Information Systems Competencies in Accounting Education- Egypt Case

Dr Adel Ahmed

Abstract

Rapid developments in information technology (IT) and Information systems (IS) have posed many challenges and changes to the accounting profession. This has resulted in a need for quicker and more decisive action by accounting education to integrate the IT/IS Competencies into accounting curriculum as requirement for new professional services and skills for accountants. This study initially obtain opinions about the current state and the future for IS into accounting programmes. Secondly, it assesses the level of IS skills and knowledge which is included in accounting programmes now and in three years' time. A survey using a mail questionnaire was used to collect the opinions and views about IS in accounting education. The conclusion of this paper is that the accounting educational program in Egypt should provide students with a firm foundation in the functional areas of business and a foundation in computing technologies. These will enable graduates to pursue both technical and managerial careers' incorporating leading edge technologies in public and private organisations. The integration of IS into the accounting curriculum should be designed to provide students with the knowledge and skills required of graduates entering employment. Furthermore, it should seek to educate and to provide the knowledge needed for these people to plan for and adopt IS techniques in business and management.

Keywords: Information Systems, Information Technology, Accounting Education Developing country

I.   Introduction and Background

Technological widespread and, especially, information technology increase has led to requirements of the work market that are more and more diverse in relation to the competencies of the accountant as a profession. The problematic of the competencies and their evaluation has become a subject of major interest in the professional educational preparation in any field. The term competency has a major impact also in the accountant education, with a powerful influence upon the way the future accountants will be evaluated. A fundamental characteristic of the competencies-based education is that the definition of offer and of the educational program starts from the purpose of obtaining certain results identified beforehand, Tudor, et al (2013).

The author identify three important challenges currently face the accounting profession and thus accounting education regarding the information technology. Firstly, information technologies are affecting the way in which organizations operate, secondly, information technologies are changing the nature and economies of accounting activity and thirdly, information technologies are changing the competitive environment in which accountants participate.

Accounting education should reflect accounting practice with regard to knowledge and skills, which are specific to practice. Jampol (1996) states:

> *"The relevant Information Technology systems are: decision support systems, executive information systems, expert systems, and office automation. A decision support system allows what-if analysis employing the retrieval of information. An executive information system is a simple data retrieval and information handling system developed specifically for the executive. Expert systems attempt to model*

expert decisions.   Office automation is the application of automated technology to support office-related functions and may include word processing, scheduling and electronic mail".(Jampol, 1996, P.23)

Technology has become an inevitable part of today's accounting practice, and therefore selecting equipment and tools, applying technology to certain tasks, and maintaining and tracing and correcting faults in technological devices are necessary skills for the average accountant (Mohamed and Lashine 2003, Ahmed, 2003)

Tudor et al (2013) concluded that It revealed a strong relationship between the dimension of IT and communication competencies related to the accounting profession and the perceived importance on the utility of various technologies which were the subject of analysis. The goal of accounting education must be to produce competent professional accountants, preparing students to become both productive members of the workplace and valuable members of the community. The goal is to produce accounting graduates who possess competencies that match the competencies demanded by those who employ them (Frederickson.and Pratt, 1995). The education of professional accountants must provide a foundation of knowledge, skills, and professional values that enables them to continue to learn and adapt to change throughout their professional lives (IFAC, 1996).

Calls for change in accounting education date back to at least the 1960s by numerous professional groups, including the American Institute of Certified Public Accountants (CPAs) and the Institute of Management Accountants, who have detailed what accounting students should study during their undergraduate programmes. Although virtually no group has asked accounting academics their views on the structure and purpose of the accounting curriculum content. 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, 2004). Rai et al (2010) identified spreadsheets, accounting applications and security management as the most important IT skills required for practicing accountants, 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 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).

As information technologies grow more advanced, current accounting education is challenged by major changes in the environment in which professional accountants are operating (Ahmed, 2003). One of the major factors that affect this environment is the impact of IT on the accounting profession. Accounting education has been under criticism for many years. Resulting from rapid technological advances and growing market globalisation, the role of today's accountants has switched from the bookkeeper of business operations or financial information generator to the provider and interpreter of diversified information to various internal and external users of financial information (Albrecht & Sack, 2000; Sundem, 1992; Williams, 1994). Such developments require expanding the knowledge and skills of accounting professionals to meet the changing demands trunk from the new business environment. Several studies have examined the issue of what should be the knowledge and

skill components of today's accounting education programs that can satisfy the demands for training future accountants. Consensus has emerged and efforts have been made to implement accounting education reform in the US and in other countries in recent years (AAA, 1996; Albrecht & Sack, 2000; AICPA, 1998; Forristal, 2002; Gill, 1998; Williams, 1994).

