

Is Student Performance on the Information Systems Analyst Certification Exam Affected By Form of Delivery of Information Systems Coursework?

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Abstract

In this paper, we compare the performance of Computer Information Systems (CIS) majors on the Information Systems Analyst (ISA) Certification Exam. The impact that the form of delivery of information systems coursework may have on the exam score is studied. Using a sample that spans three years, we test for significant differences between scores obtained on three of the areas of the ISA exam by CIS majors who completed the coursework via classroom delivery with those who completed the coursework via online delivery. Results from the study are analyzed and conclusions discussed. Opportunities for further study are proposed.

Keywords: online delivery, Information Systems Analyst Certification Exam, Core Information System Areas

1. INTRODUCTION

Third-party feedback is a fairly unbiased option for the assessment of academic programs. Our CIS program has been using the ISA exam (McKell et al 2005) for assessing our program outcomes and objectives for several years. While helping us meet the internal assessment expectations for programs offered at our institution, the ISA exam results are also used in our ABET (Accreditation Board for Engineering

and Technology) accreditation process. Further, students may benefit from the exam score as those scoring fifty percent or higher may attain professional certifications (ICCP 2011). As in the case at most institutions of higher learning, our CIS curriculum is delivered in a traditional classroom setting and, with a few exceptions, in an online format. Given the relevance that the ISA exam has in our program, we want to explore whether or not the type of delivery has an impact on the ISA exam score. The paper is

organized as follows. In the next section, we describe the ISA exam and its relationship to the Information Systems (IS) curriculum as required by ABET (2007). The next section describes the curriculum areas being considered and the study's methodology. Results are presented next. In the last section, results are discussed and conclusions offered.

2. THE INFORMATION SYSTEMS ANALYST EXAM

An important benefit from using the ISA exam for assessment purposes is that the exam content maps to the IS2002 model curriculum for undergraduate Information Systems education (Gorgone et al 2003). Further, there is a defined linkage between the IS2002 model curriculum learning units and the six IS core areas defined by IS curriculum ABET (2007) accreditation guidelines [Landry et al 2006], *i.e. hardware and software, modern programming language, data management, networking and telecommunications, analysis and design and role of IS in organizations* [ABET 2007]. Thus, ISA exam scores are useful for: 1) meeting institutional assessment requirements, 2) ABET accreditation of our program, and as indicated in the previous section 3) offering our students an opportunity to attain professional certifications.

The ISA exam is jointly administered by the office of the Institute for Certification of Computing Professionals (ICCP) and the Center for Computing Education Research (CCER) – a division of the ICCP Education Foundation. The ISA exam has been designed for graduating seniors from 4-year undergraduate Information Systems degree programs. A 50 percent or higher score in the approximately 3-hour long ISA examination (can be split into two 105 minute exams), plus an undergraduate degree, qualifies an individual to receive the title of ISA-Practitioner. A 70 percent or higher score is specified as ISA-Mastery level. A holder of the ISA certification is automatically enrolled into the ICCP Recertification program. When a student takes this examination at our College, they are given the option of paying for the credential right after the score is received and the examination is passed (50 percent or higher). The certificate is mailed to the student based on the ICCP receiving confirmation directly from our College of the student having graduated successfully from our CIS program. (ICCP 2011)

The exam-taking mechanics is as follows. The student first registers for the exam and receives a password. The exam is delivered over the internet to a proctored testing site. The exam requires about three hours to complete and includes 258 questions. The exam score is reported upon completion of exam. Table 1 shows a summary of exam results for our institution over the three-year period considered in this study (see appendix).

3. IMPACT OF TYPE OF DELIVERY ON ISA EXAM SCORES

Online delivery of courses has advantages and disadvantages. Working students can take an online course at times that are convenient to them, however online courses can be more difficult as seen by their higher dropout rates. Attrition rates are generally higher in courses delivered online. Terry (2001) reported higher attrition rates in Finance and Statistics online MBA courses (37%) versus Campus courses (17%). The dropout rate for one online MBA program as 43% compared to 11% for the campus based program (Patterson and McFadden 2009).

Online delivery is not always viewed favorably by students. Davis et al (2010) report that only 37% of students gave high rates of effective or vary effective to "pure online" courses, compared to 59% to "hybrid" and 76% for "on-ground with online supplements". There is also the question of whether all students are suited to succeed in online courses. For example, "Mid-range" students typically earn grades 10-15% lower in online courses (*Marold and Haga 2003*).

As indicated previously, most of our program is offered in an online format. We decided to investigate whether or not the type of delivery of the coursework has any impact on the ISA exam score. A sample of 131 students was used in our study over a three-year period. The average ISA exam score for the sample was 48.2 with a standard deviation of 12.3. The average student age was 30.1. The male/female ratio was 68%:32%.

