Employers' Perceptions of Information Technology Competency Requirements for Management Accounting Graduates

Gary Spraakman

School of Administrative Studies
York University

Winnie O'Grady and Davood Askarany
Business School
The University of Auckland

and

Chris Akroyd

College of Business
Oregon State University

Accounting Education: An International Journal Volume 24(5), 2015, 403-422

Abstract

Management accountants work in a computerized workplace with information technology (IT) being used for financial ledgers and reporting. Thus, the role of the management accountant has shifted from capturing and recording transactions to analyzing business issues. This paper examines the IT knowledge and skills that employers require of management accounting graduates. An exploratory field research approach was used to gather data. Chief financial officers (CFOs) and their subordinates at some of New Zealand’s largest firms were interviewed. These respondents were consistent in their requirements. In particular they emphasized intermediate proficiency with some Microsoft tools (Excel, Word, PowerPoint, and Outlook) and familiarity with the structure and navigation of an enterprise resource planning (ERP) system to be able to process transactions such as accounts receivable or accounts payable. Of those requirements, Excel for analysis was by far the most important. Our contributions update and augment the literature by clarifying the perceptions of employers regarding the IT competencies required of management accounting graduates.

Key Words: Management accounting, curriculum, graduate skills, information technology, information systems.

Employers' Perceptions of Information Technology Competency Requirements for Management Accounting Graduates

1. Introduction

The research question this paper focuses on is; what information technology[1] (IT) knowledge and skills do employers require of management accounting graduates upon hiring and during their first six months of work? As will be shown, the literature is not clear on the necessary IT competencies for management accounting graduates. Without clarity, accounting educators will not able to meet the requirements of employers. Without employer-appropriate knowledge and skills in the fast changing IT environment, management accounting graduates will not be competitive in the marketplace.

The question of IT competency is important for management accounting educators anywhere in the world as they all have a role to play in preparing management accountants graduates for employment. To produce employer-ready management accounting graduates, educators need to understand the requirements of employers. Employers also need to be surveyed periodically as IT changes frequently and thereby so do the knowledge and skills requirements of graduates.

To understand what employers require this paper reports on an interview sample of CEO's and their subordinates. Their responses allowed us to understand the richness of the contexts they operate in. This enabled us to not only answer our research question of what IT knowledge and skills management accounting graduates need to have, but also

[1] For convenience, information technology will refer to both information systems and information technology. This convenience was consistent with past evidence, but it failed to be perpetuated with the findings of this research.

shed light on the desired levels of knowledge and skill acquisition and how those competencies are used by management accountants in practice.

We found that the ability to carry out analysis using Microsoft Excel was by far the most important skill needed by new management accountants. A familiarity with the structure and navigation of an enterprise resource planning (ERP) system was also seen as being critical as this was the main database used by firms in our sample. Finally, intermediate proficiency with Microsoft's Word, PowerPoint, and Outlook were also desired.

Through the use of an exploratory field study, which involved interviews with CFO's, controllers/managers and management accountants, this paper updates and augments the literature by identifying the current IT knowledge and skills which employs want management accounting graduates to have. Our findings inform educators as to the kinds of curricula that needs to be developed to help students meet the knowledge and skills required to be successful. Our research also provides a further contribution by demonstrating the importance of surveying contemporary employers when developing management accounting curricula in a fast changing IT environment.

To answer our research question this paper is organized into three sections. The following section presents a literature review of curriculum pronouncements issued by educators about the IT knowledge and skills desired by employers. Section three discusses our field work that ascertains the IT knowledge and skills desired by employers of management accounting graduates. The final section provides concluding comments and notes the contributions and limitations of the research.

2. Literature Review

In conducting this research we recognize that management accounting is conducted in an extensively computerized practice environment (Granlund, 2007). In this environment, IT is taking over the firm's financial ledgers and reporting, and accounting is no longer possible without it (Granlund & Mouritsen, 2003). From a study of seven major enterprise resource planning (ERP) implementations, Grabski, Leech, & Sangster (2009) found IT is becoming more important for the work conducted by management accountants in large, medium and, increasingly, small firms. Consequently, IT knowledge and skills are crucially important for management accountants in all organizations. Hunton (2002) says that a management accountant's "worth is now reflected in higher-order critical thinking skills, such as designing businesses, developing e-business models … and integrating strategic knowledge (p. 67)".

Despite the increased significant presence of IT, there is an uneasy existence between it and management accounting (Boritz & Stoner, 2014). The traditional role of management accounting includes provision of information for decision making. However, in a computerized practice environment, that provision of information is done by IT units. Management accounting education is now concerned with the analysis of that information, but the specification of IT competencies for management accountants has been difficult to align especially as IT is constantly changing. Thus, this uneasiness from losing a management role and the frequent changes in IT is surprisingly perpetuated despite the absolute dependence of management accounting on IT units for processing the essential functions of production activities, transactions, and information.

To better understand employers' requirements for IT knowledge and skills of management accounting graduates the following sub-sections review the management accounting literature relating to curricula design and the related research.

We start by conducting a literature review of curricular pronouncements and recommendations, since 1975 for preparing management accounting graduates with knowledge and skills for entry level jobs in management accounting. The longitudinal review of the literature allows us to understand the interaction between IT and management accounting curricular pronouncements and recommendations.

Management accounting curricula have many competencies to integrate in addition to IT. In response to the Pathways Commission (2012), Lawson, Blocher, Brewer, et al., (2014) develop a curriculum proposal that integrates three aggregate competencies: accounting, broad management, and foundational. IT is a component of two of the aggregate competencies. One of the identified foundational competencies is "technological" along with communication, analytical thinking, etc. Foundational competency in IT is described as the "use of spreadsheet models and the use of technology to enhance communication" (p. 301). Second, under accounting competency, IT is included as "information systems," and described as "integrated information systems such as a specialized software/reporting systems with decision support, enterprise resource planning (ERP) systems" (p. 305). The challenge is to integrate the many competencies when there is uneasiness between IT and management accounting.

IT is recognized as one of many "professional skills and capabilities" identified by Wells, Gerbic, Kranenburg, & Bygrave (2009) that curricula grapple to integrate along with team work, ability to set priorities, etc. IT integration with curricula is crucial if management accountants are to become critical and analytical thinkers. Moreover, this research – Wells et al, (2009) and that of the Pathways Commission (2012) and Lawson et al. (2014) – does not explicitly explain what employers require.

We reviewed the 13 curriculum pronouncements after 1975 for preparing management accounting graduates for entry-level jobs in management accounting. Of the 13 curricula identified, only the 10 in Exhibit 1 include IT as a competency. The three that do not include IT are Lander & Reinstein (1987), Siegel & Sorensen (1994), and Russell, Siegel, & Kulesza (1999).

(Exhibit 1 – about here)

Curriculum pronouncements come from educators in the United States (7), United Kingdom (2), and New Zealand (1), who surveyed employers and, sometimes, other educators. Exhibit 1 further shows that the focus of the selected surveys is not limited to management accounting programs but also include financial accounting, tax, and auditing. The research questions (RQ), noted for each survey, address management accounting, where IT is a component. The RQs focus on all knowledge and skills required for management accountants expressed as topics, requirements, competencies, knowledge, and skills[2]. () Respondents are management accountants, CPAs in management accounting, controllers, corporate accountants, and executives. They would have been able to provide valid insights into the IT knowledge and skills that employers require of management accounting graduates if they had not been hindered by surveys with items related to past IT technologies.

