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# INFORMATION TECHNOLOGIES IN ACCOUNTING EDUCATION

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**Abstract:**

Advances in information technologies have transformed the accounting function in business and the role of accountants. Recognizing the importance, several employer bodies and professional associations have called for sound information technology skills to accountants. Whether it is auditing, financial accounting or management accounting, information technology tools that are relevant, appropriate and at industry standard level need to be embedded in the accounting context and taught with the help of modern pedagogy. Instead of adding additional content in separate information systems/technology based units in the already crowded curriculum, it is necessary to embed relevant IT tools and concepts into the existing accounting units by ensuring deep learning, contextual understanding and appreciation of the IT/IS issues in accounting context. At present, it appears the level of deployment of these technologies into accounting units is limited and many aspects employers expect the accounting graduates to posses are missing. Accounting schools must embed frameworks such as REA, concepts such as network security, accounting forensics, IT controls, business intelligence and software/applications such as SAP, MyoB and enterprise performance management, into their units in order to prepare accounting graduates of the future.

**Keywords:** Accounting, information technologies, pedagogy, curriculum

## I. INTRODUCTION

Rapid advancements in information technologies from 1990s have significantly transformed business data processing, processes and models and had a significant effect on accounting professions. Several reports by the Accreditation bodies, employer bodies and researchers have identified the need for sound information technology skills to Accounting graduates [ALTC, 2009; Chandra et al, 2006; AACSB, 2010; Hancock et al, 2009; BIHECC, 2007]. Employers want accountants who have the capability to understand and negotiate their way around contemporary information systems used for accounting. Though accounting has such a large technological foundation in the real world, it is doubtful whether university business schools are producing the 'work ready' accountants. Moreover, the generation Y students currently studying in the university business schools, though are technically savvy and competent, the level and intensity of current and emerging technologies embedded in the teaching and learning strategies as well as in the subject content in the accounting programs is relatively low.

This paper reports on a work in progress in an Australian university business school that analyzes the technologies employed in the accounting programs across the country. Based on the review of literature it presents an discussion of the debate on the need of information technology skills to accounting graduates. Based on a study conducted across the country, this paper reports on the extent of the usage of current and emerging information technologies in the accounting programs and offers recommendations.

## II. BACKGROUND

Accounting has a large technological foundation in the real world and accountants work in an information technology-enabled environment irrespective of the role, nature of organization and size. In spite of such widely held views that accountants' need skills in the selection,

implementation, management and use of information technologies at their work place, universities appear to be approaching the accounting education from a theoretical perspective. Without embedding current and emerging information technologies in the teaching and learning of accounting and without incorporating various accounting applications and technologies that are IT-based in the curriculum, university business schools are not able to produce graduates with skills that are in demand (ALTC 2009; Kavanagh & Drennan, 2008] and graduates that are 'work ready'. Though there is a significant change in the nature of accountants' work and their role in organizations [Thomson, 2009; Howieson, 2003], the university accounting education has not been following suit [Kavanagh & Drennan 2008; Albrecht & Sack 2000].

Whether universities are preparing 'work ready' professionals is a contentious issue in every profession. In accounting also, this debate has been there since the introduction of entry requirement in 1965 by the Australian accounting profession [Linn, 1996]. Employers have been complaining that the universities are producing graduates with 'theoretical' knowledge rather than 'practical' skills that will help them perform their tasks on the job effectively. This observation is not limited just to accounting, but to many other professions such as engineering and nursing [Mulgan, 1986]. Limited resources and inadequate interaction between academics and practitioners are cited as the main reasons why the current university accounting education is not able to meet future needs of students and employers [Wu and Chen, 2004].

Recent observations by the Business Industry and Higher Education Collaboration Council (BIHECC) confirm those employers' concerns and point out the inadequate development of these skills to graduates [BIHECC, 2010]. While this debate is not new, it is a complex issue. This is influenced by several factors including the expectation of students, diverse characteristics and requirement of employers, objectives of the university degrees, available resources at the universities, demands by the professional bodies, competencies of the academic staff and their teaching and learning strategies.