Characteristics of our courses delivered online are as follows. Students complete similar or identical assignments as students taking the same course in a traditional classroom setting. Online students take all of their tests on campus.

Of the six IS core areas defined by IS curriculum ABET (2007) accreditation guidelines, we offer online versions of courses in the areas of *modern programming language, data management, and networking and telecommunications*, and thus our study will be focused only on those areas.

4. RESULTS

The authors first analyzed the overall ISA score compared to the total number of CIS courses the student completed online. Figure 1 shows a scatter plot of this comparison. A positive correlation of .267 (p-value=.002) indicates that students' overall ISA score actually increased with more classes taken online. The equation is $ISA\ score = 45.4 + 2.00\ number\ online$ ($R^2 = 7.1\%$).

A second analysis was run on the overall ISA score with just the required core classes in our CIS program. The core classes would logically be the ones that would have the largest impact on the ISA exam since the core classes cover required concepts for the IS 2002 model curriculum on which the ISA exam is based. Of the seven required core CIS classes, only five are offered online.

Figure 2 shows a scatter plot of the student's composite ISA score versus the number of core CIS courses taken online. Again, there was a positive correlation, which increased slightly to .271 (p-value=.002) indicating that students overall ISA score also increased with more of the core classes taken online. The equation is $ISA = 46.5 + 3.28\ number\ core\ online$ ($R^2 = 7.3\%$).

The analysis was next broken down by ISA exam sub-scores. For each sub-score, a t-test was run to determine if taking the course covering the majority of the material for that area was taken online or in the classroom. As indicated in the previous section, only the *modern programming language, data management, and networking and telecommunications* sub-scores were analyzed as the department does not offer online versions of courses in the other three ISA exam subcategories. These three courses are also required for the CIS major.

For the Programming Language sub-score, there were 12 students that completed our CIS 3145 – Business Application Development with Visual Basic course online, and 59 that completed the classroom version. The sample size is

considerable smaller for this test. This can be attributed to the fact that prior to the latest major curriculum revision, students had a choice of several classes to meet their programming requirement. Currently all students are required to take CIS 3145 - Visual Basic as part of the core. This course also tends to have a lower success rate and since students that did not successfully complete the course in the first attempt were again removed from the analysis, this likely contributed to the smaller sample size.

Table 2 summarizes the results. The online students mean was over six points higher than the classroom students, but the difference again was not statistically significant.

Table 2. Programming languages sub-score analysis

| Delivery | N | Mean | St dev. | t-test |
|-----------|----|------|---------|------------|
| Classroom | 59 | 40.7 | 13.5 | t= -1.05 |
| Online | 12 | 47.2 | 20.8 | p-val=.317 |

For the ISA Data Management sub-score, there were 18 students that completed CIS 3060 – Database Management Systems online, and 91 that completed the classroom version. Students that did not successfully complete the course in the first attempt were removed from the analysis. Table 3 summarizes the results. The online students mean was over 3 points higher than the classroom students, but the difference was not statistically significant.

Table 3. Data Management sub-score analysis

| Delivery | N | Mean | St dev. | t-test |
|-----------|----|------|---------|------------|
| Classroom | 91 | 47.1 | 14.5 | t= -1.12 |
| Online | 18 | 50.6 | 11.7 | p-val=.273 |

For the ISA Networking sub-score, there were 18 students that completed CIS 3230 – Networking and Telecommunications Systems online, and 90 that completed the classroom version. Students that did not successfully complete the course in the first attempt were again removed from the analysis. As shown in Table 4, the online students mean was over six points higher than the classroom students, but the difference was still not statistically significant.

Table 4. Networking sub-score analysis

| Delivery | N | Mean | St dev. | t-test |
|-----------|----|------|---------|-----------------|
| Classroom | 90 | 40.6 | 18.0 | t= -1.30 |
| Online | 18 | 47.2 | 19.8 | p-val. =.205 |

5. CONCLUSIONS

Based on the results obtained, no significant difference was observed between the ISA exam scores of those students who completed the coursework online and those who completed the coursework in a traditional classroom setting. This is an important preliminary finding on the comparability of online versus regular course delivery. We effectively used the ISA exam to show that student outcomes are being met with both delivery methods.

However, we could establish that there seems to be a small, but significant positive relationship between the number of courses taken by a student in an online format and his/her overall ISA exam score. This could be an indication that the skills needed to succeed in online courses are also useful for success in Information Systems.