IT items included in curriculum pronouncements are also shown in Exhibit 1. The items tend to be derived from textbooks and the academic literature, with a few

[2] These RQs provided us with the structure for our research question which has a narrow focus on IT.

drawn from actual management accounting practices. The changing assessments about IT knowledge and skills required of management accounting graduates for the period considered in this study are shown in Exhibit 1. The observation from Exhibit 1 is that there is a lag between new IT practices and IT curriculum pronouncements. For example, spreadsheets were not specified until 1996, but early and powerful spreadsheet programs, such as VisiCalc, were introduced in the first few years of the 1980s. Similarly, ERP systems were available by 1995 (Nolan, 2000), but were not included in curriculum pronouncements until 2004.

Curricular pronouncements are aimed at the university program level. Programs consist of courses that have lists of topics or syllabi. Courses are taught based on the syllabi. When an undergraduate program adopts a particular curricular pronouncement such as those noted in Exhibit 1, the syllabi are the means of operationalizing IT knowledge and skills which could be placed in one, several, or many courses.

We consider curricula to have an international orientation for three reasons. First, the educators in Exhibit 1 come from three countries, as noted. Second, much of the IT equipment and software – such as Microsoft tools and ERP systems – are available and used throughout the world. Third, the pronouncements of the International Federation of Accountants (IFAC) specify that International Education Standard 2 requires IT knowledge and skills to be included in IFAC sanctioned pre-qualifying professional accounting education programs. IFAC (2014) requires competencies – IT strategy, IT architecture, IT as a business enabler, systems acquisition and development, management and IT, and communication and IT – exceed the requirements listed in Exhibit 1. Boritz & Stoner (2014) say in support of IFAC that educators should provide students with the

"IT knowledge and skills … to prepare them for qualification as professional accountants" (p. 351).

During the time period represented by the 13 curricula, numerous educators made pronouncements for the inclusion of IT knowledge and skills in curricula. In examining the role and relevance of computers for accounting education, Bhaskar (1982) concludes that accounting students need to understand the computer as a computational tool. In a related study, Bhaskar (1983: p. 89) outlines the curriculum recommendations at three progressive levels, namely:

- Simple accounting systems or sales ledger packages with applications such as linear programming and discounted cash flow analysis.
- Computer programming and applications such as forecasting, multiple regression, financial models, portfolio analysis
- Another programming language and complete accounting and management information systems.

We consider these recommendations to extend beyond the work of management accountants, and unlikely to be advocated by the respective employers. For example, programming is outside the day-to-day work of management accountants. Moreover, programming would be an unrealistic requirement as it would have required an extensive career investment.

Stoner (1999) examines basic IT skills of U.K. accounting students in five areas: word-processing, Windows, spreadsheets, databases, and email. He assumes that these skills are necessary for accounting graduates. His evidence over the 1990s shows that students entering university are equipped with improved baseline skills, but some students still need university training, especially with spreadsheets (e.g., Excel) and databases (e.g., Access). The findings of Stoner (1999) are based on student selfappraisals which are generally found to be inaccurate and only usable in conjunction with other, more accurate measurements (Larres, Ballantine, & Whittington, 2003). In a subsequent study, Stoner (2009) re-examines those same IT application skills for the period 1996 to 2006. While admitting the inherent limitations of self-appraisal surveys, he finds improvements but inadequacies for database and spreadsheet skills.

Recruiters at a U.S. accounting conference were asked by Chen, Damtew, Banatte, & Mapp (2009) to evaluate 35 IT competencies drawn from the IFAC International Education Guideline 11. As proxies for employers, the recruiters deem the most important competencies for all accounting graduates to be: spreadsheets, graphics, word processing, presentation packages, audit software, and tax preparation software. Audit software and tax preparation software are unlikely to be relevant for management accountants.

Arquero Montano, Anes, Hassall, & Joyce (2001) question U.K. employers about 22 IT skills and capabilities drawn from earlier studies. For each item, the researchers ask respondents to specify: "the importance of the skill … for adequate performance of accounting duties and the level of that skill exhibited by both recent graduates [from university] and newly-qualified [associate chartered] management accountants" (ACMAs)[3] (p. 303). Only two items, "use of relevant software" and "knowledge of information sources" (p. 305) pertain to IT. When asked about IT, employers indicate that it is moderately important to know how to use relevant software (ranking this item eighth out of 22) and less important to be knowledgeable about information sources (ranking it 20 out of 22 items) (Arquero Montano et al., 2001, p. 305). The authors conclude that for

[3] In the U.K., the designation is ACMA, while in the US the designation is CMA, certified management accountant.

the items they examined “IT skills do not rate as a high priority as the employers indicated that students, at both entry and newly-qualified levels, have high levels of skill in this area” (Arquero Montano et al. 2001, p. 310).

In a study similar to ours – as it is set in New Zealand and has a comparable research question, “to identify relevant …[IT]… knowledge and skills required by … accounting graduates” (p. 1), Tam (2011) identifies 266 legacy items from the literature. These are distilled into 18 categories by six “experts” drawn from different accounting professions, i.e., two from chartered accounting firms, three from commercial firms, and one university lecturer. These experts do not seem to be representative of employers, and all newly graduated accountants are considered rather than just management accountants. To focus on the most important, only the first nine of the 18 categories are included by Tam below in descending order of perceived importance:

- Spreadsheets
- Word processor
- Accounting software
- Accounting system
- Internet tools
- Data security
- Values
- Database software
- IT controls.

Spreadsheets are rated the most important, followed by word processing, etc. Some categories do not relate entirely to management accounting. For example, the composition of “accounting software” consists of: “MYOB, Great Plains, SAP, Oracle, tax return software, electronic working papers, and time management and billing systems” (p. 95). Software extends beyond management accounting with the inclusion of tax return software, electronic working papers, and time management and billing systems, and to previous time periods with the inclusion of Great Plains, which is now re-named Navision since acquisition by Microsoft.

Further confirmation of the importance of the 18 categories is obtained by Tam through semi-structured interviews and questionnaires to a convenience sample of 23 accountants holding junior and senior roles. Of these 23, 14 are considered junior (no supervisory responsibilities) and nine are considered senior (with supervisory responsibilities). Relatedly, 12 are employed as accountants by commercial organizations, five with government/educational organizations, and six with New Zealand chartered accounting firms. The last six firms would not necessarily be considered employers of management accountants, and some or all of the respondents from educational institutes are educators, rather than employers. Tam's results identify the knowledge and skills for accounting graduates but not how they are used or the level of accomplishment required.

The role of management accounting has been forced to evolve since 1975 because of technology. The impact of technology was poorly anticipated at first which has led to a number of IT curricula pronouncements in the 1970s and 1980s that now seem unrealistic, e.g., Deakin & Summers' (1975) information system design and system implementation, Knight & Zook's (1982) system analysis and design, and Bhaskar's (1982, 1983) computational and programming focus. More recently, the pronouncements have been more relevant to practice, particularly in regards to analysis and critical thinking, which dominate the work of management accountants, e.g., Tam (2011) conclusions regarding spreadsheets and Lawson et al.'s (2012) inclusion of IT in a comprehensive management accounting curriculum proposal.

We can see a number of pertinent insights from the two prior sub-sections of this literature review that reinforce the importance of our research question.

