

CPAs' Use Of Accounting Information Systems Tools

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Abstract

This paper reports the results of a survey of CPAs, about half of whom are in public practice. The survey attempts to determine which applications and tools CPAs use most frequently, and their perceptions of future use of those applications and tools. Not surprisingly, spreadsheets and word processors are most widely used, followed by tax software. Beyond those basic applications, a substantial proportion of respondents reported regularly assessing controls and designing or modifying the design of accounting systems. Over 40 percent of respondents indicated they used relational data base systems, while flowcharts remain a popular documentation tool. Respondents thought that the performance of all the tasks and use of all the applications would either increase or remain the same in the future. Relational data base systems had the greatest expected increase in future use. Survey results indicate that CPAs not in public practice use some different skills than those in public practice. Thus, data are gathered about actual applications. These findings, in turn, have academic implications for programs that base curriculum decisions on the skills presumed to be practical.

Introduction

In an editorial in the *Journal of Information Systems* (1996, p. 83), then editor A. Faye Borthick promoted the benefit of accounting information systems (AIS) courses which contain learning activities reflecting what accounting professionals are actually expected to do. She wrote, "Indeed, one test of course content appropriateness is to ask whether professionals perform the task. If professionals perform the task, it may be appropriate subject matter for students too; if professionals are not likely to perform the task, then the task may not be appropriate for AIS courses." Consequently, we surveyed CPAs and asked how frequently they used accounting information system (AIS) applications or performed AIS tasks.

Readers with comments or questions are encouraged to contact the authors via email.

To assist educators, we also asked the CPAs whether they thought the use of that application or the performance of those systems tasks would increase, decrease, or stay the same in the future. We realize the limitations of relying too heavily on the future projections of practicing CPAs. CPAs may find it difficult to look beyond the day-to-day tasks in which they are deeply involved. Still, we believe that their projections may not necessarily be less valid than projections from academics who teach, but do not actually work with these tasks and applications.

We used the survey responses also to examine differences between groups of CPAs. We compared the CPAs' current use of the AIS applications or performance of AIS tasks, and their view of future use, based on: (1) time since they received their accounting education, (2) the num-

ber of AIS courses taken in college, and (3) employment in public accounting firms vs. other organizations. We found that some responses differed significantly between these groups.

Motivation

The driving motivation for the survey was to learn what applications and tasks CPAs, both within public accounting firms and in industry, use most frequently. Employers want new hires with many traits such as the ability to think critically and possessing excellent interpersonal and communications skills. They also want students from programs that provide the accounting-related knowledge and skills most commonly needed by accountants. The information from this survey, then, might assist AIS instructors in deciding what material should be covered in their classes. AIS instructors may find reasons to make some changes; alternatively, they may be assured that their coverage is appropriate. All classes are limited in how much material they may cover in the time period allowed. This is especially acute in accounting courses. Accounting professors in all classes must choose to cover or emphasize certain material and de-emphasize or omit other material.

We also were interested in the differences between groups of CPAs in their current use, and attitudes toward future use, of AIS technology and tasks. As mentioned previously, three different groupings were of interest to us: (1) time since those CPAs received their accounting education, (2) the number of AIS courses taken in college, and (3) employment in public accounting firms vs. other organizations. We next discuss motivation for examining these groups and expectations of differences between the groups.

Differences Due to Recency of College Education

A general perception exists in our society that older people are more resistant to technological change and innovation than younger people. *Computing Canada* (1999) reports that many technology workers will be phased out, fired, or passed over because of their age, but they are unlikely to be able to prove age discrimination.

Garner (1999) reports a 17% unemployment rate among IT workers over 50, while in all other U.S. industries workers over 50 have 2% unemployment. In addition, exposure to computers has increased substantially within the last decade. In 1987, 26% of college-bound seniors reported no computer experience compared to 9% in 1996 (Education Testing Service, 1997, p. 32).

We do not plan to determine whether age discrimination exists in the accounting profession related to AIS use or whether older workers are less likely to keep abreast of the latest innovations. However, the above statistics support the existence of different technology usage because of age. We use the number of years since respondents received their college degrees as a proxy for age.

