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The Technical Skills Valued by Public Accounting Firms

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Introduction

Accounting firms are continually working to improve the efficiency and effectiveness of their work. As part of these efforts, firms adopt new technologies like bots, analytics, and specialized software. These changes have the potential to create academic issues, as "numerous studies on accounting and education and technology suggest that a huge gap exists in what is taught by educators in the university and what is being practiced in the industry" (Dangi and Saat 62). Highlighting the need for greater integration of accounting and systems curricula, PwC (2015) has stated that they foresee an increase in demand of undergraduates with a double major of accounting and information systems. Despite the need for new technologies to be increasingly and better incorporated into the traditional accounting curricula, few studies examine the technological skills valued by public accounting firms, and the proficiency of the mean college graduate in these areas.

To fill a gap in the extant literature, the objective of this study is to examine the technologies and skills accounting firms value and the proficiency of new hires with these technologies and skills. To complete this objective, a survey was created and distributed to employees of the top 100 accounting firms, per Accounting Today. They were asked about the use of certain technologies, the proficiencies of their new hires with those technologies, and their new hire's proficiency with critical analytical "soft" skills.[1] The results suggest firms utilize a variety of technologies and students are not proficient with them all. Specifically, the technologies viewed as most valuable by accounting firms are those developed by Microsoft, but new hires are not as proficient with newer technologies like Microsoft BI as they are with legacy technologies like

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[1] Within this paper, "soft" skills are defined as non-theoretical skills that accountants use in the field. These include the skills needed to use various technologies such as mathematical reasoning or data visualization. For the purpose of this study, "soft" skills were included to further investigate how proficient new hires are with not only the software and technologies listed, but also how to use said software and technology to succeed in the workplace.

Excel and Word. Firms value both mathematical reasoning and data processing as skills, but it appears that new hires could possess a greater level of skill in these areas.

By examining the skills and technical proficiencies accounting firms value, this manuscript makes an important contribution to the literature. As accounting firms become increasingly reliant on newer technologies, colleges need to continually reevaluate their required curricula to ensure that their students are adequately prepared for their future careers in accounting. The difficulty of this task is reflected in the diversity of approaches across universities; the technological component of accounting curricula is not standardized across universities to the same extent as traditional accounting topics. For example, an informal review of accounting curricula at a number of colleges and universities shows that while the accounting curriculum at several universities contains only one non-accounting technology course, other universities include a specific accounting information systems course. Even when universities do update their curriculum there can be a lag between the adoption of a technology by practitioners and its introduction into the classroom; 93% of accounting educators note resistance to technological adaptation in their teachings (Watty, Kim, et al. 2016). By providing current data on the skills that firms value and new hire's proficiency with these skills, my manuscript provides critical information educators can use to reform their curricula and better align course content with the needs of practitioners.

Literature Review

A review of the Big 4 accounting firms' websites demonstrates how important technology is to these firms. Each of these websites features the technologies used by the firm as prominently as their knowledge and skillset. The Big 4 have also issued white papers to highlight the technologies and skills they believe are valuable. For example, PwC (2015) proposes that universities should incorporate hands-on use of analytical tools. PwC has explained that in the

accounting, tax, and consulting professions, [they are] in the epicenter of the data explosion, and they want to turn said data into "meaningful insights" to better their client work (PwC 2015). EY references its use of technology such as artificial intelligence, blockchain, and automation (Whittington n.d.). KPMG highlights the use of similar technologies, stating; "in today's world, new and disruptive technologies [such as] … blockchain, the cloud, robotic process automation, machine learning, deep learning and natural language processing are emerging at a rapid pace" (KPMG 2018). Deloitte notes a need to invest in both innovation and emerging technology, as these investments are key to their business model (Deloitte n.d.). In sum, all Big 4 accounting firms acknowledge a reliance on new technologies and by extension, a need for a labor supply with competency in these areas.

In the standard accounting degree program, students study topics like financial and managerial accounting. Technological content should also be a standard part of the accounting curriculum. The need to better incorporate technology in the standard accounting degree program has been previously documented. Sithole (2015) notes that multiple employers believe graduates lack skills with spreadsheets and accounting software packages, recommending that professors adjust their curriculum to better account for the technological skills expected of accountants. PwC has recommended students gain competency in Java, Microsoft Excel and Access, and SQL (PwC 2015). These types of additions to the standard curricula would be embraced by students if the addition is properly justified. Dangi and Saat (2021) and Damerji (2021) both find that accounting students are willing and able to learn technology skills when they believe it'll enhance their career prospects.