First, most authors were educators and tended to survey or ask employers about the IT requirements for management accounting graduates. For the most part, these studies address what Bui & Porter (2010) call competencies desired by employers. Exceptions in our opinion include Albrecht & Sack (2000) and Tan, Fowler, & Hawkes (2004), who survey both employers and educators to obtain an understanding of competencies desired and provided, and Fowler (2010), who updates the work of Tan et al. (2004), and found that ERP systems had become increasingly important to employers (moving from 12th in importance out of 21 items in 2001 to seventh out of 21 in 2010.)

Second, the importance of IT for students planning to practice management accounting is not universally acknowledged. We find that 10 of the 13 curricula in Exhibit 1 recognize the importance of IT for management accounting graduates and include it. If employers consider IT knowledge and skills necessary for management accounting graduates, then the three curriculum pronouncements omitting IT present a challenge in meeting the requirements of employers.

Third, these findings are consistent with the Joint Task Force for Computing (JTFCC) (2005), i.e., universities are slow to adjust curricula to reflect changes in the IT marketplace. We note that progress has been made since 1975. Furthermore, we recognize that this literature – due to its historical rather than contemporary focus – likely contains survey items that are no longer relevant.

Fourth, the curricula especially in Exhibit 1do not describe how the knowledge or skills items are to be used by management accountants. For example, spreadsheets were used in the early 1990s for financial reporting, particularly to prepare consolidations. Now, according to this research to be discussed, ERP systems prepare consolidations and Excel is now used primarily for management accounting analyses.

Fifth, some of the suggested items cannot be accommodated within management accounting curricula. Although there are numerous examples in Exhibit 1, the suggestions from Deakin & Summers (1975) for information system design and system implementation are more appropriate requirements for computer science and IT majors, and they are clearly beyond the expectations for management accounting graduates. Moreover, systems design and system implementation imply building IT systems rather using those systems for management accounting purposes.

Sixth, these curricular pronouncements do not indicate to us the level to which the IT knowledge and skills need to be mastered. For example, Siegel & Kulesza (1996) specify spreadsheets without indicating the level of skills required. Similarly, Lee & Blaszczynski (1999) refer vaguely to “PC and Internet skills” without being clear about what and how much management accounting graduates are expected to know.

The IT knowledge and skills in the Exhibit 1 pronouncements are synthesized in Exhibit 2. Based on the evolution of IT (Noland, 2000), this synthesis is guided by the IFAC’s (2014) International Education Practice Statement 2, International Technology for Professional Accountants, and JTFCC (2005). The goal is ascertaining what would be required in 2015.

In effect, these sources tell us that transactions are processed by ERP systems that use relational databases, and thus knowledge of them is necessary for management accounting graduates. Relatedly, management accountants are expected to understand how to design and analyze systems that process transactions and provide information. To use ERP systems and related systems, our sources above suggest that Microsoft tools are required. Through this filtering or filtering out, we were left with the knowledge and skills items in Exhibit 2.

(Exhibit 2 – about here)

We conclude that at an aggregate level, the knowledge items in Exhibit 2 have a disciplinary foundation in information technology and information systems (JTFCC, 2005). This does not imply that management accounting graduates should have the same preparation in system analysis and design as students majoring in information systems and/or information technology. Nonetheless the literature suggests management accounting graduates should be able to contribute a management accounting perspective to the development of systems for transaction processing and information reporting. This contribution can be extended to ERP systems, which are merely configurations of processing and reporting systems integrated with (relational) databases, and thus the last two knowledge items in Exhibit 2 are highly related.

The first four skill items in Exhibit 2 – Word, PowerPoint, Excel, and Access – were synthesized from the recent literature and are expected to be possessed by graduates. The fifth item – Internet capability– is a skill, which according to the literature, contemporary graduating students exhibit at an advanced level.

We found from the literature that Excel is not merely a simple employment-related skill. Marriott (2004) finds that the use of spreadsheets for simulations presents students with the opportunity to develop algorithmic thinking. Simulations push students to understand the entire business through conceptualization and problem-based learning.

This literature review allows us to identify the IT knowledge and skills educators claim employers require of management accounting graduates. Given the rapidly changing nature of IT, the results of surveys are always dated and include IT items reflective of prior practice/IT environments. In other words, the earlier surveys tend to be biased to the extent they emphasize what educators perceived to be important based on the past, rather than what employers perceived as important and crucial in the contemporary work environment.

We conjecture that IT knowledge and skills can be important for the career development of management accountants. This conjecture is supported by the results from a joint study by the Institute of Chartered Accountants of Ontario and Queen's University in Canada. The study – Murphy, Anger, & Barrett et al. (2008) – surveys senior managers to identify and understand the competencies for successful advancement to CFO. The following IT competencies are considered important and/or critical for CFO success:

> Thorough understanding of the information needs of decision makers within the organization (from top level down through the organization). Overseeing a financial information system that is capable of producing useful information to meet those needs (e.g., budgeting, profitability of products, business units, customer relationships) … Ability to create or oversee IT systems, processes, and internal control policies and procedures to ensure high quality of information.
> (Murphy et al., 2008, p. 6)

The conclusion from this study is that these IT competencies for aspiring CFOs are accomplished through experience rather than through formal education. In other words, the standalone academic preparation while necessary, is not sufficient; as it must be augmented through practical experience. Moreover, this experience should be obtained early in the career of the eventual CFO. Thus, the Murphy et al. (2008) study provides two insights. First, IT knowledge and skills are crucial for the success of management accountants as measured by promotion to senior positions. Second, these competencies are not obtained through formal studies alone. Accountants who are fortunate enough to acquire such IT experience are likely to have obtained it in the early years of their careers.

3. Field Research

This paper is based on field research to determine the IT competences that employers expect from management accounting graduates. Since IT is changing relatively quickly, past pronouncements and recommendations for IT in the management accounting curricula may be outdated. Thus, to gauge the demand for IT knowledge and skills in practice, surveying employers directly is crucial.

Management accountants have many employers, and in identifying our population of employers we decided to select larger organizations who hire management accountants. The management accounting function tends to come under the chief financial officer (CFO), whose responsibilities are divided into two parts: those of the controller and those of the treasurer. The controller tends to be responsible for both financial accounting and management accounting. The management accounting role includes activities that emphasize:

- Reporting to those inside the organization for the purposes of
  - Planning
  - Directing and motivating
  - Controlling
  - Performance evaluation
- Decisions affecting the future
- The timeliness and relevance of information
- Detailed segment-based reports about departments, products, and customers.

(Garrison et al., 2012, p. 8)

We decided to interview CFOs as they would have overall hiring authority. In developing a sample of New Zealand firms we selected non-bank organizations listed in the NZX[4] Company Research database with annual sales of more than $NZ 200 million. This selection was restricted to three New Zealand cities – Auckland, Wellington, and Christchurch – in order to limit our travel costs. The $NZ 200 million minimum was established as part of a possible iterative process. The aim was to survey 15 to 20 firms, which would give us a reasonable response rates, accordingly the $NZ 200 million minimum firm size was established.[5] The response rate was acceptable and thus the minimum size firm did not need to be reduced.