Information System (IS) is an integral part of society today, both professionally and personally. IS is changing today at a rapid pace and affects most aspects of our lives. Emerging technologies include not only new hardware, software, and data communications for the use of applications but also planning and development tools for IS professionals. New products seem to surface with greater alacrity than ever before in the history of computing (Benamati, et al., 1995). A study by Lai and Nawawi (2010) reveals that the usages of e-tax applications are still not widespread in tax practice among accounting practitioners. Most of the findings from literature indicate that only a few technologies such as word-processing skills, electronic spreadsheets, email, electronic search and retrieval and small accounting software packages are considered as being adequate by the participants in attempts to identify critical IT skills among them (Greenstein and Porch 2004; Mgaya and Kitindi 2008; Ismail and Abidin 2009).

The use of IT in support of business is widespread and becoming more so. Indeed, it is no longer possible to meet the expectations of users of financial and other business performance information without Information Technology (Hewett, 1997)). Therefore, during the past few decades, accounting literature has witnessed a tremendous increase in the volume of writing about IS. Concepts, applications, problems, and potentials for the future have been discussed and assessed both by researchers and practitioners. Each group has recognised the value and importance of IS in the achievement of success in a very competitive business world and therefore, IS skills are essential for future long-term success of accountants. As systems become more "open", such as the Internet, communication becomes less likely to involve physical movements so that Audits will be done from the audit firm's office and meetings will use video conferencing facilities in addition to e-mail.

Over the past several decades, the advancement of IS has created many new challenges and opportunities in the accounting profession. In response to the aggressive growth in information requirements, companies have been searching for more effective ways of managing their information resources. At the same time, many top executives have come to believe that the traditional management team of the computer centre has failed to satisfy the information needs of decision-makers because of a basic lack of business sense. In modern organisations, information is now recognised as the single most important asset of the organisation and as such requires effective management who are highly trained and educated in information resources management (Janczewski, 1997). Top management preferred IS personnel with strong basic accounting skills along with technical skills. The IS knowledge and skills requirements should be focused on key functions, business objectives, and business impacts. Insufficient orientation toward business and management information concepts and theories had been considered as one of the major deficiencies in the education of current IS in accounting education (Easton, et al. 1995). Computer-based accounting information systems are of vital importance to modern organisations. Accountants in this kind of organisation should be professionals in analysis, design, development, implementation, use of and management of state-of-the-art telecommunications, multimedia and other computer-based information systems. In addition to maintaining traditional transaction processing systems, today's accounting professionals are involved in exciting new developments in computing systems. Such as Decision Support and Expert Systems, Database Development and

enhancement, development and use of Graphical User Interfaces (GUI), systems design using object oriented programming, design and management of telecommunications systems, and the management of end-user computing. Perhaps a lack of expertise in IS for accountants in any of these areas can be partially blamed on the accounting curricula adopted by colleges and universities. These programs were designed to satisfy the previous needs of the industry, but have not kept pace with changing personnel requirements, particularly in the global marketplace (Earl, 1996).

The accounting education program should provide students with a foundation in the functional areas of business and a foundation in computing technologies that enables graduates to pursue both technological and managerial careers which incorporate leading edge technologies both in public and private organisations. The education of accountants at undergraduate, postgraduate and professional levels must take recognition of their need to understand the impact of IT on the practice of their profession. Furthermore, it should seek to educate and to provide the knowledge needed for these people to plan for and to adopt IS techniques in business and management. Computer-based accounting information systems provide not merely a passive means of retrieving and presenting information, but rather an active enabling technology, which redefines the role of the accountant. A question emerges in the potential role of a specialist information accountant: Should information be owned and controlled by its users, or should it be regarded as a corporate resource under the management of an information systems professional?.

The challenges facing contemporary organisations require the skills of a special kind of accountant, which, this research paper called "The hybrid accountant" (Combining IS competence's and mainstream accounting capabilities). A hybrid accountant blends different skills and knowledge of business management and information management.

A "hybrid accountant" is of two types, either a businessperson with a good understanding of information technologies or an information systems person with a good understanding of the business aspects of their organisations. The research is deliberately going to use different roles of the accountant within computerised systems, this could develop both types of hybrid accountant.

The coming years brings many different challenges and opportunities for the accounting profession. One of these is information technology systems. Accounting is becoming more science-orientated owing to the increasing sophistication of Information Technology (Jones and Terry, 1988). As the world moves toward market economies, and with investments and operations crossing borders to a greater extent, the professional accountant must have a broad global perspective in order to understand the context in which business and other organisations operate (IFAC, 2011). There are speedy shift in the influence characteristic that influence the environment in which professional accountants work. One of these is IS which is advancing at a rapid pace. Over the last thirty years, the various computer revolutions and IS developments have had a major impact on the business community across the globe.

