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The results of the survey confirm the results of previous surveys such as those conducted by the IMA [1996] which indicate that spreadsheet applications are the most important skill utilized by accountants.

A large number of respondents also indicated the desire for accounting students to possess a minor in computer information systems. It would seem from these results that students can increase their desirability for employers by getting competency in information systems in addition to a basic degree in accounting. As the business environment continues to change, so does the role of the accountant and the information systems that they use.

It is fair to conclude that accountants have been widely affected by the use of technology in the business arena. As the business environment changes, the role of the accountant changes as well. With the ever-changing technology that we have today, accounting students need to be prepared to acquire technological know-how. Students will not only need to possess general accounting skills but also general computer knowledge. Also, anyone planning to go into the accounting field would have to be able to adapt well to technology because technology is dramatically impacting this field. The implication of this study for educators designing accounting curricula is that they should teach students the computer skills needed by industry. Educators should ensure that the accounting courses that students are required to take include the computer skills that will make accounting graduates desirable to industry. This seems to be taking place as shown in Table 9 above.

Students who do not possess computer skills will not be able to fulfill the roles and expectations that are placed upon them by employers.

Table 9		
Computer Applications Taught in Accounting Courses		
Application	**Frequency**	**Percentage**
Spreadsheets	241	25.6%
Word-Processing	183	19.4%
Database	45	4.8%
Graphics	30	3.2%
Decision Support	8	.84%
Flowcharting	52	5.5%
E-Mail	83	8.8%
Accounting General Ledger	63	6.7%
Statistical	7	.7%
Internet Search	141	14.9%
Web Design	21	2.2%
Enterprise Resource Management	10	1%
Tax Software	41	4.3%
Auditing Software	14	1.4%
Languages	3	.31%
Total	942	100%

CONCLUSION

The survey results indicate that employers desire accounting graduates who have computer knowledge. The results show that both small and large companies seek accounting graduates who possess a fairly good understanding of computer application programs. The results also indicate that most employers provide training in computer applications.

A large number of respondents indicated that accountants in their companies were using spreadsheet applications. This would indicate that students who do not possess spreadsheet knowledge would be at a disadvantage. Other technological skills such as knowledge of database applications were also desired. These results indicate that potential employers not only expect graduates to be proficient in basic computer applications such as spreadsheets, word processing and databases but also they seek those students who are proficient in more sophisticated systems such as ERP, general ledger and industry specific software. The results also express the growing need for colleges and universities to update their own curriculums to reflect the changing needs of the employers. This would mean that aside from the basic programs that are taught, there need to be additional classes offered to students where they can learn the programs being used in industry.

as would be expected, due largely in part to the increased use of technology. Nowadays companies seek students who are not only accounting but also computer literate. It is students who possess both these qualities, who will gain that competitive edge.

Table 8 presents the answers that respondents gave when asked if there was on the job training for computer application programs used by the company. The table indicates that the great majority (83%) of companies offer such training courses and only 11% do not offer training. The fact that such a large number of companies offer training indicates the value that companies place on having computer literate employees. The reason for the 11% who do not offer on the job training might be either that those companies use simple spreadsheet, word processing and database applications for which no extensive training is needed or that they do not possess the resources to offer training to their employees. The 83%, who do offer training, might be using more sophisticated computer software. These programs require understanding and training beyond what is taught at the schools.

Table 8		
Training Programs in Computer Applications		
Training	Frequency	Percentage
Yes	80	83.33%
No	11	11.46%
Don't know	2	2.08%
Did not Answer	3	3.13%
Total	96	100.00%

A companion survey to this study, Salimi (2002) [10] was done to survey accounting instructors in the USA to determine the computer applications being taught to accounting students. A table from this study is presented below as Table 9. The table indicates that Spreadsheets were the most common applications used in accounting courses followed by Word Processing, Internet Search, E-Mail, Flowcharting and Database. More sophisticated applications such as Enterprise Resource Planning, Tax and Auditing software were also taught but less frequently. This indicates that accounting instructors are providing students with the required skills to meet the needs of industry. Students are being exposed to basic computer skills such as spreadsheets. More sophisticated applications are being taught to a lesser degree. In the future accounting instructors may have to increase the amount of sophisticated computer skills being taught to students in response to the demand from industry.

importance in companies. ERP and knowledge of general ledger packages were rated next and were about equally desirable. This reflects the growing sophistication and use of computers in the accounting function. An understanding of the internet, web searching, and e-mail was also considered important reflecting the growing importance of the internet and online communication. Programming skills were the last of the desirable skills mentioned by respondents.