New Zealand, the venue for this research, is a relatively small country in the South Pacific Ocean with a population of 4.5 million people. Thus, New Zealand firms are smaller in size on average than those found in the U.K., U.S, or even in Canada. Nevertheless, these relatively large New Zealand firms would be comparable to similar sized firms in the U.K., U.S., and Canada. The CFOs at the resulting 35 firms were invited to participate in this research and to nominate two accountants employed in the firm (preferably, the CFO and a management accountant) to discuss the expected IT knowledge and skills for management accounting graduates. We asked them to commit themselves and/or their subordinates to participate in 60-minute interviews. See Exhibit 3 for the response rate and characteristics of the firms. The titles of the 39 respondents

[4] NZX listing includes all companies listed on the New Zealand stock exchange.
[5] We sent the invitation letters on March 29, 2012, and followed up with a single telephone call. Initially, 36 firms were selected, but one was excluded because that firm was anonymously large and different, i.e., it was nearly three times the size of the second largest firm and a co-operative rather than a shareholder owned firm. Interviews were conducted in April and May of 2012. Of the 20 scheduled interviews, 14 were conducted by two researchers and the remaining six were conducted by one researcher. Interviews involved between one and three respondents for an average of 1.9 respondents per interview. Exhibit 3 shows the ranges, means, and medians without and with the large firm.

included: eight CFOs, 20 controllers/managers, and 11 management accountants. There were seven female respondents and 32 men.

Exhibit 3 shows that our 20 responding firms are larger in terms of average mean and average median (NZ$1,391 million, $780 million, respectively) than both the population of 35 firms (NZ$1,176 million, NZ$570 million) and the 15 non-responding firms (NZ$888 and NZ$570 million). The sampled firms and the population have the same range, NZ$200 million to NZ$7,416 million. The firms excluded because they were outside the three largest cities are smaller on average. The sample firms come from the following industries: agriculture, fishing, and forestry; building materials and construction; consumer; durables; food and beverage; insurance; transportation; and utilities. The industries (and respondents) differ significantly as to main activities and underlying technologies.

(Exhibit 3 – about here)

Research was undertaken in accordance with the ethics guidelines established by the University of xxxxx.[6] At the beginning of the interviews the prospective respondents were provided with a Participant Information Sheet, which explained the project and let them know they could withdraw from the project at any time. They also received a Consent Form for signing to indicate agreement to participate. None of the participants withdrew from the project.

The first five semi-structured questions in the interview protocol are independently of the literature. This approach ensures our questions avoided references to past technologies that might no longer be relevant for contemporary firms and allowed

[6] Approved by the University of xxxxx Human Participants Ethics Committee on March 15, 2012, for three years. Reference Number 7912.

our discussion to be free ranging. Semi-structured interviews are preferred over a survey approach to allow for probing questions about contemporary IT requirements. We focus on respondents' opinions on the necessary IT knowledge and skills for management accounting graduates. Respondents were not required to reveal information on what was happening in their firms and appeared highly willing to share their professional opinions. All interviews were audio recorded and transcribed. Respondents were sent the respective text document with requests to address inaccuracies. We received minor clarifications from respondents representing eight of the 20 responding firms.

During interviews we asked CFOs and other management accounting professionals to specify the IT/ERP knowledge and skills used by management accountants in their firms and required of management accounting graduates. The specific questions asked were:

1. What is your job title?
2. What do you do?
3. Does your position description require you to have IT knowledge and skills?
4. What IT/ERP systems do you use and how do you use those systems?
5. What IT knowledge and skills do you need for using those systems in your work?
6. What would a new university graduate need in the way of IT knowledge and skills to effectively work in your unit?

We designed the research protocol to gain an understanding of the contexts within which particular IT knowledge and skills are used. We developed Questions 1 to 5 to understand the respondents' IT context, their positions, the IT systems they use, and the IT knowledge and skills they needed to successfully perform their roles. In effect, Questions 1 to 5 enabled the respondents to answer the sixth question more precisely. The sixth question was implied by the literature, particularly by the legacy item shortcoming; responses to it reveal the IT knowledge and skills requirements of management accounting graduates for effectiveness in the respondents' firms.

Efforts were made to enhance the reliability of our evidence and the persuasiveness of our interpretations. First, respondents were asked the same questions thus facilitating the identification of (in)consistencies in responses. Second, interviews were recorded verbatim and transcribed and transcriptions independently verified against the recordings. Third, transcriptions were independently analyzed by two of the authors, and their analysis compared and reconciled differences to increase the reliability of the interpretations. Finally, the remaining authors reviewed and verified the initial findings using knowledge gained through interviews they conducted, and they offered alternate interpretations when required.

The results of our analysis show that our respondents' perceptions about the IT knowledge and skills required for management accounting graduates to be surprisingly uniform among the 39 respondents from the 20 firms (See the appendix for summary of the findings to question 6). As the appendix shows, all firms report that all or some Microsoft Office tools are required, i.e., Word, PowerPoint, Outlook, and Excel. Word is needed for writing reports; PowerPoint for preparing presentations; Outlook for distributing information via the Internet, e.g., invoices and statements; Excel for data analysis. Many organizations around the world, including Microsoft, train and test for competency with Microsoft tools. The common levels of proficiency are basic, intermediate, and advanced. Based on the evidence from our sample of firms the required skill level was seen to be at a basic to intermediate level for Word, PowerPoint, and Outlook.

Respondents for all 20 firms identify Excel as the most important IT skill requirement. Ten firms specify that the Excel skill should be at least at an intermediate level, two at the intermediate-advanced level, one at the advanced level, one at the working level, two required a working knowledge, and four were non-specific on the level of competency. With that evidence, it can be seen that management accounting graduates need to have Excel skills at least at ant intermediate level, if not above.

These findings support the recent literature in some ways. Our analysis confirms that Microsoft tools are important except for Access, a database tool, which was found to be relatively less important in contrast to what has been reported in the literature (see for example; Lee & Blaszczynski, 1999; Arquero Montano et al., 2001; Tan et al., 2004; Stoner, 2009; Harrast, Strong, & Bromley, 2010; Fowler, 2010). Many respondents, as noted in the appendix, consider Access an unnecessary skill for management accountants. Although database understanding can be acquired with Access, many respondents expected management accounting graduates to obtain their understanding of databases from an ERP or integrated accounting system and Excel.[7]

Of the remaining Microsoft tools, Excel is shown to be the most important. The following quotes are typical:

- "Excel is pretty much a prerequisite." (3)[8]
- "If they do not use Excel, they do not get a job ... Excel is a tool of the trade." (9)

[7] Respondents strongly indicated that the ongoing improvements in Excel were making the database functionality of Access decreasingly important.
[8] Specific firms from the sample are indicated by the number in brackets. The referencing was done by firm rather than by respondent.

- "We have accounting systems … [but] … all data manipulation … is done with Excel." (12)
- "Any new person has to have Excel skills otherwise we would not employ him or her." (8)

In elaborating on what is meant by an intermediate understanding of Excel, respondents said that management accounting graduates should be adept in the use of v-lookups, filters, functions, pivot tables, graphs, charts, sorting data in different ways, automatically filling columns and rows, and linking spreadsheets together. Proficiency in the use of Excel is deemed to be crucial for data extraction from databases, problem modeling, problem analysis, and presentation of results to managers. Consequently, many respondents mention an interaction between Excel and analyses. Without Excel, analysis could not be undertaken in Granlund's (2007) contemporary computerized practice environment. Respondents also note that much more effort is needed on the part of students to acquire an intermediate level of proficiency for Excel than for Word, PowerPoint, or Outlook.