II.   Literature Review
II.1 Educational Theory
Accounting graduates are increasingly required to demonstrate strong practical skills underpinned by sound theoretical principles. Clearly, both formal and situated learning activities are instrumental in developing appropriately skilled graduates. Hartnett and Yap (2003) investigated the relationship between instruction style and student performance

Unfortunately, it seems that traditional forms of accounting education do not necessarily bridge the gap between the classroom and the real world (Holcomb & Michaelsen, 1996). The differences between knowledge required in the workplace and knowledge gained from learning experiences in institutions such as universities are well documented (Holcomb & Michaelsen, 1996). Herrington and Oliver (2000, p. 23) argue that the emphasis in formal educational institutions is on extracting essential principles, concepts and facts, and teaching them in an abstract and decontextualised form. They argue that much of the abstract knowledge taught in universities is not retrievable in real-life, problem-solving contexts because traditional approaches to teaching ignore the interdependence of situation and cognition. When learning and context are separated, knowledge itself is seen by learners as the final product rather than as a tool to be used to solve problems. However, Herrington and Oliver (2000) suggest that appropriate and effective pedagogic techniques and practices be developed to foster meaningful learning and not that formal instruction be abandoned in favour of context-dependent strategies that are learned ''on the job''. Herrington and Oliver (2000) suggest that situated learning is a constructivist approach which offers students an opportunity to contextualise knowledge gained in formal learning environments. Collins (1988; p. 2) definition of the concept is ''the notion of learning knowledge and skills in contexts that reflect the way that knowledge will be useful in real life''. In accounting, this approach has the potential to better equip students with the skills required of them in employment.

Herrington and Oliver (2000, p. 24) suggest that ''a critical aspect of the situated learning model is the notion of the apprentice observing a community of practice''. The strategy involves students attending workplaces as learners where they are able to watch, and preferably participate in activities to help augment the theories learned earlier in formal learning settings. Lave and Wenger (1991, p. 110) describe this as ''legitimate peripheral participation''. Kirk and McDonald (1998) suggest that this participation enables students to piece together the culture of the group and what it means to be a member, enabling them to learn the language and stories of a community of practice, and how to speak both within and about the practice.

In acknowledging the benefits of situated learning, many universities attempt to incorporate some form of work experience in their educational programs. However, large classes reduce the feasibility of this practice. Computer based learning offers a viable alternative, particularly those that offer simulated and interactive opportunities to learn, and Oliver and Herrington (2000, p. 179) argue that situated learning environments are well supported in a web-based environment by the information and communication capabilities of technology.

II.2 Curriculum Choices
A number of survey studies have identified skills, knowledge, and attributes that professionals and educators believe entry-level accountants should possess (e.g. Novin et al., 1997; Siegel & Sorensen, 1994). Schmidt (1993) examined the curriculum requirements at universities in states that had adopted the 150-hour requirement in order to determine the direction of the academic responses to the individual state's 150-hour requirement.

Under the influence of globalisation and the ongoing expansion of technology, many scholars believe that there is an obvious discrepancy of expectation between the providers of accounting education (i.e. teachers and students) and the demanders of that education (i.e. accounting firms and business enterprises) (Albrecht &Sack, 2000; Li,1999; Ma, 1996; Tu,1989; Cheng, 2002; Cheng, 2005).

In 1990 and 1992, the Accounting Education Change Commission (AECC) published two position statements that defined the objectives of education for accountants and dealt with the first course in accounting. Position Statement Number One asserted that a primary objective of accounting education should be to provide "a basis on which life-long learning can be built" (AECC 1990, 1). Position Statement Number Two dealt with the first course in accounting and reemphasized the importance of teaching students to learn.

A number of studies state that compared to the education circle, the courses the business circle should emphasize more are: IS, business strategy, commercial law, international commerce, e-commerce, business ethics, and research methods in accounting (Richard, 1993; Williams, 1993; Albrecht & Sack, 2000).

III.   The Aims and objectives
Within the wider context of the development of computer applications in accountancy to prepare students for the current and future job market need; and to embed the overall concepts of IS so they can be taken to organisations for more effective use of information technology systems in modern organisations. The present study will address the following two questions:

- What are Accounting educators' opinions about the current state for IS into accounting programmes?
- What are the levels of IS skills and knowledge that currently integrated into accounting programmes and what are expected of future graduating accounting students?

The above two questions will be answered by gaining an insight into the accounting educators in the business schools in Egypt in order to collect the perceptions and views with regard to the level of IS skills/knowledge that accountants should possess.

IV.   Framework of IT/IS Skills
The proposed IS skills and knowledge include five categories; IT/IS skills/knowledge for accountant as a USER, as a MANAGER, as a DESIGNER, an EVALUATOR of information systems also, there are General Information Technology Knowledge. This framework which will be presented in this paper, is the result of the use of an inter-disciplinary method. The researcher will use IS literature for the designer role, Information Resource Management (IRM) curriculum model for the manager role, Electronic Data Processing (EDP) literature for the evaluator role, End-Using computer literature for the user role and lastly computer science literature for the general skills and knowledge which the accountants should possess.