A limited number of studies have examined the technological skills valued in the accounting profession and possessed by recent graduates. Sithole (2015) surveys employees in the

accounting departments of private companies across a variety of industries. Respondents were asked to assess the technological proficiency expected of an entry level accountant as well as rank the skills possessed by the mean employee. The results of the study showed that employers were satisfied with entry level accountants' knowledge of word-processing and communication software. The author concludes that education programs should expand beyond teaching Microsoft software and begin to incorporate more advanced content (e.g., intranet setup and server management). Nwokike and Eya (2015) conducted a similar study that examines the skills required of accounting graduates. They focused on the automation of the office environment and wanted to learn of both technological skills and soft skills needed by incoming workers. They recommend "that technology and soft skills should be an integral part of accounting education curriculum". Further, they argue graduates lack certain skills and that educators must begin to include "word processing skills, spread sheets, database, electronic presentation" in their curriculum (64). Jackling and De Lange (2009) also found that graduates were not equipped with a sufficient knowledge of technology skills.

While research indicates technology is a critical part of the accounting profession, evidence suggests the importance of technological skills is not fully appreciated by accounting students or accounting educations. For example, Ragland and Ramachandran (2014) find that accounting students undervalue the importance of Microsoft Excel skills relative to newly hired accountants. Furthermore, they find a noticeable difference between the perceived knowledge of Excel functions between students and new hires (Ragland and Ramachandran 2014). This is important because it highlights the inconsistency between the technology used in the accounting industry and the importance of that technology in accounting curriculum. Harrast, Strong, and Bromley (2010) examine whether there could be a better "mix" of technology and theory in the teaching of

accounting. They find "that a large fraction of students are not proficient in requisite technologies even after completing the majority of their undergraduate accounting course work. [They] believe this supports the argument that the accounting curriculum would benefit from an increase in technology training" (Harrast, Strong, and Bromley 1).

The gap in the self-reported value of technological skills between students and accounting professionals may be driven by personality traits and other frictions that make changes to accounting curricula slow. Dangi and Saat (2021) conduct a survey to understand what factors, like training frequency, ease of use, and perceived usefulness, most affected the adoption of technology in accounting education. They use the technology acceptance model (TAM) to measure an individual's acceptance or rejection of technology. The authors state that tertiary school educators should endorse a technology influx in their curriculum, but they find that this has not happened. Both students' and educators' personality traits were a major factor that influence the intent to use educational technology. This is important to consider as it may be a reason why new hires are not adequately prepared with technology.

Research Questions

The objective of this study is to examine the technological and soft skills valued by public accounting firms and the mean graduate's proficiency in these areas. While firms have issued white papers outlining desirable skills, these papers do not provide a relative ranking, and to the best of my knowledge, no prior research has examined the proficiency of recent hires across multiple technologies. Consequently, I ask the following research questions:

RQ1a: What technological skills are most important to the career prospects of recent graduates hired by the firm?

RQ1b: Among recent graduates hired by the firm, what is the mean level of proficiency with the most critical technological skills?

RQ2a: What "soft" skills are most important to the career prospects of recent graduates hired by the firm?

RQ2b: Among recent graduates hired by the firm, what is the mean level of proficiency with the most critical "soft" skills?

Methodology

To obtain data on the technological proficiency of recent graduates working with public accounting firms, a survey instrument was developed. The survey is presented in Appendix A. The questions included in the instrument relate to the technological proficiencies and soft skills that firms believe are important, and the competency of recent hires with these technologies and skills. An invitation to participate in the study that included a link to the survey was sent to employees at 100 public accounting firms. First, one employee from each of the 100 firms was contacted. Then, after the first round of responses, an additional 49 employees from the firms were contacted as an attempt to increase the total responses. These firms were selected from Accounting Today's annual "Top 100 Firms 2021" listing.[2] The participants in this survey were those most familiar with the desired characteristics of new employees; managers and recruiters in the human resources department. Through a combination of email and LinkedIn, I reached out to these employees with a brief introduction and explanation of the survey. Potential participants were then provided a link to the survey, which was delivered using Qualtrics.

Results

New Hires' Average Proficiency in Technologies

The survey was distributed to 149 individuals, of which 9 fully participated in the study.[3] Table 1 shows that firms feel their new hires are moderately proficient regarding preparation for the technology used in the industry at 6.44/10. The data suggests firms believe the technological proficiency of new hires could be improved.