Proficiency with Excel macros is perceived to be unnecessary for a number of reasons. Complex macros that approximate programming or writing code could be subject to errors, a frequent problem with Excel. Instead of using Excel macros for repetitive reports it is deemed more prudent to expand the use of the ERP system. According to respondents:

- "Macros are beyond what would be necessary." (10)

- "If anyone said they were an Excel expert, and they started getting into macros, I would just tell them to stop. Because that becomes – it is not technically code, but it is too complicated …" (9)
- "We do not get up to the level of writing our own macros, but we can use most of the formulas that we are aware of within Excel in terms of modeling and creating spreadsheets." (12)

All respondents represent firms with ERP systems, although only a few firms have fully integrated ERP systems. The larger firms tend to have SAP or comparable major systems coupled with management reporting systems such as Hyperion and Cognos. The smaller firms have industry specific modules and/or other generic modules for accounting and human resources. All 20 responding firms agree that while exposure to an ERP system is useful, modest exposure is sufficient. Nearly all respondents said that Excel is the key tool for making sense of the large amounts of data provided by ERP systems. One respondent, for example, provided the following concise explanation of how Excel and ERP systems relate:

- "I think before they can be a management accountant … they need to look at being an analyst, and the key to being an analyst is being able to manipulate data. And data will always come from somewhere in the [ERP] system and they need to be filtered." (3)

There is a general belief that all ERP systems have the same basic structure comprised of various transaction processing and reporting modules, relational databases, and navigation procedures. Thus, all that is required of management accounting graduates is to understand one system, be it an ERP or other integrated accounting system.

Respondents indicate that knowledge and skills from one system can be readily transferred to understand another firm's ERP system once the graduate is hired. One respondent at a firm (5) proposed that universities provide at least some course content covering a simple ERP system. This would provide students with an opportunity to process typical transactions, such as payables or receivables, and follow them through to the general ledger and on to a management report.

None of the respondents recommend any particular ERP system for two reasons. First, even when the same ERP system is used in two firms, the actual implementation of specific modules and their configuration could vary. Second, the basic functionality is similar among all ERP systems. Thus, all respondents believe that familiarization with one ERP system would allow management accounting graduates to work effectively with their firm's in-house ERP system. Respondent comments supporting this observation include:

- "The fundamentals are quite the same. I have just done a bit of recruiting as well, and a few people have had JDE experience, but SAP or any other Oracle systems or whatever, the fundamentals are usually the same, so people can pick them up. Just as long as people understand what an ERP is and does, then they can work across systems. That's a real key point, this understanding of what an ERP is, and what it does, and what it can tell you, and what you need to know, versus actually how do you do that." (16)
- "I would not say you need to know SAP or any particular ERP system but some experience with SAP or Oracle or whatever … to understand how they can navigate around and how things work together." (13)

This paper shows that IT knowledge and skills are necessary for management accounting graduates in contemporary firms. Our aim was to find out what new management accountants did with their IT knowledge and skills. Accordingly, we asked CEO's, controllers and current management accountants four questions on how ERP systems impacted: (Question 7) performance measures, (Question 8) management accounting techniques, (Question 9) activities of management accountants, and (Question 10) the use of non-financial information. The responses confirmed our earlier insights; that management accounting graduates are highly involved with data analysis. ERP systems integrate the data processed through all organizational systems and create large data repositories including both financial and non-financial information. Data are analyzed outside the ERP systems using Excel. ERP systems operate in conjunction with Hyperion or Cognos to provide alternate types of analysis based particularly on drill-down functionality and the linking of financial results and non-financial performance drivers.

4. Concluding Comments

These papers focused on understanding; what IT knowledge and skills do employers require of management accounting graduates? To drill down further we asked about the desired levels of those knowledge and skill requirements, and how the knowledge and skills set get used. The finding of our analysis of field interview data collected from 20 large New Zealand companies was that employers want management accounting graduates to have intermediate proficiency in some Microsoft tools (Excel, Word, PowerPoint, and Outlook) and sufficient familiarity with an ERP system to understand how it is structured, how to navigate through the system, how to process transactions and most importantly how to undertake analysis of data from the ERP system. Proficiency in Excel was shown to be the most important requirement, reflecting the primacy of data analyses in the tasks assigned to management accounting graduates. More specifically, data analysis by management accounting graduates using Excel frequently involves large sets of data extracted from ERP systems. Furthermore, management accounting graduates are expected to be sufficiently proficient to undertake drill-down analysis of financial numbers to identify how they are explained by underlying non-financial drivers.

These findings update the literature and shows that IT is continually evolving but the specific IT knowledge and skills required change over time. Nonetheless, the requirement that management accounting graduates have IT knowledge and skills remains. It can be seen that the literature – due to its historical rather than contemporary focus – tends to mispronounce the IT requirements for management accounting graduates (e.g., Tam, 2011) and that some pronouncements are, perhaps, not relevant when disseminated. For example, Excel spreadsheets were previously used for producing periodic reports. They are now used mainly for analyses, as management reports are now produced using ERP systems. Moreover, Access is less necessary for helping students understand databases. ERP systems with their relational databases offer an appropriate option for instructing students about the functionality of databases. Similarly, recent versions of Excel have features that familiarize students with database technology. Accessing the Internet is now a generic skill, like reading, writing, and basic mathematics.

An understanding of ERP systems cannot be developed using Excel. According to a respondent (20), “they are totally different ball games.” ERP and Excel knowledge and skills are, nevertheless, mutually reinforcing. ERP systems process transactions and create large repositories of data. Subsets of this data are selected for extraction and analyses using Excel. The important insight for educators is that management accounting graduates need to understand how ERP systems process transactions, how the various subsystems fit together, and where the relevant data reside. Only with this knowledge can management accountants effectively apply their Excel skills to analyze the resulting data.

As noted in our findings, this paper updates and augments the literature. The continual evolution of IT suggests that the IT knowledge and skills of management accountants must similarly evolve. This fact makes it possibly inappropriate to rely on past literature to identify which IT knowledge and skills employers require or educators should include in the curricula for management accounting graduates. By identifying the contemporary requirements of New Zealand CFOs and their controllers/managers and management accountant subordinates our findings avoid the possible bias inherent in using past pronouncements of IT requirements.

The views of current practicing accountants reported in this paper are much more nuanced than those of earlier curriculum studies. Through the use of field research this paper shows that employers want management accounting graduates to be versed in using Excel as an analytical tool. This is much more specific than previous generic statements about “being skilled with spreadsheets.” The specific ERP knowledge that management accounting graduates are expected to have is the ability to navigate an ERP system and to process transactions. Finally, management accounting graduates will likely need an intermediate level of proficiency with the other main Microsoft tools (Word, PowerPoint, and Outlook), As mentioned earlier, there is an interaction between Excel and management accounting analysis. The interaction appears strong for New Zealand management accounting graduates. The strength of the interaction may vary internationally, which would be an important future research project. Another project would be to understand how educators add additional IT knowledge and skills to their course syllabi. It would also be of interest to understand how professional accounting associations affect curricula.

Our findings about the importance of databases refine earlier research. Exhibit 2 shows that Access was one of the skills suggested by the literature. Moreover, Tam (2011) reported that knowledge of databases is important for management accountants. Our data shows that the required database knowledge and skills for analyses can be directly developed through Excel and ERP systems rather than a database package such as Access. The difference may be due to historically-based questionnaire items that do not fit with contemporary practice, where Excel and ERP databases have replaced the need for Access.