IV.1 General Information Technology Knowledge (G)
Professional accountants may need to acquire general IT/IS knowledge related to business information systems.
1-Information Systems Technology (G1)
for example, components of information systems technology (H/W, S/W), information systems processing methods in organisations, structure of information systems in organisations .etc.
2-Computer-Based Accounting Systems (G2)
for example expert systems in accounting and auditing, technology and financial systems etc.
3-Files/Databases (G3)
(file organisations. Database Management Systems (DBMS), database concepts, controls and security .etc.)

4-Communication Technology (G4)
(data communication and networks, communication technology, design, communication controls, business Telecommunications (LAN, WAN, INTERNET)
5-Role of information within business and Information Management (G5)
For example, Transaction Processing System (TPS), Management information system (MIS), Decision support system (DSS), Executive information system (EIS), -Expert system (ES), neural network (NN)
6-Electronic Commerce (Telecommunication in Business On-line Resource) (G6)
(Electronic Data Interchange (EDI), Electronic Payment Schemes, electronic markets and catalogues, Point Of Sale (POS), Electronic Funds Transfer System (EFTS)
7-Administrative issues (G7)
(reporting relationships of the IT/IS department, approaches to staffing, personnel development and performance evaluation)

IV.2 IT/IS skills/knowledge for the accountant as a USER of information technology (U)
Professional accountants use various information technology tools and techniques to help them meet their objectives. Professional accountants may need to be familiar with these tools and the way in which information technologies and systems can be applied.

1-Hands-on exposure to major program products (day-to-day application) (U1)
for example word processors, spread sheets, statistical packages, database management system, .etc.
2-Ability to use Accounting Systems packages (U2)
for example consolidation, foreign currency translation, current value accounting, lease accounting, computer-assisted tax planning tools, Transaction Cycles/Accounting Subsystems, financial modelling, general ledger systems packages, revenue/expenditure/Payroll cycles etc.
3-Ability to use database service and Internet for financial reporting and disclosure (U3)
4-Ability to search On-line Public Access Databases (U4) such as use on-line retrieval services for tax case research from CD-ROM or WWW
5-Ability to understand the structure of typical computerised accounting systems and subsystems (U5),
including the flow of transactions, data file organisations, and programmed accounting procedures, financial modelling, general ledger systems packages, revenue/expenditure/Payroll cycles

IV.3 IT/IS skills/knowledge for accountant as a Manager of information systems (M)

Most professional accountants are involved in financial management roles which bring them into contact with information systems. Many accountants in organisations fulfil information system management functions, in partnership with other managers, or as part of their overall responsibilities.

1-Data Resource Structures (M1)
for example, data resources and information, applications of data administration, management of system maintenance and change
2-Management of Accounting Information Systems (M2)
for example, management of end-user computing, information resources management principles, information concepts and requirements .etc.

3-Global Information Management (M3)
for example, global information resources management, information technology and global marketing, information technology and international financial services, information technology and international accounting, information technology and global operations, information technology and research & development, information technology and global human resources
4-Executive Information Systems Management (M4)
(executive decision-making, executive direction of information systems, strategic application of information systems, executive information systems and control of information)
5-Ability to use financial database and spreadsheet for planning and control purposes (M5)
6-Ability for selection and acquisition of hardware/software (including contract negotiation) (M6)
7-Ability for reinforcement of investment analysis using software (M7)
8-Ability to participate as part of system development team, appreciation of information and methods, behavioural consequences of project management ((M8)
9-Understanding of the methods of operating and managing business systems once implemented (M9)
10-Understanding of the system development life cycle, its phases, and management principles for the system development process (M10)
11-Appreciation of the social, economic, and legal implications of computer technology, including effects of automation on work, institutions, and freedoms (e.g., privacy) (M11)
12-Decision Support Systems (M12)
(roles of decision support systems, approaches to decision support systems, decision support systems development)
13-Strategic considerations in IT/IS development (M13)
(Planning of information systems based on business success factors/criteria, components of long range plans,
Integration with business objectives and success factors,
participation in strategic planning (membership on steering committee)
14-Administrative issues (M14)
(Reporting relationships of the IT/IS department, approaches to staffing, personnel development and performance evaluation)

IV.4 IT/IS skills/knowledge for accountant as a DESIGNER of information systems (D)
Professional accountants, as employees or external advisors, have been involved in the design of financial systems for decades. In the past, such design roles have been in the context of manual record-keeping systems. Today, accountants are expected to continue to provide similar services, albeit in an IT/IS context. This may be as a member of an in-house team or task force working to establish business system requirements, as a member of an in-house system development team for an employer, or as an external advisor helping to design a business system for a client.