AIS Courses Taken

Obviously, if college AIS courses are valuable, the number of courses taken could impact the type of AIS work performed by CPAs. We expect that the more AIS courses completed, the more likely CPAs will be involved with high-level AIS applications and tasks. "High-level" in this context refers to tasks beyond just working with spreadsheets, word processors, and tax software.

CPAs in Public Accounting versus Other Organizations

In addition, we are interested in whether CPAs working in public accounting differ from those working outside public accounting. We would particularly expect that accountants in CPA firms would more frequently use tax software than those working in other organizations. We would also expect a difference between the responses related to some other tasks listed in our survey, but would not hypothesize a directional difference. Perhaps CPAs in industry would use relational database systems and similar applications more frequently than CPAs in public accounting firms. Both the Institute of Management Accountants (Gary Siegel Organization, 1999) and the American Institute of Certified Public Accountants (1999) have stressed the need for in-

created systems education in their discussions of required knowledge, skills, and abilities for new professionals. However, their recommendations are too general to provide us with specific suggested differences between CPAs employed in public versus private organizations.

We view potential differences in responses between CPAs by employment group as interesting because accounting departments at many universities rely heavily on accountants at CPA firms to advise them on curriculum and topic coverage decisions. Finding differences in responses between these groups would indicate that schools should exercise caution not to rely too heavily on CPAs in one employment group. As stated above, the Institute of Management Accountants (Gary Siegel Organization, 1999) recently released a study detailing the work of management accountants. While more general than this survey, it can be used in conjunction with this study to plan future course coverage.

Research Methods

Sample

The AICPA provided us with a randomly selected sample of 250 members employed in public accounting and 250 employed in other areas. We gratefully acknowledge the AICPA's assistance in this survey. Our sample may not be ideal because not all graduating accounting majors join the AICPA or become CPAs. Certainly, fewer than 50% of accounting graduates work in public accounting. (Currently, only 39.5% of all AICPA members work in public accounting.) However, the AICPA provided us with access to the best randomly selected national sample of practicing accountants we could obtain. With 202 usable surveys returned, we attained a response rate of 40.4%.

Survey

Prior to the national mailing, we conducted a small pretest with board members from the local chapter of the Institute of Management Accountants, and then a larger mail survey with a sample from CPAs licensed in one state. The na-

tional survey was conducted in the spring of 1999 and asked for general background information such as: type of degree earned, year the degree was earned, type of employment, and number of systems classes that the person had taken while in college. The questions on the survey asked how frequently they used certain systems applications, and performed certain AIS-related tasks. The respondents were asked to indicate whether they used the application or performed the task daily, weekly, monthly, quarterly or not at all. Then on a three-point scale, respondents were asked whether they thought the frequency of use of the application or performance of the task would increase, stay the same, or decrease in the future. A copy of the survey is available from the authors.

Analysis

We examined descriptive statistics from the overall sample to determine which AIS applications or tasks CPAs were using or performing most frequently. We used contingency tables and chi-square statistics to test for significant differences between groups of accountants. We sorted the responses into groups, constructed contingency tables for each question, and determined whether the chi-square statistic indicated a significant difference between the groups. (Occasionally a respondent would neglect a question necessary for group classification.) To compare responses of groups on the questions of the frequency of use of an application or performance of a task, we developed two-by-five contingency tables. For questions regarding expectations of future use of the application or performance of the task, two-by-three contingency tables were constructed.

We sorted the respondents by year of graduation. To obtain a large enough group of relatively recent graduates, we compared the 53 respondents obtaining their degree in 1989 or later, to the 78 respondents obtaining their degrees in 1981 or earlier. We omitted from this analysis CPAs who obtained their degrees from 1982 to 1988 or did not indicate a graduation date. We believe that comparing only the most recent to the most distant graduates could best isolate differences caused by timing of education.

We also used contingency tables for comparisons of other CPA groups. We sorted the 194 respondents that indicated the number of AIS courses taken and compared responses from the 111 CPAs who had completed none or one AIS course to responses from the 83 CPAs who had completed two or more AIS courses. Likewise, we sorted the 197 respondents that indicated current employment area and compared responses from the 106 CPAs employed in public accounting to those from the 91 CPAs employed outside public accounting.