The International Federation of Accountants (IFAC), a major professional accounting body, has been stressing the importance of information technology skills to accountants since 1995 and released guidelines to university business schools. The recent release of these guidelines specify the knowledge of transaction processing systems, data organization and access methods, IT architecture, IT security management, IT strategy, IT internal control, IT systems acquisition, development and implementation, and management IT [IFAC, 2007] for professional accountants. Similarly, the International Accounting Education Standards Board (IESB) emphasizes the acquisition of competence – "*the ability to perform a work role to a defined standard with reference to working environments*" which includes the IT-enabled work environment (IESM 2009). According to IESB (2009), a professional accountant must possess the necessary professional knowledge and skills in addition to values, ethics and attitudes and IT skills are an important component of this skills portfolio.

The Education Committee of the International Federation of Accountants (IFAC) has considered IT as an integral component of the University Accounting curriculum. They identified IT knowledge and competencies as one of the three knowledge and skills areas that a professional accounting education should contain [IFAC, 2003]. The IFAC recommends inclusion of IT control knowledge, IT user competencies, IT control competencies and knowledge of evaluating an information system. Accounts are required to demonstrate their understanding of the impacts of IT on business processes and models, IT risks, IT enabled internal controls and ability to use various contemporary accounting information systems and technologies [IFAC, 2003].

In its submission to Bradley's review of higher education, the Joint Accounting Bodies (JAB) that include CPA Australia, National Institute of Accountants and the Institute of Chartered Accountants in Australia, have stressed the importance of imparting work ready skills to students [JAB, 2008]. They have recommended "curriculum renewal to better reflect the contemporary demands of business in a rapidly changing globally competitive world," [JAB, 2008]. Rather than expanding the number and content of the technical accounting subjects, the JAB has

recommended embedding the required skills for improved 'employability' of the graduates into intentional curriculum design of constructed learning experiences.

Even though development of capabilities as against the 'competencies' is considered the main role of university accounting education [Mulgan, 1986], competencies are also considered important given the employers requirement of effective 'employability' of 'work ready graduates. For example, Wornoff (2009), in an analysis of the legal profession which is similar to accounting profession as it is also service-based, argues that both universities and practitioners have complementary roles to play in the development of professional practitioners. With regard to teaching practical skills, Wornoff (2009) argues that the universities have a comparative advantage for both the teaching of tasks and context within courses taking a perspective wider than the immediate commercial concerns of a particular professional firm.

Several reports by the Accreditation bodies and employer bodies have identified the need for sound information technology skills to Accounting graduates [ALTC, 2009]. Employers want accountants who have the capability to understand and negotiate their way around contemporary information systems used for accounting. Widespread diffusion of information technologies into the workplace means that students who have high level up to date IT skills will be likely to integrate more rapidly into an organization and become productive sooner rather than those who do not [Heales, 2005].

Rapid IT advancements from 1990s have significantly transformed business data processing, processes and models and had a significant effect on accounting profession. Rapid growth, range and the dynamic nature of the current and emerging technologies used within accounting practices [Gellinas and Gogan, 2006], poses a challenge to identify a specific list of IT skills that are relevant and useful to accountants [Greenstein & McKee, 2003].  A study of accountants in Australia by Rai et al (2010) identified spreadsheets, accounting applications and security management as the most important IT skills required for practicing accountants. Similarly in a study in Malaysia by Ismail and Abidin (2009), auditors have ranked accounting applications as the most important category of IT skills required. Rai et al (2010) identified the reported lack of skills among accountants in Australia in IT security management and accounting applications despite them rated as the top five important skills. In a recent survey of accountants and auditors, the American Institute of Certified Public Accountants (AICPA) have identified IT security, reporting from business intelligence software solutions, leveraging efficiencies from accounting software, IT risks and IT-enabled internal controls among the top priority initiatives for their organizations [AICPA, 2010].

Several studies conducted since 2001 have suggested the need to better incorporate IT skills into accounting curriculum [Rai et al, 2010]. As pointed out by Wessels (2005), several core subjects in the accounting curriculum such as financial accounting, management accounting and auditing are taught without any reference to the role of IT and IT-enabled automation of accounting processes, transactions, controls and reports. A study by Chandra et al (2006) identified a growing gap between the information technology skills demanded of accountants and those supplied by the universities in USA.