1-Information Systems (IS) Design and Implementation (D1)
(information management and information systems, systems analysis of information systems, definition of information systems, systems design of information systems, systems implementation of information systems, systems maintenance and management of information systems)
2-Ability to write simple file-processing and report-writing routines in several common programming languages e.g. COBOL, C, C++ (D2)
3-Knowledge of financial accounting, managerial accounting, auditing and ability to use state-of-the-art system analysis and design techniques (D3)

4-Ability to design and apply computer-assisted auditing techniques for a variety of audit purposes (D4)

5-Ability to design and use decision support aids and financial modelling tools (D5) such as linear programming, statistical tools, simulation packages, and network models for enhancing managerial decision making.

6-Ability to design financial databases for planning and control purposes (D6)

7-Ability to participate as part of a system development team with an appreciation of information system development theories and methods, behavioural consequences of system change, and principles of project management (D7)

8-Knowledge of and ability to use state-of-the-art system analysis and design techniques. e.g. Object-oriented programming, object-based programming (D8)

9-Algorithm Concepts and Information Management (D9)
(algorithm planning and processing information systems, algorithm validation concepts, algorithm technology and database management)

10-Knowledge in the role of information in organisation design and behaviour (D10) (For example data bases and data base management systems, system development life cycle (SDLC) .etc.)

11-System design techniques (D11)
(for example, data flow diagrams, entity-relationship model, decision tables and trees, prototyping, computer aided software engineering methodology (CASE) .etc.)

12-System acquisition/development life cycle phases, tasks and practices and maintaining control over system development processes (D12)
(for example, investigation and feasibility study, requirements analysis and initial design, detailed design specification/documentation, hardware evaluation and acquisition, software evaluation , acquisition, development

IV.5 IT/IS skills/knowledge for accountant as an Evaluator of Information Systems (E)
The role of the accountant as **EVALUATOR** encompasses the functions of internal audit, external audit and other evaluative roles filled by accountants, whether or not formally identified as audit roles.

1-Internal control in computer-based systems (E1)
(for example, control objectives, effect of IT/IS audit on organisation, compliance with applicable laws and regulations, cost effectiveness of control procedures, control Auditing in a computer environment .etc.)

2-Understanding of characteristics of EDP systems, their major components , and methods of operation (E12

3-Ability to design and apply computer-assisted audit techniques for a variety of audit purposes (E3)

4-Ability to specify, identify, and documents financial and operational controls in computer-based systems (E4)

5-Ability to evaluate effectiveness and efficiency of management and operations in computer-based system (E5)

6-Auditing of Accounting Information Systems (E6)
(for example, the role of internal and external auditors in relation to AIS, the effects of the computer on internal controls, security, back-ups and recovery, audit of general controls, audit of application controls)

7-Accounting systems internal control (E7)
(for example, purpose of internal controls, classification of internal controls, system documentation standards, computer systems controls, control costs and benefits etc.)

8-Evaluation of Decision Support Systems (E8)
(for example, model validation and information, DSS information analysis, information management and DSS, systems support and maintenance of DSS, system security and control of DSS)
9-Legal, ethical, auditing and information system control standards (E9)
(for example, legal and ethical requirements, auditing standards relevant to IT/IS, computer control guidelines and standards, computer Security, Viruses and Computer fraud
10-Evaluation objectives (E10)
(efficiency/effectiveness/economy of IT/IS use, compliance with policies, statutes and regulations, evaluation of Internal control in computer-based systems etc.)
11-Evaluation methods and techniques (E11)
(obtaining an understanding of systems in business context, documenting systems and elements of control structure, tests of features, controls, transactions and balances etc.)
12-Communicating results of evaluations (E12)
(for example types of reports, levels of assurance
13-Specific types of evaluations (E13)
(system maintenance, IT/IS asset safeguarding, data integrity, privacy and security, continuity of processing/disaster recovery planning, system processing operations/activities, application processing)
14-Computer-assisted audit techniques (CAATs) (E14)
such as approaches (auditing around the computer, auditing through the computer, auditing with the computer), professional standards feasibility considerations, categories of CAATs

V.   Sample

One of the most critical influences on the quality of data that emerge from a survey is the choice of people to respond to questions. In other words, the researcher has to choose the right person to respond to the questionnaire. This choice involves a number of decisions which include choosing the population of interest, creating a sampling frame and whether conduct a census or select a sample.

The sampling unit means to whom the questionnaire should be directed. In other words, the population of interest comprises of the entire group of people from whom a researcher would like to obtain information: the people whose views are needed to achieve the objectives of the survey. This is a critical decision because asking the right questions to the wrong person could mislead the whole research process. Therefore, the person within the accounting department who actually has expertise in IS teaching or research should be the target person of the sampling unit. This study approached subjects from Egypt

V.1 Egyptian Subjects

The Egyptian subjects for this study were accounting staff in the Faculty of Commerce at Egyptian universities. From 194 people who teach accounting subjects in Accounting departments at Faculties of Commerce in Egyptian universities there are 52 who teach and are interested in accounting and computers and accounting information systems courses. The researcher approached the entire fifty-two members and handed the questionnaires to them personally. A total of 32 usable responses were achieved. The response rate was 32 of 52 (61%)