This paper more precisely identifies the IT competencies that are required as well as the level of proficiency. Moreover, we explain how that knowledge and those skills are used by management accounting graduates. Our findings inform educators explicitly and succinctly as to the IT knowledge and skills desired by employers. Thus, for management accounting graduates, educators can make trade-offs to deploy curricula that can develop the required knowledge and skills. Our research provides a further contribution by demonstrating the importance of surveying contemporary employers when developing management accounting curricula in a fast changing IT environment.

This research has the usual strengths and limitations of qualitative, interview-based investigations. One issue is the generalizability of the findings and whether they can be extended beyond New Zealand. The firms in our survey are smaller than their counterparts in the U.S., U.K., and even Canada. Nonetheless, the IT tools investigated here are ubiquitous. ERP systems are used internationally; they are not unique to New Zealand. Similarly, Excel and the other Microsoft tools are also generic beyond New Zealand. Consequently, we believe our findings have validity beyond the specific research location.

Exhibit 1 – Employers Surveys

Authors	IT Item From Survey Instrument
Deakin & Summers (1975), US., 39 items from management accounting textbooks, surveyed 250 CPAs practicing management accounting. RQ: What curriculum is needed for students wanting to pursue careers in management accounting?	Information system design, system implementation.
Knight & Zook (1982), U.S., 72 items from the AAA, surveyed 150 controllers and 150 CPAs. RQ: What are the topics for education in (financial and) management accounting?	System analysis and design, computer systems, other information systems.
Novin, Pearson, & Senge (1990), U.S., 44 items from Deakin & Summers (1975), Knight & Zook (1982), and Lander & Reinstein (1987), surveyed 500 controllers. RQ: What is the common body of knowledge for management accounting?	Microcomputer skills.
Siegal & Kulesza (1996), U.S., many knowledge and skills items from IMA Practice Analysis, 4,000 corporate accountants. RQ: What are the knowledge, skills, and abilities that delineate the scope of management accounting?	Spreadsheets, computerized accounting systems.
Novin (1997), U.S., 66 items used with CPAs, 500 CMAs. RQ: What are the education requirements for management accounting, (auditing, and tax)?	Spreadsheets, accounting information systems, computer software, database management systems, systems analysis and different design, word processing.
Lee & Blaszczynski (1999), U.S., 10 items, executives at one-third of Fortune 500 firms. RQ: What are the perceptions of the competencies necessary for entry-level accountants?	PC and Internet skills.

Hassell, Joyce, Arquero Montano, & Anes (1999), U.K., 22 IT items, 950 CIMA members. RQ: What accounting knowledge and personal skills are needed for new graduates (and newly CIMA qualified)?	Use of relevant software, knowledge of dealing with information sources.
Albrecht & Sack (2000), U.S., 22 IT items, 1200 members from AICPA, IMA, AAA, and Big Five, both faculty members and practitioners. RQ: What knowledge and skills are believed to important for accounting graduates?	Spreadsheet software, word-processing software, Windows, Internet, presentation software, database software, information systems planning and strategy, electronic commerce, technology security and controls, communication software, systems analysis.
Tan et al. (2004), NZ, 21 items from Novin et al. (1990) that came from research, academics at 15 educational institutions and practitioners at 300 firms. RQ: What are the important techniques and skills for management accounting graduates?	Computer systems-ERP systems, PC/Excel skills.
Cooper (2006), UK. 37 items developed with CIMA, 1,600 CIMA members. RQ: What are the views of practitioners on a broad range of topics from within and outside the management accounting discipline?	Information technology and systems, strategic information management, planning, and implementing IT strategies, the social and organizational impact of IT.

Exhibit 2 – IT Knowledge and Skills Synthesized from the Literature

Knowledge
Systems analysis
Systems design
Databases
Enterprise Resource Planning Systems

Skills
Word
PowerPoint
Excel
Access
Internet

Exhibit 3 – Sample Analysis

	Population of Interest	Non-responding Firms	Sample of Responding Firms
Number	35**	15	20 57.1% response rate
Sales Range*	$200-7,416 million	$205-4,132 million	$200-7,416 million
Sales Mean*	$1,176 million	$888 million	$1,391 million
Sales Median*	$ 570 million	$570 million	$ 780 million
Standard Deviation*	$1,492 million	$962 million	$1,759 million

* New Zealand dollars

** Note, one firm was eliminated from the population of interest because it was more than twice the size in sales as the next largest firm.

References

Albrecht, W. S. & Sack, R. J. (2000). *Accounting Education: Charting the course through a perilous future* (Accounting Education Series, Vol. 16). Sarasota, FL: American Accounting Association.

Arquero Montano, J. L. A., Anes, J. A. D., Hassall, T. & Joyce, J. (2001). Vocational skills in the accounting professional profile: the Chartered Institute of Management Accountants employers' opinion, *Accounting Education: An International Journal*, *10*(3), 299-313.

Bhaskar, K. N. (1982). Use of computers in accountancy courses. *Accounting and Business Research, 13*(49), 3-10.

Bhaskar, K. N. (1983). Computers and the choice for accountancy syllabuses. *Accounting and Business Research, 13*(50), 83-93.

Boritz, J. E. & Stoner, G. N. (2014). Technology in accounting education. In R. M. S. Wilson (Ed.), *The Routledge companion to accounting education* (pp. 347-375). New York, NY: Routledge.

Bui, B. & Porter, B. (2010). The expectation-performance gap in accounting education: an exploratory study. *Accounting Education: An International Journal, 19*(1-2), 23-50.

Chen, J., Damtew, D., Banatte, J.-M. & Mapp, J. (2009). Information technology competencies expected in undergraduate accounting graduates. *Research in Higher Education Journal, 3*, 1-7.

Cooper, P. (2006). Adapting management accounting knowledge needs to functional and economic change. *Accounting Education: An International Journal, 15*(3), 287-300.

Deakin, E. B. III & Summers, E. L. (1975). A survey of curriculum topics relevant to the practice of management accounting. *American Accounting Review*, *50*(2), 380-383.

Fowler, M. B. (2010, September). *Striking a balance in management accounting curricula: have the views of educators and practitioners changed between 2001 and 2010?* Paper presented at the New Zealand Applied Education conference, Eastern Institute of Technology, Napier, NZ.

Garrison, R. H., Noreen, E. W., Brewer, P. C., Chesley, G. R., Carroll, R. F., Webb, A., & Libby, T. (2012). *Management Accounting* (9th ed.). Toronto, ON: McGraw-Hill Ryerson.

Grabski, S., Leech, S. A. & Sangster, A. (2009). *Management Accounting in Enterprise Resource Planning System*. Oxford, U.K.: Elsevier.

Granlund, M. (2007). *On the interface between management accounting and modern information technology – a literature review and some empirical evidence* (Working Paper). Finland: Turku School of Economics.

Granlund, M. & Mouritsen, J. (2003). Problematizing the relationship between management control and information technology. *European Accounting Review, 12*(1), 77-83.

Harrast, S., Strong, J., & Bromley, R. (2010). More accounting theory or more information technology? *Accounting Educators' Journal, 20*, 1-19.

Hassall, T., Joyce, J., Arquero Montano, J. L. A., & Anes, J. A. D. (1999). Vocational skills and capabilities for management accountants. *Management Accounting*, December, 52-55.