Though, accounting has such a large technological foundation in the real world, universities, primarily approach them from a theoretical perspective without embedding modern information systems and technologies in the teaching and learning and therefore are not producing graduates with the skills that are in demand [ALTC, 2009; Kavanagh & Drennan, 2008]. Therefore, more integrated approach to the education and development of professional accountants that involves complementary roles played by the universities, employers and professional accounting bodies such as CPA, as suggested by Velayutham and Perera (2009 is required. In spite of some developments in the accounting curricula in recent years with greater usage of software tools such as Excel, MYOB and Quick books, graduates perceive that there are significant gaps in the skills to prepare them for their work as professional accountants [De Lange et al, 2006]. A study by Chandra et al (2006) identified a growing gap between the information technology skills

demanded of accountants and those supplied by the universities in USA. When the skills demanded by employers do not align with those acquired by students in university business schools, graduates believe they are full prepared by the universities. This inadequate preparation for 'work readiness' imposes an unnecessary cost of retraining on the industry in basic accounting practices and processes that demand integration with IT skills.

This issue has become particularly significant and timely in the context of recent moves by the Australian Federal Government to introduce "codified course attributes and graduate outcomes across all areas of post-school study" as a part of its Australian Qualifications framework (AQF). With the accounting discipline being the first to be considered for the development of minimum academic standards under AQF [Matchett 2010, p.30] in business degrees, there is an opportunity to explore some of these issues. As information technologies increasingly become embedded in most of the accounting and other non-accounting transactions in business, it is essential for students to acquire these skills in universities. Improved understanding of the information technologies and their potential impact on business processes and models, may also help accountants in resolving the IT paradox that shows a lack of correlation between productivity and investment in technology [Thorp, 1999].

The Association to Advance Collegiate School of Business International (AACSB 2010) wants business students' learning experiences to include the use of appropriate instructional technologies and technology tools. The American Institute of Certified Public Accountants (AICPA) suggests "individuals entering the accounting profession must acquire the necessary skills to use technology tools effectively and efficiently," (AICPA, 2006: pp.3). In fact, these skills are considered essential in order to develop and apply other functional competencies. Similarly the Bedford Committee of the American Accounting Association (AAA), in a report to the university faculty, suggested accounting academics to acquire necessary skills to carry out computer-assisted teaching and learning. Training accounting graduates who are fit to work in an information technology-enabled environment is more challenging for academia than ever before.

The following section will discuss the information technologies currently deployed and taught in various accounting programs.

## III. INFORMATION TECHNOLOGIES IN ACCOUNTING PROGRAMS

### Some technology tools

Today computer competency is a very important part of an accountant's technical ability. All companies use some form of a computerized accounting system, such as QuickBooks, Peachtree, or MYOB or SAP and several management accounting tools enabled by information technologies. In fact, there is no single organization whether it is a small or medium or large enterprise that does not use some accounting software to manage its accounting transactions and reports. These systems use a variety of computer functions to properly record financial information and create financial statements and reports. Thus, accounting application software solutions are pervasive in industry and employers expect accounting graduates to have good mastery of accounting software [Hancock et al 2009].

MyOB, Quickbooks, NetSuite, AccountEdge and Sage Peachtree are some of the most popular computerized accounting systems used by small and medium-sized enterprises (SME) all over the world. These software packages help SMEs to manage inventory, customers, vendors, employees, payroll, general ledger, accounts payable, accounts receivable, time billing, costing, banking, fixed assets, financial statements and reports. Some universities use one of these software tools to teach accounting concepts at the foundation level to business students.

Spreadsheet have an important role in businesses even when an organization has the latest and most comphrensive accounting software solutions for managing accounting processes. Many

times account reconciliations or other reports are created using spreadsheets from financial information and many reports produced by the accounting applications are imported into the excel spreadsheet and manipulated for further use. In fact, spread sheeting is considered one of the key IT skills essential for management accountants who provide management decision support [Beaman and Richardson, 2007]. Though many university accounting programs incorporate excel spreadsheets as tools in teaching management accounting units, employers still expressed disappointment in the excel competence of graduates in Australia [Hancock et al, 2009; Chandra et al, 2006].