VI.   Research Methodology

The actual collection of empirical data is one of the most important stages in the production of any piece of academic research. Consequently, careful and thoughtful preparation for this

stage of the research process is necessary to ensure that the data collected is appropriate. There are two vital decisions involving data collection; firstly, deciding initially which data is relevant to the research purposes and the sources from which to obtain this data. Secondly, choosing the most appropriate tool(s) for the collection of such data. In fact, although both decisions seem distinctive, they ought to be made simultaneously. The reason for this inseparability is simply because the major criteria for selecting a certain method(s) of data collection is the nature of data to be collected and the research purposes for which this data was collected in the first place. Accordingly, making the first decision would lay the ground for making the second one. In the following sections all these decisions and their justification will be discussed in some detail.

VI.1 The questionnaire Methodology
A questionnaire was determined to be the most efficient and economical means of contacting accounting educators in different countries. This research took place during the period from August 2015 to February 2016 as the researcher used Self-Administrated Questionnaires where the researcher approached the subjects personally and handed the questionnaire, after a certain time the questionnaires were gathered personally as well.

VII.   Reliability and Validity
A good question possesses two important qualities: Reliability and Validity.   In survey research, an important distinction is made between these two terms. A question is "reliable" if it evokes consistent responses (that is, if a person would answer the question the same way in subsequent interviews).

The reliability of the questionnaire was measured using Cronbach's Alpha for each part of the questionnaire and can be considered as good. The opinions of the current state (0.8490) general IS (0.8470), User IS skills (0.8110), Manager IS skills Alpha (0.9214), Designer role (0.9134) and Evaluator skills (0.9479).

Before administering the survey, the survey instrument was rigorously validated through pilot testing and interviews. As Straub (1989) explained, the objective of instrument validation is to provide the researcher and the reader with a higher degree of confidence in the research results.   This goal can be achieved by minimising areas in the questionnaire where misinterpretation and misunderstanding by the respondent can occur.

VIII.   Non-Bias in Results
It is important to establish that the responses received are not biased according to the demographic characteristics used for the selection of the sample. Obviously, a bias in the responses to one or other demographics group would give that group a disproportionate influence on the results. Such a bias would further limit generalisations from the sample to the population of its members. A further area for possible bias that has to be investigated is due to non-respondent (Wallace and Mellor, 1988). It is important to attempt to establish that those members that did not respond to the survey did not do so because of some mutual characteristics. In order to access non-response bias, late responses were compared to early responses. This procedure assumes that late respondents are similar to non-respondents (Oppenheim, 1966). The researcher checked non-response bias by doing chi-square ($x2$) tests on the responses of early and late responses for the group. The results of these statistical tests indicated that there was no significant difference between the first ten respondents and the last ten respondents for each group.

IX.   Reporting the Results

The present study seeks the following:

First, to obtain opinions about the current state and the future for IS into accounting programmes. Second, to determine what are level of IS skills which are included in accounting programmes now and in three years time?

These findings regarding the five sets of IS skills/knowledge which accounting education integrates into accounting programmes are now presented for each country.

IX.1 Opinion about the current state and future for IT/IS in accounting education.

Table-1 Opinion about IT/IS skills into accounting programmes

	Strongly agree % (N)	Agree (N) %	Neutral (N) %	Disagree (N) %	Strongly disagree % (N)	Total (N) %
1- Accounting education equips students with IT/IS skills for their role beyond graduation in their employment		15.6 5			84.4 27	100% (32)
2- There exists a gap between IT/IS skills that students currently learn in accounting education at university level and what accountants do in the real world with regard to IT/IS	87.5 28	12.5 4				100% (32)
3-IT/IS skills in accounting training at undergraduate level are not adequately covered	40.6 13	59.4 19				100% (32)
4-Most IT/IS syllabuses in accounting degrees concentrate on programming languages rather than looking at the broad issues of IT/IS	3.1 1	53.1 17	12.5 4	28.1 9	3.1 1	100% (32)
5- University does not provide sufficient grounding in the use of IT/IS in a commercial environment	53.1 17	34.4 11	9.4 3	3.1 1		100% (32)
6- University lecturers in accounting education are out of touch with the needs of the profession in the real world with regard to IT/IS skills	53.1 17	34.4 11	9.4 3	3.1 1		100% (32)
7- University lecturers do not possess the necessary IT skills and knowledge to teach IT successfully in accounting	84.4 27	15.6 5				100% (32)
8- The accounting profession, industry and commerce are unable to specify what IT/IS they require to be taught at university	46.9 15	37.5 12	15.6 5			100% (32)
9- The business community and those involved in accounting education must first decide what their objectives are with regard to IT training	56.3 18	37.5 12	6.3 2			100% (32)
10- Communication between the business community and universities needs to be improved so that IT training can more closely match needs	46.9 15	53.1 17				100% (32)
11 Having more IT/IS available in undergraduate accounting makes students more effective in their employment and improve their work	50 16	50 16				100% (32)
12- The university should do more to help students understand the application of IT/IS and the use of computers as a tool, rather than concentrate on technical mechanical aspects	59.4 19	40.6 13				100% (32)
13- Accounting students should gain " Hands- on " experience of computers, not just BASIC or FORTRAN and C++ programming	53.1 17	56.9 15				100% (32)