Results

Overall Sample

As previously stated, we received 202 usable surveys from CPAs currently employed, a 40.4% response rate. (Not all respondents answered all questions.) Our initial aim of the survey was to assess which applications CPAs were currently using, what related tasks they were performing, and their view of the future use and performance of these applications and tasks. This information should assist in structuring topic coverage for undergraduate AIS courses. Table 1 summarizes the results by listing the percentage of respondents who indicated that they performed the tasks daily or weekly, monthly or quarterly, or not at all. (The table is in sequence by applications or tools used by the most respondents.)

The table reveals that almost all CPAs used the basic computer information programs frequently: 93% used electronic spreadsheets and

Table 1
Descriptive Statistics - Current Use or Task Performance

Application or Task	Percent Using or Doing Daily or Weekly	Percent Using or Doing Monthly or Quarterly	Percent not Using or Doing at all
Electronic Spreadsheets	93	5	2
Word Processor	93	5	2
Assessing Controls	19	52	29
Designing or Modifying the Design of an Accounting System	11	56	33
Tax Software	44	17	39
Using a Relational Data Base System	21	20	59
Preparing or Interpreting Flowcharts	7	33	60
Preparing or Interpreting Data Flow Diagrams	6	28	66
Participating in the Design of a Computer Network	2	28	69
Preparing or Interpreting Record Layouts or Data Dictionaries	9	21	70
Managing System Development Projects	6	21	73
Preparing or Interpreting Other Forms of Systems Documentation	7	17	76
Using Human Information Processing Concepts to Design Reports	4	19	77
Using or Designing a Decision Support System	7	14	79
Preparing or Interpreting Data Models	3	11	86
Using or Designing an Expert System	2	6	92
Coding in a Programming Language	2	2	96

word processors at least weekly. Sixty-one percent of the respondents were using tax software at least quarterly. Likewise, 71% and 67% of the respondents, respectively, were, at least quarterly, assessing controls or designing or modifying the design of accounting systems. Current involvement in the other areas was less widespread. Only 41% or fewer of the respondents performed any of the other tasks or used the other AIS applications. Particularly, only 8% ever use or design an expert system, and only 4% code in a pro-

gramming language.

Table 2 summarizes the responses by percentage that believe that their performance of the task or use of the application will increase, decrease, or remain about the same, in the future. (The table is in sequence by applications or tools expected to increase in use.) A majority of respondents thought the future would include about the same frequency of use for each task or application. But in all cases, more respondents believed these tasks and applications would increase rather than decrease in the future. Notably, 41% and 38% of the respondents thought that use of a relational data base system and participation in the design of a computer network, respectively, would increase in the future.

These results have implications for AIS classes. Apparently, very little in the current AIS subject domain can be eliminated from the curriculum based on respondents' view of the future. However, as students bring more basic knowledge (e.g., spreadsheet and word processing skills) in with them into upper-level courses, the AIS course can focus on topics like relational data base systems and network design. In the future, many accountants might well be expected to contribute in these newer areas.

Omitted questions from the survey may indicate unfamiliarity with the various AIS terms included in the questions. Table 3 lists the frequency that questions were not answered by one of the 202 respondents. Table 3 results do not indicate that a large number of respondents omitted any questions about current use. However, substantially more respondents omitted questions about their future perceptions of use. (Our analysis comparing groups produced the same results

Table 2
Descriptive Statistics – View of Future

Application or Task	Percent Future Increase	Percent Future Decrease	Percent Future Same
Using a Relational Data Base System	41	1	58
Participating in the Design of a Computer Network	38	4	58
Assessing Controls	36	3	61
Electronic Spreadsheets	36	4	60
Designing or Modifying the Design of an Accounting System	35	4	61
Using or Designing a Decision Support System	34	1	65
Word Processor	34	5	61
Managing System Development Projects	32	2	66
Using or Designing an Expert System	31	1	68
Using Human Information Processing Concepts to Design Reports	31	2	67
Preparing or Interpreting Record Layouts or Data Dictionaries	29	2	69
Preparing or Interpreting Data Flow Diagrams	29	3	68
Preparing or Interpreting Flowcharts	29	4	67
Tax Software	27	4	69
Preparing or Interpreting Other Forms of Systems Documentation	25	3	72
Preparing or Interpreting Data Models	22	2	76
Coding in a Programming Language	10	3	87

as those reported below when we assumed that an omitted question indicated no current use or an expectation of no change in future use.)