Table 1

How prepared are accounting graduates using technology in the workplace? (1-10)

N	Median	Mean
9	6	6.44

Technologies used by firms and new hires' proficiencies

The survey asked participants to rank the relative importance of different technologies and assess their new hires proficiency with these same technologies. The technologies listed in the survey were gathered from common software displayed on the top 100 firms' websites. Table 2 summarizes the responses. The data shows that firms value Microsoft technology, with Excel, BI (Microsoft Business Intelligence), and Word ranked as the most important technologies. Microsoft Excel was the most selected technology and firms ranked their new hires' proficiency as 6.083/10. Microsoft BI was the second most selected technology but only had a 2.286/10 proficiency rating. Microsoft Word was the third most selected and had a 7.667/10 proficiency. The data suggests a disconnect exists between the most important technologies for the firms, and the technologies with which new hires have the greatest proficiency. Microsoft BI, for example, is ranked 2nd most important technology by firms, but new hires are the least proficient with this technology. Also,

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[3] This results from this study may not be generalizable due to a low response rate. While 149 surveys sent out to recruiters and/or HR managers, only 9 participants fully completed the survey.

Tableau and Oracle are two technologies that new hires are well-versed in, yet firms do not seem to value the software.

Table 2

Technologies Utilized by Firms and New Hires' Proficiencies

	N (count)	Median	New Hire Proficiency (mean)
Microsoft Excel	12	6.5	6.083
Microsoft BI	7	3.0	2.286
Microsoft Word	6	7.5	7.667
Salesforce	4	4.5	4.750
SQL	3	3.0	3.333
Oracle	2	6.5	6.500
Tableau	2	6.5	6.500
IBM Watson	0	0	0
Java	0	0	0
Alteryx	0	0	0

Important firm technologies not listed in survey

In addition to asking participants to select from a pre-populated list of technologies, the survey included an open-ended question where respondents could identify critical technologies omitted from the listing. Table 3 summarizes the technologies that participants indicated were important in their firm. The data in this table shows that Commerce Clearing House (CCH), is a very common technology used at accounting firms. CCH is a software that provides accounting and information systems services, similar to CaseWare. These technologies offer an easy-to-use platform where all workpapers and documents are in one place. CCH offers both tax and business law news reports for accounting firms to maintain knowledge of all current accounting rules and regulations.

Table 3

Firm Technologies not Listed in Survey

Technology	Count
CCH	4
Adobe	2
Outlook	2
Prosystem	1
Smartsheet	1
Document	1
IDEA	1
CaseWare	1
Quickbooks	1

Level of proficiency in "soft" skills

The survey instrument asked participants to select three critical soft skills and rate new hires' proficiencies with those skills. Table 4 summarizes the responses to these questions. The data shows that "data processing" and "mathematical reasoning" are the two most important soft skills for new hires. In the survey, "data processing" was described as "transforming raw data into a useable format", while "mathematical reasoning" was explained as "solving for values found in financial statements". Employers reported slightly higher levels of proficiency for "visualizations" relative to "data processing" (5.7 and 5.67, respectively). This is unsurprising given the responses on the importance of different software; Tableau and Microsoft BI are both used for data visualization purposes. It is important to note that although these skills are ranked as the most important, the mean proficiency does not appear to be satisfactory. The data also suggests that analytical thinking is a highly valued skill for new hires, as both data processing and mathematical reasoning were the two most selected soft

skills. On the other hand, knowledge and skill with information systems and technologies are not as necessary as the use of bots was only selected one time.

Table 4
Level of Proficiency in "Soft" Skills Selected

	N (count)	Median	New Hire Proficiency (Mean)
Data Processing	10	6	5.70
Mathematical Reasoning	8	7	6.75
Quantitative Modeling	5	4	4.40
Multivariate Statistics	3	5	5.67
Visualizations	3	6	6.00
Bots	1	2	2.00

Conclusion

Technology is playing an increasingly important role in the accounting industry. Firms have made it clear they feel college accounting students need to be proficient with a number of technologies and "soft" skills. For example, PwC suggests universities adopt, "a statistical analytics course… a computational analytics course… and a data analytics practicum" (PwC 2015). Academics have made similar suggestions; Sithole (2015) argues that "the way to address the IT skills deficiencies would require accounting instructors to look beyond the basic computer skills of Word, Excel, and Access." Ragland and Ramachandran (2014) conclude these types of changes aren't implemented quickly in part because "students' perceptions are not the same as public accounting employers' expectations with respect to analytical skills using Excel technology." There is a disconnect between firm expectations and what accounting students are being introduced to in their higher education.

To provide information on this important issue, I sent a survey to 149 employees at 100 accounting firms. They were asked questions related to the use of certain technologies, the level of proficiency new hires have with those technologies, and the importance of various "soft" skills used in the public accounting industry. The results suggest accounting firms believe Microsoft

technologies are most important for new hires. However, new hires lack proficiency in Microsoft Business Intelligence (Microsoft BI). In addition, data visualization soft skills are valued by firms, and firms feel that their new hires are moderately proficient in Tableau.