Hunton, J. (2002). Blending information and communication technology with accounting research. *Accounting Horizons*, *16*(1), 55-67.

International Federation of Accountants. (2014). *International Education Practice Statement 2, Information Technology for Professional Accountants*. Retrieved from Iafc.org: http://www.ifac.org/publications-resources/2014-handbook-internationaleducation-pronouncements: December 27, 2014).

Joint Task Force for Computing Curricula. (2005). *Computing Curricula*. Los Alamitos, CA: Association for Computing Machinery, Association for Information Systems, and the Computer Society.

Knight, R. E. & Zook, D. R. (1982). Controllers and CPAs evaluate the relevance of education topics. *Management Accounting*, November, 64-68.

Lander, G. H. & Reinstein, A. (1987). Identifying a common body of knowledge for management accounting. *Issues in Accounting Education*, *2*(2), 264-280.

Larres, P. M., Ballantine, J. & Whittington, M. (2003). Evaluating the validity of self-assessment: measuring computer literacy among entry-level undergraduates within accounting degree programmes at two U.K. universities. *Accounting Education: An International Journal*, *12*(2), 97-112.

Lawson, R. A., Blocher, E. J., Brewer, P. C., Cokins, G., Sorensen, J. E., Stout, D. E., Sundem, G. L., Wolcott, S. K., & Wouters, M. J. F. (2014). Focusing accounting curricula on students' long-run careers: recommendation for an integrated competency-based framework for accounting education. *Issues in Accounting Education*, *29*(2), 295-317.

Lee, D-W. & Blaszczynski, C. (1999). Perspectives of ‘Fortune 500’ executives on the competency requirements for accounting graduates. *Journal of Education for Business, 75*(2), 104-107.

Marriott, N. (2004). Using computerized business simulation and spreadsheet models in accounting education: A case study. *Accounting Education: An International Journal, 13* (Supplement 1), 55-70.

Murphy, P., Anger, T., Barrett, A., Chan, Y. Luo, Y., Rahrovani, Y., Roger, J. & Wylie, J. (2008). *Moving from CA to CFO: A competency framework.* Toronto, ON: Institute of Chartered Accountants of Ontario and Queen’s University.

Nolan, R. L. (2000). Information technology management since 1960. In A. D. Chandler, Jr. and J. Cortada (Eds.), *A nation transformed by information* (pp. 217-256). New York, NY: Oxford University Press.

Novin, A. M. (1997). Education for careers in management accounting, auditing, and tax: A comparison. *Journal of Education for Business*, *73*(1), 29-34.

Novin, A. M., Pearson, M. A., & Senge, S. V. (1990). Improving the curriculum for aspiring management accountants: the practitioner’s point of view. *Journal of Accounting Education*, *8*(2), 207-224.

Pathways Commission. (2012). *Charting a National Strategy for the Next Generation of Accountants.* American Accounting Association and American Institute of CPAs.

Russell, K. A., Siegel, G. H., & Kulesza, C. S. (1999). Counting more, counting less. *Strategic Finance*, September, 38-44.

Siegel, G. & Kulesza, C. S. (1996). The practice analysis of management accounting. *Management Accounting*, April, 20-28.

Siegel, G. & Sorensen, J. E. (1994). What corporate America wants in entry-level accountants, *Management Accounting*, September, 26-31.

Stoner, G. (1999). IT is part of youth culture, but are accounting undergraduates confident in IT? *Accounting Education*, *8*(3), 217-237.

Stoner, G. (2009). Accounting students’ IT application skills over a 10-year period. *Accounting Education: An International Journal, 18*(1), 7-31.

Tam, T. C.-W. (2011). *The relevant information technology knowledge and skills for accounting graduates in New Zealand* (Unpublished doctoral thesis). Southern Cross University, Lismore, NSW, Australia.

Tan, L. M., Fowler, M. B. & Hawkes, L. (2004). Management accounting curricula: striking a balance between the views of educators and practitioners. *Accounting Education: An International Journal*, *13*(1), 51-67.

Wells, P., Gerbic, P., Kranenburg, I., & Bygrave, J. (2009). Professional skills and capabilities of accounting graduates: The New Zealand expectation gap. *Accounting Education: An International Journal*, *18*(4-5), 403-420.

Appendix – Summary of Responses to Question 6

1. "a working knowledge of Excel and all the main Microsoft Office Products." "we would not expect them to have a detailed knowledge of a [ERP] system, but it would be beneficial."
2. "MS tools, Excel, Access, Outlook, etc.; able to understand the actual [ERP] systems … MS tools should be understood and practiced at the intermediate level."
3. "Excel is pretty much a prerequisite for most roles now." "[Excel and] the other one is Microsoft tools." "ERP training is quite specific, because a lot of companies buy packages … and modify them for themselves, but basic entry of invoices or processing cash is the same. It is an advantage … to have someone who has had the same ERP experience, but the systems are pretty user friendly." "They need to be able to work in Outlook. .…" Having worked on some ERP system might be advantageous."
4. "We have alluded to Excel being the big one, really to get much further, pivot tables are a must have, v-lookups, those kind of things, so getting to the more intermediate, pushing up to an advanced level." "all the places I have worked at, they have had different [ERP] systems, it is a way of thinking that you need to have, and a willingness to learn and pick up new things." "we use everything .. to build into Excel, Word to get that end financial account."
5. "It would be pretty helpful if you had part of a course, had a simple ERP system, and you could go in there and know how to process an accounts payable voucher and follow it through to the general ledger, and then a report, and maybe process an accounts receivable …" "Excel. And I guess Word, or the Microsoft Office package." "We do not use Access."
6. "Excel is key." If they can do all of the basic stuff, like v-lookups, and maybe if they have a little bit of exposure to doing macros. But I certainly would not expect them to walk in on day one and be able to write a macro." "Intermediate on day one is probably good ..." "Because all the systems are so unique and customized, you could not teach everything, like in SAP, you want to get a trial balance, you type in FS10N … so teaching generic skills …"
7. "I think what is very useful is databases, generally, now that can be Excel, Visual Basics, Access." "what we are looking for is someone in more of the Microsoft area, is to be able to suck out information and put it into format that are usable, reporting, analysis, that sort of thing. So it is that sort of skill that we perceive as valuable." "Our [ERP systems] requirements are different to other peoples as well, but what you [educators] can teach them is the ability to be able to learn it."
8. "As we move on, and get more sophisticated, the use of Excel, pivot-tables, we expect newer people to have those skills, especially from a university." "any new person has to have Excel skills, otherwise we would not employ him or her." "[with a new employee] you would expect some understanding of [ERP] systems quite a bit similar background … to have taken one or two courses, and to be really good at Excel." "mostly Excel, Access, not so much Outlook, but a little bit of Word." "most ERP systems you can drag the information out into Excel, paste it, and then you can manipulate it. You might need to use pivot tables and graphs." "if we did not have Navision [an ERP system] we would use Excel a lot more heavily than we do now…"
9. "you cannot exist as a modern-day finance professional without appreciation of [Excel]." " I would not say you would not recruit somebody because – if we use JD Edwards and we asked if they had used it, and they said no but I have used SAP. It is more that mindset." "you look at their CV, and you think have they had experience, what are the types of things they have been doing, same as the things you are asking here. Have they had experience with systems." "If they do not use Excel, they do not get a job." "Excel is a tool of the trade … Knowledge of Excel at an intermediate level." "If anyone said they were an Excel expert, and they started getting into macros, I would just tell them to stop. Because that becomes – it is not technically code, but it is too complicated … So things like pivot tables, searches, queries, and things like that, where you are using filters. You go beyond that are you are actually doing stuff that the ERP system should be doing." "ERP systems … are really capable of collecting a large amount of data … you use Excel to try and make sense of a lot of data." "standard Microsoft Office Suite…" "[Access] is something a lot of people used to use, and then moved away from it because it is a bit too mysterious. The capacity of Excel has grown considerably."
10. "Excel today is key for anyone dealing with accountants and accounts and processes. It is just a common tool that seems to be expected ... Comfortable with moving around spreadsheets and