Comparisons of CPA groups

Graduation date

Responses based on recency of graduation indicate few significant differences. Only the perception of future use of electronic spreadsheets and current preparation or interpretation of other

forms of systems documentation varied significantly on this classification. Table 4 presents these contingency tables.

The perception of future use of electronic spreadsheets differed mainly because three post-1988 graduates thought that spreadsheet use would decline in the future. Post-1988 graduates currently prepare or interpret other forms of sys-

tems documentation significantly more frequently, and more on a daily basis, than earlier graduates. Respondents who use "other forms of systems documentation" were asked to specify the form. Among those who answered, the overwhelming majority indicated that they were referring to manuals or other narrative documentation of systems.

AIS courses completed

Our analysis indicates only one significant difference between responses from CPAs grouped by the number of AIS courses completed. CPAs completing two or more AIS courses manage system development projects significantly more frequently than CPAs who completed fewer than two AIS courses. Answers for this question are not surprising, because the phases of the systems development life cycle are frequently a topic in AIS courses, and rarely discussed in other courses. Also, managing system development is a rather "high-level" task. Table 5 reports the contingency table for this question.

On the other hand, explaining the absence of differences in responses to other applications and tasks that could demand high-level AIS skills requires more speculation. Reputations and capabilities in these other areas may be influenced more by experience and training programs completed on the job rather than by academic preparation.

Employment area

Comparing CPAs by employment groups produced significant differences to the most questions and perhaps the most interesting results. Obviously, CPAs in public accounting used tax software significantly more frequently than CPAs outside of public accounting. Tables 6 and 7 show summaries of the responses side by side for both employment groups for each question and indicate where responses differ significantly between the groups.

As reported in Table 6, CPAs not in public accounting perform or use the following five high-level AIS tasks or applications significantly

Table 3
Number of Omitted Answers of 202 Respondents

Application or Task	Current Use	Perception of Future Use
Electronic Spreadsheets	0	2
Word Processor	0	2
Assessing Controls	1	7
Designing or Modifying the Design of an Accounting System	0	6
Tax Software	3	9
Using a Relational Database System	2	20
Preparing or Interpreting Flowcharts	1	10
Preparing or Interpreting Data Flow Diagrams	3	13
Participating in the Design of a Computer Network	4	17
Preparing or Interpreting Record Layouts or Data Dictionaries	2	10
Managing System Development Projects	6	21
Preparing or Interpreting Other Forms of Systems Documentation	12	31
Using Human Information Processing Concepts to Design Reports	13	28
Using or Designing a Decision Support System	5	23
Preparing or Interpreting Data Models	5	16
Using or Designing an Expert System	9	23
Coding in a Programming Language	3	24

Table 4
Recency of Graduation

Panel A: Electronic Spreadsheets, Future

Grad. Date	Increase	Decrease	Same	Totals
Pre-1982	34	0	44	78
Post-1988	15	3	35	53
Totals	49	3	79	131

$\chi^2 = 6.87^{\#}$

Panel B: Preparing or Interpreting Other Forms of Systems Documentation, Currently

Grad. Date	Daily	Weekly	Monthly	Quarterly	Not at all	Totals
Pre-1982	50	18	5	2	3	78
Post-1988	46	7	0	0	0	53
Totals	96	25	5	2	3	131

$\chi^2 = 10.62^*$

[#]Significant at .05, with 2 degrees of freedom.

*Significant at .05, with 4 degrees of freedom.