O'Neil (2009) discusses the student characteristics in an online environment. This author used an 18 question checklist to compare students in three groups of students taking online courses: Seniors, Freshmen, and Freshmen in a "First-year Experience Campus". The last group is considered an 'unprepared' group. The unprepared group was more likely to say No to the questions:

- "I am not intimidated by using technology for learning",
 - "I am an independent learner", and
 - "I easily understand what I read".
- Both Freshmen groups were more likely to respond no to the questions:
- "I am a self-starter"
 - "I am open to working in an un-structured setting"

Seniors with more experience taking classes in general, and online courses in particular, will perform well in online courses because they have the skills to do so.

Student in our department can take online or regular classes and will self-select the type of course they prefer. Thus the students with the

skill to do well in an online course, independent, self-starters, able to read and learn in un-structured environments, and not intimidated by technology, should also do very well on the ISA exam.

Future studies can look at additional factors that lead to success in CIS programs and online courses, such as overall skill levels as measured by GPA scores, age, professional experience, motivation and learning styles. We can also look at the performance in the specific courses and in the corresponding ISA core area scores as they relate to the online and regular classroom delivery modes.

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Appendices and Annexures

Table 1
MSCD Exam Summary

| Core Area | # of Items | All Schools | MSCD |
|-----------------------------------|------------|-------------|------|
| Hardware and Software | 10 | 41.8 | 47.3 |
| Modern Programming Language | 12 | 40.9 | 44.8 |
| Data Management | 44 | 46.0 | 51.2 |
| Networking and Telecommunications | 12 | 45.1 | 45.3 |
| Analysis and Design | 108 | 47.5 | 51.2 |
| Role of IS in Organizations | 72 | 52.0 | 56.3 |
| | | | |

Figure 1. ISA score versus Number CIS courses taken online (r=.267, p=.002)

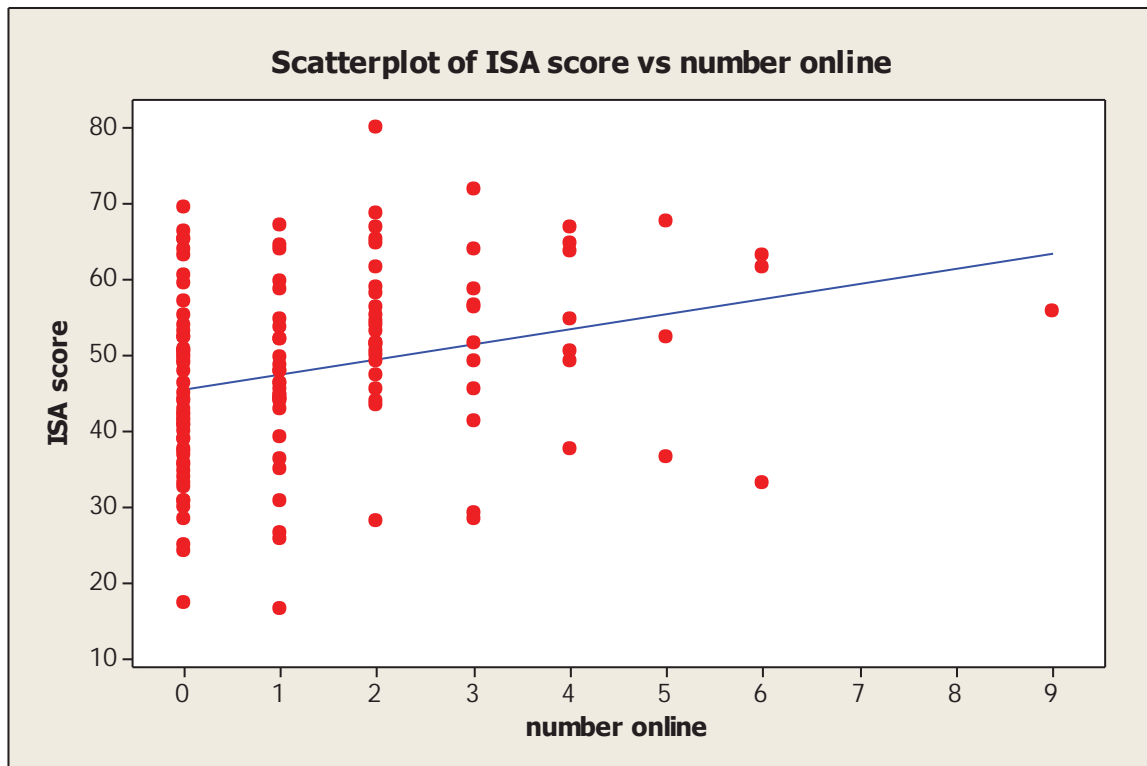


Figure 2. ISA score versus Number core CIS courses taken online ($r=.271, p=.002$)