A significant proportion of large enterprises use integrated enterprise-wide information systems such as SAP, Oracle that provide support for accounting as well as other business functions. In addition, many companies use various advanced management accounting tools such as activity based costing, balanced score card and strategic enterprise management. These tools are information-technology enabled now and are typically embedded in various advanced IT solutions such as SAP. One of the important technical skills employers want accountants to posses is the mastery of accounting software [Hancock et al, 2009]. ERP (enterprise resource planning) systems are the most popular tools used in teaching accounting courses in USA. Considering the maturity of the ERP software in the market, and the support offered by large ERP vendors such as SAP, Oracle and Microsoft to universities, there is a good deployment of these tools in accounting courses in USA.

Further Microsoft access, data mining, data warehousing, XBRL (Extensible Business Reporting Language) are other technologies available. Even though these technologies are viewed as the most important and relevant to industry, they are not embedded in a large number of university business schools accounting programs [Hancock et al, 2009]. Though REA (resources, events and activities), a modeling logic is taught in many university business schools in USA, other contemporary technologies such as XBRL, ERP, business intelligence, IT security and IT-enabled forensics are not taught in university accounting programs. For example, a study conducted in US identified excel, REA and Great Plains Dynamics (an ERP system for small and medium sized enterprise) are the most popular applications embedded in accounting units [Chandra et al, 2006].

REA is another data modeling framework that is important for many accountants at their workplace. REA (resources, events and agents), is a method of modeling data and business processes from an accounting perspective. It is used as a framework for building and understanding accounting information systems in a shared data environment both within the enterprise and between the enterprises in supply chain context. Widely used in USA accounting programs, this modeling framework integrates the teaching of accounting transaction structures, commitments, business policy specifications, process improvement and value chain construction [McCarthy, 2003]. With many accountants typically involved in modeling and process improvement projects in organizations, REA and process modeling skills are important skills accountants would like to have these days. While IT concepts such as data mining, data warehouses, and ERP systems are more amenable to integration in management accounting units, activity based accounting, lean accounting, and six sigma quality management concepts can leverage these IT-based concepts to enrich management accounting curricula (Chandra et al 2006).

## Context of analysis

The aim of this analysis is to understand the nature and type of the technology tools incorporated in various accounting programs in Australia. The objective of this study is to establish the need for the deployment of appropriate, relevant and current information technologies/tools into the accounting program and understand how they could contribute to improved learning outcomes. The second objective is to recommend suitable tools from the range of options available depending upon the local circumstances and constraints, and develop a comprehensive plan for gradual introduction into the accounting program in a business school. In addition, the objective is to equip students with appropriate, relevant and latest skill sets required for making a productive

contribution in the workplace and improve the competitive advantage of our graduates in Accounting. The outcomes of this initiative will also contribute to the educational mission of the faculty and university to build and sustain the leading learning community in business in its region. In particular, this initiative will help achieve the "*mastery of information technology*," as mentioned in the mission statement, in addition to the development of generic skills, cross-disciplinary studies and promotion of international understanding" (USYD 2010).

As the only Australian institution with AACSB (Advanced accreditation in both business and accounting programs, the findings of this study will also help the institution to maintain and exceed AACSB requirements.  AACSB accreditation standards require the inclusion of learning experiences in the design and application of technology to financial and non-financial information management, business processes and their analysis, recording, analyzing and interpretation of historical and prospective information (AACSB 2009) in accounting programs. For both the business programs as well as for the accounting programs, the AASCB standards require the schools to make their graduates competent in the uses of technology and information systems, both in the content as well as in the pedagogy. AACSB requires the schools to demonstrate the inclusion of information systems/technologies in the curriculum and the particular pedagogies used in teaching and learning (AACSB 2010) and demonstrate the relevancy and currency of their programs.

## Information technologies in accounting programs:

Information technology tools and systems are used as a teaching aid in many accounting courses. In the first phase, information about the units in accounting programs is collected from the university web sites and handbooks. Further, several academic staff members from universities across the country are contacted for further information and details about the unit. Some have agreed to send detailed outlines while others have declined to share that detailed information.