This research should be of interest to both public accounting firms and universities. Accounting firms may read this to inform their views of their new hires' technological proficiencies. Universities may benefit from this research, as the data may show a disconnect between what firms' expectations are for their new hires, and what an individual university requires of their accounting students. This may result in changes to accounting curricula that result in the incorporation of more technology. The data also suggest that coding technologies are not seen as extremely vital for new hires. For the soft skills, it appears that skills with accounting software technologies are most important, as data processing and mathematical reasoning would be most commonly used in a software such as Microsoft BI or CaseWare. The AICPA (American Institute of Certified Public Accountants) and AAA (American Accounting Association) found that Microsoft technologies all ranked in the top 10 of technological skills needed in accounting. Skills in Microsoft Excel ranked 1st, Microsoft Office 3rd, and Microsoft Word 9th (The Pathways Commission 2015). It is important to consider the need of learning the theoretical side of accounting, but with the rapid technology surge in the world, the need for education of technology could prove beneficial to the accounting industry.

Appendix A

New Accounting Hire Talent

CONSENT FORM FOR PARTICIPATION IN A RESEARCH STUDY RESEARCHER AND

TITLE OF STUDY

 My name is Nicholas Mokas, and I am an undergraduate student at the University of New

Hampshire. I am working on my honors thesis pertaining to the level of technology used at

accounting firms. The project has UNH IRB-FY2022-300.

WHAT IS THE PURPOSE OF THIS FORM?

This consent form describes the research study and helps you understand what will be asked of

you if you elect to participate. It proves information about what the survey will ask you to

provide feedback on. It also lists your rights as a research participant. You should:

• Read this document carefully and ask me any questions that arise when reading.

• Not agree to participate until your questions are answered and that you do wish to participate.

• Understand that your participation in this study includes answering a short survey which will

take approximately ten minutes.

• Understand that the potential risks of participating in this study are expected to be minimal.

WHAT IS THE PURPOSE OF THIS STUDY?

The purpose of this research is to provide evidence related to the various technologies used at

accounting firms and the level of proficiency new accounting hires have with these technologies.

Approximately 50 employees from various firms are expected to participate in this study, all of whom must be over 18 years old to participate.

WHAT DOES YOUR PARTICIPATION IN THIS STUDY INVOLVE?

Your participation involves the completion of a survey, which will last approximately ten minutes. The survey only should be completed once.

WILL YOU RECEIVE ANY COMPENSATION FOR PARTICIPATING IN THIS STUDY?

You will receive no compensation for your participation in this study.

DO YOU HAVE TO PARTICIPATE IN THIS STUDY?

Participation in this study is completely voluntary. You may choose to not take any part in it. If you agree to participate, you are not required to answer any of the questions in the survey. If you decide to not participate, there will be no penalty.

CAN YOU WITHDRAW FROM THIS STUDY?

If you elect to participate in this study and then change your mind, you have the right to stop at any point in time. Any data collected from your participation will be removed from the study records.

HOW WILL THE CONFIDENTIALITY OF YOUR RECORDS BE PROTECTED?

Your identity will remain confidential and will not be linked to the answers you provide. No email address or IP address will be collected when you complete the survey form.

CONTACT INFORMATION

If you have any questions, please contact Nicholas Mokas (npm1014@wildcats.unh.edu) to discuss them. If you have questions about your rights as a research subject you can contact Melissa McGee in UNH Research Integrity Services, (603)862-2005 or melissa.mcgee@unh.edu to discuss them.

1. Using the scale below, please indicate how prepared accounting graduates you've recently hired are with respect to the use of technology in the workplace? (Scale 1-10, 10 being well-prepared).

2. Please select the technologies that are the most important to the career prospects of recently hired accounting graduates (Please select only 3).

- Salesforce

- Oracle

- Microsoft Excel

- Microsoft Access

- Microsoft BI

- IBM Watson

- Java

- SQL

- Alteryx

- Tableau

3. How proficient is the average recent accounting graduate with the technologies you selected? (Scale 1-10, 10 being proficient)

4. If there are technologies utilized at your firm that are important, but weren't referenced in the prior questions, please list them below.

5. Please select the "soft" skills that are the most important to the career prospects of recently hired accounting graduates.

- Bots (e.g., using an AI to create system for repetitive tasks)

- Mathematical reasoning (e.g., solving for values found in financial statements)

- Quantitative modeling (e.g., building a template for finding materiality)

- Multivariate statistics (e.g., building a model)

- Visualizations (e.g., creating informative graphics or dashboards)

- Data processing (e.g., transforming raw data into a useable format)

How proficient is the average recent accounting graduate with the "soft" skills you selected?

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