing learning outcomes of online sections with traditional sections in a single multi-sectioned course using a common final exam. Much like these earlier empirical studies, our findings suggest online delivery appears less effective in terms of learning outcomes. And our findings are inconsistent with conclusions drawn by some from survey research in which students reported they had learned as much or more in online courses than they would have learned in traditional classroom-based courses not actually taken.

Lastly, it bears remembering that nothing in our data suggests unambiguously *why* the lower CPA exam scores exist in graduates from online universities. Our results indicate only that first-time CPA exam takers from online universities earn lower average scores on the CPA exam than those from traditional universities. Why this occurs is something not inferable given our correlational research design. Since our design lacks random assignment of subjects to groups, and was not experimental, it provides no reasonable basis for causal inference about why discovered relationships exist (Bryman and Cramer, 2005).

As noted above, causal inference demands a fully randomized experimental design in which researchers actively manipulate a research variable across two randomly assigned groups. In our research this was impossible; to randomly assign subjects to either *online universities* or to *traditional classroom-based universities* in order to make sure the two groups will be identical at the outset is not something remotely possible or desirable in our society. Therefore, because of the limited nature of our research design, the particular reasons why graduates of *online universities* score lower on the CPA exam than graduates of traditional classroom-based universities cannot be unambiguously inferred.

Our findings may result from any number of factors, or combination of factors. As an example, one could speculate our result is simply a function of selection bias—online schools may attract, on average, a lower quality accounting student than do traditional universities. On the other hand, one could equally well speculate that online delivery is the determinative factor. That is to say online accounting education may be less well suited for producing students capable of achieving high CPA exam scores on average. Or it could be other factors that we have not even considered.

But despite being unable to logically infer why discovered differences exist, our data nevertheless show that statistically significant differences in the CPA exam scores of the two groups do exist, and surprisingly large differences at that. The average CPA exam scores of students receiving their accounting educations at *online universities* are found to be over 7 percentage points lower than those receiving their accounting educations in traditional classrooms.

We have noticed another characteristic in our data not readily discerned from the results reported above. The data show a **much smaller percentage** of students from *online universities* even attempt to take the CPA exam relative to *traditional classroom-based universities*. For example two of the very largest

online universities, both offering complete online bachelor's in accounting degrees, ITT Technical Institute with 81,132 undergraduates, and Ashford University with 57,254 undergraduates, did not have enough graduates sitting for the 2010 CPA exam to meet the minimum NASBA requirement of 20.

In order to give the reader a better sense of the smaller proportion of students sitting for the CPA exam graduating from *online universities*, Table 4 compares the ten largest *online universities* to the ten largest *traditional classroom-based universities* in terms of overall student enrollment at each and number of first-time CPA exam testing events by graduates from those universities.

This data should be interpreted with some caution because we have only been able to discover the total number of students enrolled at each of these large universities, not the total number of accounting graduates. Thus, it could be the case that some very large online universities may have very small accounting programs explaining the small numbers taking the CPA exam. Nevertheless, overall, the pattern is clear. Proportionally fewer students from online universities take the CPA exam at all and then with less success. If accounting programs at online universities are in fact roughly proportional to their overall enrollments when compared to traditional classroom-based universities, then this effect is quite dramatic.

**Table 4**  
**Ten Largest *Online Universities* Compared With Ten Largest *Traditional Universities***

	Ten Largest <i>Online Universities</i>			Ten Largest <i>Traditional Classroom-Based Universities</i>		
	Name	Under-graduate enrollment	First-time candidates	School Name	Under-graduate enrollment	First-time candidates
	<b>University</b>			<b>Arizona</b>		

1	<b>of Phoenix</b>	253,594	496	<b>State U.</b>	54,277	724
2	<b>ITT Tech. Institute</b>	81,132	< 20	<b>U. of Central FL</b>	45,371	166
3	<b>Devry University</b>	80,813	258	<b>Penn State U.</b>	45,185	919
4	<b>Kaplan University</b>	74,566	22	<b>Ohio State University</b>	41,348	698
5	<b>Ashford University</b>	57,254	< 20	<b>Texas A&amp;M</b>	38,809	242
6	<b>Baker College</b>	42,831	26	<b>U. of Texas, Austin</b>	38,168	273
7	<b>Strayer University</b>	42,201	129	<b>Michigan State U.</b>	36,290	343
8	<b>Everest University</b>	37,784	< 20	<b>University of Florida</b>	33,628	272
9	<b>Liberty University</b>	36,053	62	<b>U. of Minnesota</b>	33,236	304
10	<b>Excelsior University</b>	30,543	120	<b>U. of Washington</b>	32,718	435
	<b>TOTALS</b>	<b>736,771</b>	<b>1,170</b>	<b>TOTALS</b>	<b>399,030</b>	<b>4,376</b>

Table 4 makes evident that while the ten largest *online universities* have nearly twice the full-time equivalent undergraduate enrollment as the ten largest *traditional classroom-based universities*, they have only about one-fourth the number first-time CPA events.

Finally, we caution against over-generalizing about the quality of online education from our results. In un-aggregated data, some *online universities* have higher than average CPA exam scores, and some *traditional classroom-based universities* have lower than average CPA exam scores. Delivery mode obviously is not the sole factor related to CPA exam success. Readers are encouraged to remember that individual differences in candidates exist at schools of both types, and may often be more determinative than educational delivery mode.

The correct interpretation of our main finding should be, on average, the CPA exam scores of graduates from *online universities* are lower than those of graduates from *traditional classroom-based universities*. Many exceptions to the average exist among the thousands of individual cases examined.

Finally, to summarize and repeat our main point one last time: our purpose has not been to describe causal relationships between educational delivery mode and CPA exam scores. Nor has our purpose been to develop and explicate a general theoretical model showing the nature of factors determining this relationship. Rather, our purpose has been to discover whether a systematic relationship exists between educational delivery mode (online or traditional) and average CPA exam scores, and if so, to understand the magnitude and direction of differences.

We believe this has been successfully accomplished. To the extent that higher than average CPA exam scores reflect higher quality accounting education, *online universities* are indeed associated with a somewhat lower quality accounting education.

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