Based on the information collected so far from 9 universities, a summary of the technology components employed in the units are presented below. It gives a brief summary of the range and type of technologies employed in Accounting units at the undergraduate and post graduate levels in Australian universities. The term 'high' means the institution is using this technology intensively in the unit and has an important assessment component with at least 20% of the weightage. I am dead tired to do anything

Table 1: Summary of the technologies employed in accounting units

| Technologies | PG | UG | Nature of units where technologies are employed |
|---|---|---|---|
| Spreadsheet | 60% | 80% | Mostly in Mgt accounting units |
| Access | 20% | 40% | Business/Accounting info systems units |
| Quick books | 0 | 20% | Introductory accounting unit |
| MyOB | 40% | 60% | Introductory financial accounting units |
| Other accounting software | 0 | 10% | Same as above |
| SAP | 5% | 40% | Introductory financial accounting and accounting info systems units |
| ARIS | 10% | 10% | Accounting info systems units |
| SAS business intelligence | 10% | 10% | Advanced accounting info systems units |
| ACL Audit software | 10% | 10% | Auditing unit |
| Other auditing software | 10% | 10% | Auditing unit |
| Blogs, Wikies, Web 2.0 | 10% | 10% | Foundation course on business technologies |
| MyAccountingLab | 10% | 20% | Accounting units |

Table 2: Course wise details

| Accounting units | Most popular software used | Comments |
|---|---|---|
| Introductory first year accounting unit | Quickbooks, MyOB, SAP | Introductory accounting unit; typically software is used to demonstrate accounting transactions, processes and reporting at different levels. |
| Financial accounting - first year unit | Excel, MyOB and SAP | Financial accounting and company accounting units with focus on financial statements, |
| Management accounting | Excel, and SAP | Most of the first cost accounting/management accounting units use Excel; One university uses SAP Controlling module to teach them concepts of costing, . While the first unit in management accounting focused on tools, the second unit focused on the strategic issues |
| Accounting//business information systems | SAP, Access, MyOB & other process modeling tools | When accounting/business information system is a compulsory core unit in the accounting program, universities used SAP. With focus on processes, transactions and modeling |
| Auditing | ACL audit software and | Most of the universities do not use any technology tools here, except one leading university that uses proprietary forensics and auditing software tools and another university that uses ACL audit software |
| Advanced/strategic Management accounting | Excel, SAP | Excel and SAP are the key tools used by universities for advanced management accounting units. |
| Specialised elective units in BIS | SAS, data mining, business intelligence tools | These tools are used by two universities where they offer specialized elective units on business intelligence and forensics. |

## Discussion

Excel is the most popular software employed in accounting units. Many introductory units in management accounting typically employ excel. Even though the level of excel expertise imparted is limited, with hardly any university teaching students advanced features such as macros, and other aspects.

Unlike in USA, deployment of ERP software solutions in Australian business schools is generally limited. Many of the partners in the SAP university alliance program are from the department/discipline of information systems and outside the business faculty. Except two universities, all other 8 universities in Australia and New Zealand do not seem to have accounting units with SAP as a part of the program. The emphasis, its intensity of usage in business or accounting courses is limited and varies from university to university. While some schools use this only in one post graduate unit, other schools deployed this software in undergraduate units.

While one school used SAP only in postgraduate accounting units, another school used SAP in accounting foundations course. Another two universities incorporated SAP in their core business/accounting information systems unit, which is a compulsory unit in the accounting program.

In general, it appears undergraduates courses covered more IT topics and tools than PG courses in Australia similar to USA. With many post graduate courses such as Master of Professional Accounting, and Master of Business (accounting) similar to the undergraduate courses, the IT topics covered are not significantly different. Similar to USA, undergraduate courses appear to have covered more IT topics probably because of the relative emphasis of hands-on experience at the undergraduate level.

In spite of the current awareness of the importance of IT, and recognition that it will become more important in future, most undergraduate accounting degrees require only one unit in a 3 year 24 unit course. Both CPA and ICAA have similar accreditation requirements. Different university business schools adopt different models while covering IT related concepts and skills in their accounting curriculum. Some university schools require accounting students to complete separate unit titled 'accounting or business information systems'. The aim is to teach basic information systems concepts including the concepts of data modeling, processes, business transactions, information technology concepts, information systems development, selection and implementation, and some decision support concepts. This is taught with the hope that students will integrate the knowledge from both information systems/technologies and accounting perspectives. As it has become increasingly difficult to incorporate one or two separate units that deal with all the IT related topics and tools, in the already crowded curriculum.