Table 6		
Computer Skills desired in New Accounting Graduates		
Skills	Frequency	Percentage
Spreadsheet	41	24.85%
Database	25	15.15%
General Computer knowledge	19	11.52%
Word processing	18	10.91%
Understand Networks	16	9.70%
Presentation	10	6.06%
ERP knowledge	9	5.45%
General ledger accounting software	9	5.45%
Web search, e-commerce, internet	7	4.24%
Email	6	3.64%
Programming skills	5	3.03%
Total	165	100.00%

Table 7 presents the responses regarding the desirability of students with minors in computer information systems. An overwhelming 66% of employers desired students to possess not only a degree in accounting but also a minor in computer information systems. From the results it can be concluded that although companies ask for at least general computer knowledge, a large number want those who have additional education in computer information system. This is,

Table 7		
Increased Desirability of Students with Minors in Computer Information Systems		
	Frequency	Percentage
Yes	63	65.63%
No	18	18.75%
Maybe	12	12.50%
Did not answer	3	3.13%
Total	96	100.00%

graduates possess a high level of proficiency with spreadsheets due to the numerous spreadsheet projects assigned in accounting courses.

Other programs such as database, word processing, ERP systems and general ledger packages were also ranked high on the list of computer applications employed. These results also indicate that in addition to basic office software, general ledger and ERP packages are also being extensively used. It would be beneficial for students to be educated on the software that companies are using.

Table 5		
Computer Applications used by Accountants in companies		
Computer tools	Frequency	Percentage
Spreadsheet	79	21.47%
Database	49	13.32%
ERP system software:	45	12.23%
Word processing	44	11.96%
General ledger package	41	11.14%
Email	20	5.43%
Presentations	19	5.16%
Industry specific software	17	4.62%
Audit software	16	4.35%
Fixed Assets	16	4.35%
Other	22	5.98%
Total	368	100.00%

Table 6 presents the computer skills desired in new accounting graduates. A great number of respondents (25%) picked spreadsheet knowledge as a desired skill. This again can be explained by the extent to which accountants use spreadsheets to analyze and present information. Database knowledge was rated second after spreadsheets as a desired skill. Accountants are constantly asked to provide information expediently and with database systems they can pull up virtually any information requested.

General computer knowledge was rated third by respondents. With this technologically advanced era we have embarked upon, computer knowledge is essential, and if the student does not possess that general knowledge, the chances of succeeding diminish dramatically.

Word processing software was rated fourth emphasizing the importance of written communication in business. Understanding of computer networks was rated fifth. Presentation software was rated next highest emphasizing its

Table 3 presents the different types of industries that were represented as well as the number of respondents for each. The results indicate that many respondents to the survey (31%) were from manufacturing and process industry. Another 17% were from the wholesale/retail industry and 16% from business services such as consulting. About 10% of the respondents worked in financial services or accounting firms. Thus the respondents came from a wide cross-section of industry. This information is valuable because even if recent graduates work for accounting firms, whether it be in the auditing, taxation or consulting area, they find themselves dealing with clients in these industries. The manufacturing, wholesale, retail business services and other industries are attractive to those students interested in private rather than public accounting.

Table 4 presents the position of the respondents to the survey. The results indicate that most of our respondents held influential positions in their respective companies. From the study, we see that close to 59% of the respondents held very high positions within the accounting/finance function of the organization. Another 15% were high-level executives at the CEO level or close to the CEO level. With this information we can conclude that the people who responded to this survey are very much the same people who are influential in the hiring for accounting positions industry.