Table 5
Number of AIS Courses Completed

Managing System Development Projects, Currently

AIS Courses	Daily	Weekly	Monthly	Quarterly	Not at all	Totals
< 1	3	2	3	11	92	111
> 2	4	2	9	19	49	83
Totals	7	4	12	30	141	194

$\chi^2 = 14.98^{\circ}$

^oSignificant at .01, with 4 degrees of freedom.

more frequently than CPAs in public accounting:

- Preparing or Interpreting Other Forms of Systems Documentation,
- Using a Relational Data Base System,
- Using or Designing a Decision Support System (DSS),
- Participating in the Design of a Computer Network, and
- Managing System Development Projects.

CPAs who are not in public practice thus appear to use a wider variety of systems skills. For example, they may well be using a relational data base system to provide their information customers with reports based on data stored in tables. They may be members of the team designing the company's computer network. Also, they may be responsible for the development of the company's accounting system.

Table 7 indicates that CPAs in public accounting are more likely to believe that their Assessing Controls and Preparing or Interpreting Other Forms of Systems Documentation will increase in the future. As stated in the discussion above about Table 4, respondents were asked to specify which of the "other forms of systems documentation" they were contemplating. All of the CPAs in public practice who responded to this request specified manuals or other

narrative documentation. Only among those not in public practice was there some variation, such as process mapping or conceptual designs. CPAs in public practice may be contemplating a future of more time spent reviewing narrative documentation of their clients' systems.

The differences in responses indicate that, when obtaining input for curriculum and topic coverage decisions, accounting educators should request input from a wide range of accountants, not just those employed at CPA firms. Schools that send most of their graduates to work in CPA firms may want to rely solely on accountants in CPA firms for direction on coverage in the AIS class. However, schools in which a lower percentage of graduates begin work at CPA firms could rely more heavily on accountants outside public accounting for input.

Table 6
Descriptive Statistics – Current Use or Task Performance
CPAs in Public Accounting versus CPAs Outside of Public Accounting

Application or Task	In PA Percent Daily or Weekly	O/S PA Percent Daily or Weekly	In PA Percent Monthly or Quar- terly	O/S PA Percent Monthly or Quar- terly	In PA Percent None	O/S PA Percent None	
Electronic Spreadsheets	91.5	96.7	4.7	2.2	3.8	1.1	
Word Processor	94.3	93.4	3.8	5.4	1.9	1.1	
Assessing Controls	20.8	18.5	51.9	50.0	27.3	31.5	
Designing or Modifying the De- sign of an Accounting System	7.6	15.0	54.3	57.0	38.1	28.0	
Tax Software	70.5	12.2	12.4	22.2	17.1	65.6	**
Using a Relational Data Base Sys- tem	12.3	32.2	17.0	21.1	70.7	46.7	**
Preparing or Interpreting Flow- charts	5.7	7.6	30.5	37.0	63.8	55.4	
Preparing or Interpreting Data Flow Diagrams	5.7	6.6	21.9	34.1	72.4	59.3	
Participating in the Design of a Computer Network	0.0	5.6	22.9	34.8	77.1	59.6	*
Preparing or Interpreting Record Layouts or Data Dictionaries	6.7	10.9	17.3	26.1	76.0	63.0	
Managing System Development Projects	1.0	11.1	11.6	33.3	87.4	55.6	**
Preparing or Interpreting Other Forms of Systems Documentation	4.0	11.6	14.0	20.9	84.0	67.5	*
Using Human Information Proc- essing Concepts to Design Reports	3.0	4.8	15.8	23.8	81.2	71.4	
Using or Designing a Decision Support System	1.9	13.2	10.7	18.7	87.4	68.1	**
Preparing or Interpreting Data Models	2.9	3.3	6.8	14.5	90.3	82.2	
Using or Designing an Expert Sys- tem	2.0	1.1	2.9	9.1	95.1	89.8	
Coding in a Programming Lan- guage	1.9	2.2	1.0	3.3	97.1	94.5	

*Significant difference between groups at p-value $\leq .05$.

**Significant difference between groups at p-value $\leq .01$.

Further Analysis

We also conducted analyses to test for interaction effects. We found no evidence that reported results were affected by interaction between any of the factors we used to group the CPAs for comparison purposes.