Beyond the basic or compulsory units, there is limited opportunity for students to take elective units that go beyond the basic accounting information systems units in many traditional accounting courses. Consequently students are often unable to visualize the links between the two disciplines unless there is a concerted effort by the academics in explaining those links and demonstrating the integration and significance.

Moreover, the requisite skills in business intelligence, decision support, network security, IT-enabled internal controls and accounting forensics are not covered anywhere in the program leaving a gap in the 'preparedness' of the graduates. In an already crowded curriculum where the subject content is ever expanding, it is increasingly difficult to make students take separate IT/IS units and acquire these vital skills. While some students may learn these IT skills in the workplace on their own, or with the help of some professional training offered by the employers, a majority of graduates struggle at the workplace.

As an alternative, it is suggested to incorporate the concepts, tools and skills into several units depending upon the relevance and content rather than offering a separate unit on information technologies/systems. By embedding information technologies and systems into the regular accounting units whether they are in financial accounting, management accounting and/or auditing, it is possible to meet the requirements of the professional organizations as well as improving the 'employability and 'work-readiness' of the graduates. IT-enabled tools and software solutions are available for adoption and integration into the regular accounting teaching whether they are for accounting forensics, computerized auditing tools, or management accounting tools, or IT-enabled balanced scored cards or strategic enterprise management software solutions or business intelligence tools. Conceptual issues should be appropriately related to practical applications in an intellectually challenging manner, without undue emphasis on formal technical procedures. On a pedagogical level, embedding IT related issues into the core accounting technical topics, will ensure the contextual understanding and deep learning.

In addition to embedding these IT tools into accounting program, technologies could also be deployed in the pedagogy of teaching. The current crop of generation Y students generally are more technology-savvy, and, the way they use books, multimedia and online solutions are

significantly different from previous generations. Many Y generation students whether they study accounting or engineering, typically use media assets such as e-lectures, i-Pod content for understanding the subject content. These millennium students must be prepared not only with the accounting knowledge and skills, but also with the abilities to adopt, evolve and continue learning in pace with the world. A paradigm shift in teaching and learning strategies that incorporate blended learning and student-centered learning is necessary.

Products such as MyAccounting lab by the Pearson Education group, are some of the new tools that have learning-centered approach at the heart and are increasingly deployed by university accounting schools. MyAccountingLab is a web-based tutorial, and assessment software for accounting that not only facilitates effective learning to students, but also gives flexibility to lecturers making technology an integral part of their unit or a supplementary resource. With features such as powerful homework and test manager, item analysis for tests and quizzes, enhanced security for tests and homework and grade book tracking [Speckler, 2010]. In the context of increased reliance on casual tutors and teaching assistants, limited homework options, inadequate feedback on assessments, lack of standardization of content and outcomes, varying expectations of students, academics are increasingly seeking technology solutions to teach large classes in accounting programs. Technology tools such as MyAccountingLab will teach students not only the accounting content, but also how to learn. It makes them 'work ready' with the necessary problem solving and communication skills [Speckler, 2010].

Other tools such as Web 2.0, online discussion forums, Wikies, Blogs, social networking sites such as twitter are also used for enhancing the learning. It is believed that they can learn better when these blended learning enabled by technologies is introduced in the curriculum. Accordingly several business schools have incorporated various information technology tools.

## V. CONCLUSIONS

Information technology competencies are one of the key technical skills accounting graduates are required to possess. In order meet the AACSB and IFAC requirements and help students become 'work ready', university business schools are required to incorporate these information technology software tools into the accounting units. With the accounting curriculum already crowded with the ever expanding subject knowledge, it is not possible to impart these skills through additional units. Moreover, learning about information systems and technologies in isolation without accounting context is difficult and not observed to be effective. Whether it is auditing, financial accounting, cost accounting, balanced score card, activity based accounting or sustainability accounting, information technology tools that are relevant, appropriate and at industry standard level need to be embedded in the accounting context and taught with the help of modern pedagogy. At present, it appears the level of deployment of these technologies into accounting units is limited. Accounting schools must embed frameworks such as REA, concepts such as network security, accounting forensics, IT controls, and software/applications such as SAP, MyoB, business intelligence and strategic enterprise management, into their units in order to prepare accounting graduates of the future.

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