Table 4		
Position of Respondent		
Categories	**Frequency**	**Percentage**
Financial / Accounting (CFO, Controller)	74	58.73%
Executive (CEO, COO, President, Vice-President, Owner, Partner, etc.	19	15.08%
Systems Analyst / Programming / Computer Systems Management / Audit management	18	14.29%
Sales / Marketing / Distribution	8	6.35%
Other	7	5.55%
Total	126	100.00%

Table 5 presents information about the computer applications currently being employed by accountants in industry. The greatest number (21%) of respondents indicated that spreadsheets were being widely used. This is justified by the use of spreadsheets for cash management, inventory, budgeting, forecasting and numerous other uses in companies. Fortunately most accounting

Table 2		
Company Size in terms of Revenue		
Range	**Frequency**	**Percentage**
1. Less than $1,000,000	11	11.46%
2. $1,000,000 – 5,000,000	5	5.21%
3. $5,000,000 – 10,000,000	6	6.25%
4. $10,000,000 – 25,000,000	7	7.29%
5. $25,000,000 – 50,000,000	9	9.38%
6. $50,000,000 – 100,000,000	8	8.33%
7. $100,000,000 – 500,000,000	17	17.71%
8. $500,000,000 – 1,000,000,000	3	3.13%
9. More than $1,000,000,000	24	25.00%
Did not answer	6	6.25%
Total	96	100.00%

Table 2 presents the company size of respondents, in terms of revenue. The results indicate that 25% of the respondents came from companies whose annual revenues were more than $1,000,000,000. This might explain the high use of advanced computer applications such as ERP software by the respondents. These programs are expensive to buy and implement and only companies with large technology budgets can afford such software.

Due to the healthy revenues and employee size of our respondents it is fair to say that many accounting graduates would seek employment with these same firms. Therefore, it would behoove graduates to know what it is these employers expect of them and attain the level of competency desired by them.

Table 3		
Industry category		
Categories	**Frequency**	**Percentage**
Manufacturing and Process Industry	41	31.06%
Wholesale / Retail / Distribution	23	17.42%
Business Services / Consultant	16	12.12%
Finance / Accounting / Banking	14	10.61%
Real Estate / Legal	11	8.33%
Research and Development	10	7.58%
Computer Manufacturer / Computer Retailer / Wholesaler / Distributor	8	6.06%
Other	9	6.83%
Total	132	100.00%

A focus group consisting of executives on the advisory council of an accounting department at a California university was initially used to gather information regarding the technological competencies desired of accounting graduates. The findings from the focus group were then used to develop a questionnaire, which was mailed to accountants working in industry.

The questionnaire elicited demographic information about the respondents. The questionnaire then asked about the type of computer programs used by accountants in the respondent companies and what technological skills would assist a graduating accounting student in being hired. The survey also asked whether the company offered computer training to newly hired accountants and in what areas. The questionnaire was mailed to a random sample of 350 accountants working in industry in September 2001. These accountants were chosen at random from a listing of Certified Management Accountants working in the USA. There were 96 responses received giving a response rate of about 27%.

RESULTS

Table 1 presents descriptive information regarding the size, in terms of people, of the companies surveyed. Respondents to the survey came from industry; neither large nor small companies were over or under represented. As can be seen from the table about 75% of the respondents came from companies with from 100 to 10,000 employees. About 10% of the responses came from companies with less than 100 employees and about 15% from companies with more than 10,000 employees. Thus there is a good cross-section of small and big companies in the sample thus providing a basis for finding out the technological competencies desired in new accounting graduates by a wide range of companies.

Table 1		
Company Size in terms of People		
Size	Frequency	Percentage
1 – 100	3	9.38%
101 – 500	9	28.13%
501 – 1000	4	12.50%
1,001 – 5,000	6	18.75%
5,001 – 10,000	5	15.63%
10,001 – 50,000	3	9.38%
50,001 – 100,000	1	3.13%
More than 100,000	1	3.13%
Total	32	100.00%

much of what accountants do obsolete and the demand for the traditional work of accountants, audit and tax, has decreased.

Davis [1999] found that computer literacy requirements for all job levels increased dramatically over a three-year period in the early nineties. However they also found that recent college graduates lack computer-literacy skills. This situation is also true in the accounting profession.

A study sponsored by the IMA and the FEI titled What Corporate America wants in Entry-Level Accountants (1994) studies the needs of industries. This study reports that more than two-thirds of America's accounting graduates work for corporations. The survey found that the Accounting Knowledge Skills Areas (AKSA's) considered most important by corporations include Information Systems Design. The study also found that there was a big preparation gap in this area between expected versus actual preparation of college graduates.

The IMA has also published a study titled The Practice Analysis of Management Accounting (1996). The study found that among the most important Knowledge Skill Areas (KSAs) for work were the use of computerized spreadsheets and the use of computerized accounting systems. These KSA's were also among the highest ranked for entry-level accountant's competencies.