Conclusion

We surveyed CPAs to determine which AIS skills and applications are most frequently used and appear to be important for the future. We conducted the survey to substantiate the validity of topics taught in AIS courses. Survey results indicate that very little can be eliminated

Table 7
Descriptive Statistics – Future Perception of Use or Task Performance
CPAs in Public Accounting versus CPAs Outside of Public Accounting

Application or Task	In PA Percent Increase	O/S PA Percent Increase	In PA Percent Decrease	O/S PA Percent Decrease	In PA Percent Same	O/S PA Percent Same
Electronic Spreadsheets	41.0	28.6	1.9	5.5	57.1	65.9
Word Processor	38.1	28.6	1.9	8.8	60.0	62.6
Assessing Controls	42.6	28.9	1.0	5.6	56.4	65.5
Designing or Modifying the Design of an Accounting System	36.6	33.0	3.0	6.6	60.4	60.4
Tax Software	32.3	20.7	2.9	4.6	64.7	74.7
Using a Relational Data Base System	41.5	38.8	1.1	1.2	57.4	60.0
Preparing or Interpreting Flowcharts	33.3	22.5	5.1	3.4	61.6	74.1
Preparing or Interpreting Data Flow Diagrams	34.3	23.0	3.0	2.3	62.6	74.7
Participating in the Design of a Computer Network	40.0	36.1	1.1	5.8	58.9	58.1
Preparing or Interpreting Record Layouts or Data Dictionaries	29.3	28.1	2.0	2.2	68.7	69.7
Managing System Development Projects	29.3	37.2	1.1	2.3	69.6	60.5
Preparing or Interpreting Other Forms of Systems Documentation	27.6	20.0	0.0	6.2	72.4	73.8
Using Human Information Processing Concepts to Design Reports	31.2	30.8	1.1	3.8	67.7	65.4
Using or Designing a Decision Support System	31.9	37.6	0.0	2.4	68.1	60.0
Preparing or Interpreting Data Models	22.9	22.1	1.0	2.3	76.1	75.6
Using or Designing an Expert System	27.2	36.9	0.0	1.2	72.8	61.9
Coding in a Programming Language	9.8	10.9	3.2	3.6	87.0	85.5

*Significant difference between groups at p-value $\leq .05$.

from the curriculum. Spreadsheets and word processors remain widely popular tools, but obtaining these skills should probably be required before students enter AIS. Over two-thirds of our respondents were involved in assessing controls and designing or modifying the design of an AIS. Also, almost all CPAs predicted no decreases in the future use of any AIS tasks. However, the most respondents predicted increases for use of relational data base systems and in the design of computer networks.

CPAs use significantly different applications depending on whether or not they are in public practice. CPAs in public practice are more

likely to be using tax software and expect to spend more time reviewing clients' system documentation. On the other hand, those not in public practice are more likely to be using a relational data base system, using a decision support system, participating in the design of a computer network, or managing a system development project.

The above finding may have relevance for academic programs which have specific tracks of study designed for public accounting or industry. The significant differences between responses from CPAs in public practice and those working for other organizations also indicate that

developers of accounting curricula should perhaps be cautious when seeking input from practicing CPAs. Programs that send graduates to diverse types of employers should not rely solely on input from CPAs in public practice when making curriculum decisions.

We can see several directions for further study. First, it would be useful to survey accountants in industry who chose not to pursue the CPA certification. Their responses could be compared to the CPAs' responses to identify any significant differences. Second, further study might explore the capacity in which CPAs use some of the AIS tools. For example, do CPAs design and construct, or merely use relational database systems and decision support and expert systems? The depth in which these topics are discussed in class could differ depending on the answer to that question. Based on results from our survey, accounting graduates should find useful: an evaluative level of knowledge for controls and systems design, an application level, or higher, knowledge of relational data bases, and, increasingly, the ability to participate in the design of networks.

Suggestions for Future Research

Further research could investigate the depth of the use of some of these tools. For example, are CPAs actually designing relational databases, or are they using them for ad hoc querying, or merely for data entry? The same types of questions could apply to use of decision support systems and expert systems. To focus more on skills required of new hires, the survey could be extended to a larger sample of more recent graduates. Comparison with recent graduates who choose not to pursue the CPA certification is another possibility for future research. ☞

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