doing formulas and things like that." "I think more and more you would be expecting the younger ones to have greater knowledge as time goes by because it is being taught in schools today, so by the time they have been through university, you would expect quite a bit." "In terms of [ERP] accounting systems, I would probably say 60/40 being on the job [training] and existing [from university] knowledge.." "I guess what I am saying is that you have a basic knowledge of how the [ERP] system works, and then you learn how that particular system you have in front of you deal with that.." "I would expect the introductory level [of Excel] now to be handled at high school and the intermediate level to be done at the university level." "Pivot tables are so useful. Macros are beyond what would be necessary." "I do not think Access is even a system because of you have an …[ERP]… system…" "Word, Excel, Outlook are the are big three and you are pretty lucky if you get someone who can use all of them, [including] PowerPoint and Access."

11. "you want someone that has good Excel skills and an understanding of accounting within a computing environment, but you are going to have to teach them the transactions, obviously because you cannot learn every system at university." "good Excel and all those sorts of skills…." "Obviously they cannot know a SAP or a non-accounting system or those systems inside and out, but it is the ability to be able to think the logic. Most [ERP] systems are pretty much similar. … Most systems use the same kinds of steps and logic to flow through, and I think graduates need to have an understanding of how those things work and flow…"
12. "Basically almost everything we do is in Excel. … Ultimately all the data manipulation and everything is done with Excel." "We use PowerPoint for some of our reporting, but 95% of what we do is in Excel, and it is generally just the Microsoft suite that we use as well, with the exception of Word. We not really use Word that much." "Excel requirements are at least intermediate … we do not get up to the level of writing our own macros, but we can use most of the formulas that we are aware of within Excel in terms of modeling … and creating spreadsheets." "familiar with IT products or [ERP] accounting system products… " " Most [ERP] accounting systems are relatively intuitive these days, so I think if you put a student in a course that was based on any kind of simple, manual accounting package or accounting system, that kind of familiarity with an accounting system, hopefully they can jump onto the next one, and its is quite intuitive." "at least intermediate [Excel]." "expectation of intermediate Word and PowerPoint use as well." "For an accountant, [macro building] can be useful, but it is probably another path you can go down to building databases or big models …[and] … not your main role…"
13. "So we have to understand how data flow through the system, where it is generated from, and links from one system to another … [and] know how to manipulate different systems…" "it does not hurt to be able to navigate around SAP." "it does not have to be specific ERP skills, but it is just someone who is [ERP]system savvy, who is comfortable with an [ERP] system and is not afraid to explore it…" "And then onto Excel, I think at advanced – I am not a big fan of macros, but advanced Excel skills, I think is an absolute requirement.. . If you cannot manipulate huge amounts of data quickly … you just going to fail." "we tend to use v-lookups, sum-ifs, pivot tables, the graphs and charts … linking spreadsheets together…" "into PowerPoint, and Word documents and PDFs and that Suite of things."
14. "All Microsoft products. I would hope that most university students would have a pretty good understanding of that stuff." "have higher understanding of Excel because that is the accountants' tool." "But getting into JD Edwards, Integrity and Hyperion I would say not a very high level because … if you go to a different business, you might find they have got SAP or they have something else .. so when they come they at least know what a consolidated system is."
15. "All those Microsoft skills, we would expect those as standard.… Excel … good … at least intermediate." "Word would be intermediate." "Access would be intermediate." "And potentially some exposure to ERP systems. I mean in many respects I do not think it matters which one, but just some broad understanding of how they work, what they are about."
16. "[For] all of these [ERP] systems … the fundamentals are quite the same.… Just as long as people understand what an ERP system is, then they can work across systems. That is a real key point, this understanding of what an ERP system is, and what it does, and what it can tell you, and what you need to know, versus actually how do you do that."

    "On the CVs … when it says MBOY or whatever I discount that but if it has SAP or JD Edwards or something similar, then you say okay that is cool." "Just to understand what an ERP system is…" "Excel skills are … hugely important. Excel is embedded in all of our processes, so that is something that people do need." "I live and breathe pivots, filters, v-lookups, sum ifs … I am not so hot on macros, that to me complicates and makes it difficult to handle worldwide."

17. "SAP, Oracle, and PeopleSoft; they are all different, but they are all similar." "[If students have different ERP system preparation than our] Microsoft AX experience, obviously that will be an advantage … [when] … someone might come in and said, 'well I have been using that, and did you know you could do this?' or 'there is a different way of approaching it' and that is where I have found benefits …" "we have got to dump all of that information into our spreadsheets." "I think whatever IT skills you can pick up in university and bring to the job are only going to help. The stronger you are the easier it is."

18. "We use a lot of systems which come together and forge interactions. The difficult part is understanding how those all fit together in what you are doing." "It is more process-oriented actually having people understand where things come from, where they go to, and what the impacts are…" "Excel will always be around, you cannot get away from it…" "I would not say advanced. Excel has a lot of features, and a lot of them are hard to learn unless you need to use them. I think probably intermediate level." "Things like pivot tables and some of the more complicated but really useful formulas. I would have thought that is again bread-and-butter..." "I would say from a general IT skills perspective, most young people coming out of university are pretty good at using windows and files and it is more the accounting specific stuff that they lack." "We do not really use Access for anything." "We tend to jump from Excel to using data-tools like SAS and other tools depending on volumes of data and what you are trying to do."

19. "I think any accountant coming to a finance role needs a pretty good grasp of Excel … intermediate to advanced levels of Excel. … also [exposure to] some of the accounting systems, your SAP, your Cognos…" "but using JD Edwards, you obviously have to have a good understanding of accounting fundamentals … That should be taught in first year accounting." "it would be useful having a third year advanced Excel paper …" "Microsoft Reporting Services just to be agile."

20. "would need to be able to get the applications started through the Microsoft Office Suite …" "if we had a choice between someone with no knowledge of Excel versus someone with an intermediate knowledge, we would be going with the intermediate straight away because those types of roles are pretty heavy with pivot tables and all the rest of it." "I would expect them to understand the basics of how Excel works, … be able to use things like Outlook and Word, to that extent they could get something done … about them having the understanding and being able to link stuff together, to be able to construct a model or do simple calculations." "the important thing here is about concepts, and actually understanding how the ERP system comes together and actually understanding what the payables function does and what the HR function does." "understanding the [ERP] concepts and the flow of information." "Another problem you have is that any company you go to, even if they have the same system they have implemented it differently, so someone comes and they have used Oracle or they have used SAP, really it does not matter as long as they have got the concepts behind how those systems work, it does not matter which one they have used." "ERP systems are about processing transactions and consolidating those, whereas Excel is about doing calculations doing some analysis, to dingo some modeling, to doing some scenarios."