Elliott (2000) describes the CPA of the future as a "person skilled in information leveraging, someone who helps individuals and organizations achieve their objectives through the strategic use of information and information systems." This emphasizes the fact that accountants will have to be familiar with Information Technology (IT).

The AICPA annually identifies the top ten technologies for each year. These are the technological skills accountants should be familiar with. The use of XML (EXtensible Markup Language), which is included in the top technologies, is particularly important for accountants (Fedorowicz, 2000). XML and its offshoot, XBRL (EXtensible Business Markup Language) will revitalize financial reporting, especially over the Internet. XML provides a framework within which data from any type of source can be communicated and understood by any other system, independent of technology platform. It will be important for accountants to be familiar with this language in the future because when vast amounts of data can be shared easily, the issue of data integrity and auditing becomes a bigger challenge and takes on a new role.

METHODOLOGY

This study reports the results of a survey of accountants in industry regarding the desired technological competencies for recent accounting graduates.

academic preparation today must include increasing amounts of information technology training. They also concluded that all professional accountants must acquire an essential body of IT knowledge. The AICPA committee published five categories of General Information Technology Information Requirements. These are 1. Information Technology Concepts for Business Systems, 2. Internal Control in Computer Based Business Systems, 3. Development Standards and Practices for Business Systems, 4. Management of IT Adoption, Implementation and Use and 5. Evaluation of Computer Based Business Systems.

The AICPA's Core Competency Framework for Entry into the Accounting Profession also stresses the need for accountants to be familiar with technology. Under the category of Functional Competencies the framework mentions the need for accountants to be able to access electronic databases, assess the risk of technology and automated business processes, use technology to assess and control risk and document work performed and build appropriate models and simulations using electronic spreadsheets.

The 2000 Salary Guide published by Robert Half [2000] states that while a few years ago accountants with solid spreadsheet skills were considered highly marketable, companies today are seeking much more advanced technological capabilities in their accounting staff. Proficiency with the latest spreadsheet software is critical and knowledge of database applications is becoming increasingly important. Businesses undergoing financial systems conversions and upgrades require accounting professionals with direct Information Technology (IT) experience. Demand for IT skills is expected to escalate as more firms examine e-commerce possibilities and use increasingly sophisticated software to exchange financial information internally and externally.

A survey commissioned by Robert Half International [2000] found that 52% of 1,400 chief financial officers (CFO's) polled said that information technology training will be the first priority in supporting the professional development of their accounting staff in the next two years, versus 22 percent who plan to invest in traditional financial skills development.

The Journal of Accountancy (2000) reports the results of a survey of 400 companies describing the personal and business skills accountants and finance professionals can acquire to increase their chances of being promoted. The survey found that Information Technology was mentioned by the most companies (about 62%) as the professional skill CPA's should concentrate on developing in order to get ahead in their careers.

Albrecht and Sack [2000] state one of the reasons why practicing accountants and educators would not study accounting today is because technology has made

A SURVEY OF INDUSTRY REGARDING TECHNOLOGICAL COMPETENCIES DESIRED IN NEW ACCOUNTING GRADUATES

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Abstract

Employers of accounting graduates are requiring that they possess computer skills and prefer to hire students who possess computer skills. The paper presents the results of a survey of industry in the USA regarding technological skills desired in new accounting graduates. The questionnaire was mailed to a random sample of 350 accountants working in industry in the USA. The questions related to computer skills desired in new accounting graduates revealed that spreadsheet knowledge was the most desired followed by databases. Also among the skills mentioned most frequently were knowledge of presentation software, networks, messaging, computerized accounting systems and ERP systems.

INTRODUCTION

Technology now defines our world. It is embedded in the way most business is conducted. Although technology has changed the way business is conducted, many employees lack the necessary computer skills to work with current technologies. Accountants have not been left untouched by the new technological changes. The objective of this paper is to determine the kinds of technological competencies desired in new accounting graduates by employers in industry in the USA.

PREVIOUS LITERATURE

The AICPA's (1999) Technology Curriculum and Competency Model Task Force [1999] has published its findings that technological changes are among the most important challenges facing the accounting profession. They listed three challenges facing accounting education as being 1. Information technologies are affecting the way in which organizations operate 2. Information technologies are changing the nature and economics of accounting activity and 3. Information technologies are changing the competitive environment in which accountants participate. The AICPA committee concluded that as a result of these changes,