14- Accounting students should have experience in the use of applications , such as spreadsheets , word-processing, data base management and accounting packages	50 16	50 16				100% (32)
15- The accounting syllabus at university level is mainly concerned with the auditing of computer systems and data processing, rather than with the wider application of IT/IS to improving business performance		81.3 26	12.5 4	6.3 2		100% (32)
16- IT/IS education at University level is mostly theoretical	43.8 14	40.6 13	6.3 2	9.4 3		100% (32)
17- The use of computers in accounting practice enhances the efficiency and effectiveness of the accountant's work	59.4 19	40.6 13				100% (32)

Table - 2 Views about content and delivery of IT/IS

	Extremely satisfied	Satisfied %	Neutral %	Dissatisfied %	Extremely dissatisfied %	Total %
Satisfied degree with the CONTENT of IT/IS skills/knowledge into accounting curriculum				43.8 14	56.3 18	100% (32)
Satisfied degree with the DELIVERY of IT/IS skills/knowledge into accounting curriculum				56.3 18	43.8 14	100% (32)

Table 3   The Obstacles which face the integration of computers into teaching area(s)

	NO (%)	YES (%)
Lack of suitable software		100
Lack of suitable hardware		100
Too expensive (Financial Shortage)		100
Lack of interest in integration		100
Lack support systems staff in IT/IS		100
Lack of training		100
Need more information on how to integrate IT/IS		100
Staff must become computer literate before students		100
Size of students in the class room or lecture stage		100

IX.2 What IT/IS skills/knowledge should be integrated into accounting programmes?

In this section the respondent was ask to use the following 4 point scale to indicate his

assessment about IT/IS both at PRESENT in his accounting department, CURRENT SITUATION NOW, first column) and what should be integrated into accounting education in THREE YEARS into the future (the second column) for the five set of framework IS skills

1- General Information Technology Knowledge (G).

2- IT/IS skills/knowledge for accountant as a USER (U)

3- IT/IS skills/knowledge for accountant as a MANAGER

4- IT/IS skills/knowledge for accountant as a DESIGNER

5- IT/IS skills/knowledge for accountant as an EVALUATOR

Below **Tables 4 - 8** present the results of the current level and the future for the five categories

Table 4 Level of General Information Technology Knowledge (G)

	Current Situation				Three Years future			
	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %
G1	31.3	50	18.8			12.5	53.1	34.4
G2	53.1	37.5	9.4			9.4	71.9	18.8
G3	18.8	65.6	15.6			6.3	28.1	65.6
G4	50	43.8	6.3			3.1	53.1	43.8
G5	56.3	53.8				3.1	43.8	53.1
G6	71.9	28.1				3.1	25	71.9
G7	43.8	56.3				21.9	59.4	18.8

Table 5 Level of IT/IS Skills/Knowledge For The Accountant As A User Of Information Technology (U)

	Current Situation				Three Years future			
	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %
U1	25	71.9	3.1				21.9	78.1
U2	50	43.8	6.3				31.3	68.7
U3	81.3	18.8				28.1	43.8	28.1
U4	50	50					31.3	68.8
U5	40.6	53.1	6.3				31.3	68.8

Table 6 Level of IT/IS Skills/Knowledge For Accountant As A Manager Of Information Systems (M)

	Current Situation				Three Years future			
	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %
M1	65.6	31.3	3.1			40.6	56.3	3.1
M2	56.3	43.8				3.1	81.3	15.6
M3	65.6	34.4			3.1	21.9	59.4	15.6
M4	75	25				12.5	71.9	15.6
M5	62.5	34.4	3.1			12.5	65.6	21.9
M6	53.1	43.8	3.1			34.4	62.5	3.1
M7	75	25				28.1	62.5	9.4
M8	53.1	34.4	12.5			25	68.8	6.3

	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %		No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %
M9	65.6	31.3	3.1			9.4	84.4	6.3	
M10	71.9	28.1				18.8	71.9	9.4	
M11	65.6	34.4				12.5	81.3	6.3	
M12	71.9	25	3.1				71.9	28.1	
M13	59.4	37.5	3.1				62.5	37.5	
M14	59.4	34.4	6.3				71.9	28.1	

Table 7 Level of IT/IS skills/knowledge for accountant as a designer of information systems (d)

	Current Situation				Three Years future			
	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %
D1	50	50				21.9	65.6	12.5
D2	71.9	28.1			25	75		
D3	68.8	31.3				34.4	53.1	12.5
D4	87.5	12.5			3.1	46.9	43.8	6.3
D5	81.3	18.8			3.1	25	46.9	25
D6	71.9	28.1			15.6	43.8	34.4	6.3
D7	84.4	12.5	3.1		18.8	56.3	25	
D8	81.3	18.8			25	56.3	18.8	
D9	93.8	6.3			21.9	53.1	21.9	3.1
D10	100				25	56.3	18.8	
D11	96.9	3.1			18.8	59.4	21.9	
D12	84.4	15.6			21.9	46.9	31.3	

Table 8 Level of IT/IS skills/knowledge for accountant as an evaluator of information systems (e)

	Current Situation				Three Years future			
	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %
E1	50	40.6	9.4			3.1	68.8	28.1
E2	43.8	40.6	15.6			9.4	65.6	25
E3	87.5	12.5				3.1	68.8	28.1
E4	53.1	43.8	3.1			3.1	53.1	43.8
E5	59.4	34.4	6.3			9.4	59.4	31.3
E6	34.4	56.3	9.4			3.1	62.5	34.4
E7	59.4	40.6				3.1	65.6	31.3
E8	87.5	12.5				6.3	71.9	21.9
E9	59.4	40.6				15.6	75	9.4
E10	59.4	40.6				6.3	68.8	25
E11	59.4	40.6				3.1	65.6	31.3
E12	59.4	37.5	3.1			6.3	65.6	28.1
E13	59.4	40.6				9.4	53.1	37.5
E14	59.4	37.5	3.1				53.1	46.9

X. Discussion and Conclusion

It is appear from the reporting of the results that accounting educators in Egypt feel that the accounting educational system is in crisis regarding IS skills and knowledge. Egyptian

students do not compare well with regard to IS skills to those of other countries with whom they should compete in the business world. Business spends a lot of money every year training higher level skills to its work force when these skills should have been taught at university level. Nowadays, there are concerns about identifying an approach to education, restructuring that makes sense, educationally as well as financially.

Furthermore, many graduates lack the higher-level IS skills required in the modern commercial corporate world. We need to recognise that the initial short-term costs of improving our universities and incorporating technology into the curricula are much less than the long-term costs which would result from an undereducated or inappropriately educated population. This would adversely affect our standing in the world.

In the decades since, the world has changed dramatically, the Information Age imposes significant changes and different requirements on an educated citizenry. The current Egyptian economy requires workers who are educated broadly and deeply, who can not only communicate with their co-workers and with customers, but who can also solve problems. Egyptian society requires citizens, who are innovative, who can think critically and analytically, and be prepared for lifelong learning especially in IS skills and knowledge.

Egypt should keep abreast with the march of advanced countries in the IS sphere and Egypt should establish a modern technology project in accounting systems that would provide a base for the information industry. Well-trained accounting teachers making effective use of the technology on offer can have the capability of dramatically improving the learning experiences. Accounting educators are the keys to success in any accounting educational change. Therefore, they must be trained, supported, and provided with adequate resources in order to be successful in implementing new teaching methods and integrating IS skills into accounting programmes. The teachers need training, support and time to integrate technology into their curricula. Business has a strong motivation to improve our accounting educational system, a clear expressed interest in helping to modernise and improve it, and the means and experience to provide valuable assistance which includes funding and further training. Learning environments should include access to a wide range of technologies and to the entire world of information. The environments should offer opportunities for creativity, critical thinking, information access and manipulation, communication, and multi-sensory stimulation such as interactive multimedia. Increased recognition of need for integrating and the ways concerning how to integrate IS are helpful for successful integrating IS into Egyptian accounting programmes.

General Information Technology Knowledge
The level of IS knowledge NOW, as the survey mentioned, was low knowledge. For the it was only moderate. This might be because the level of hardware and software technology used in Egypt is need to be updated

IS skills/knowledge for the accountant as a USER of information technology
The level of current IS skills/knowledge in sample was low. Also, the samples indicate that IS skills/knowledge should be at a high level in the Future. The reason for this is that the accountant's role as a user of information systems does not depend on the physical level of technology but upon accounting application packages which are at the same level in developing and developed countries.

IS skills/knowledge for an accountant as a MANAGER of information systems
The level of IS skills NOW in was low in sample. Professional accountants are involved in financial management roles which bring them into contact with IS. Many accountants in organisations fulfil information system management functions, in partnership with other managers, or as part of their overall responsibilities. This role does not seem a priority for accountants, so therefore, the level was low knowledge. But in the future, as accountants become more involved, it was expected to be a moderate level.

IS skills/knowledge for an accountant as a DESIGNER of information systems
These sets of skills/knowledge included twelve skills. The average level for all of them NOW there was no level of knowledge. Professional accountants, as employees or external advisors, have been involved in the design of financial systems for decades. In the past, such design roles have been in the context of manual record-keeping systems. Today, accountants are expected to continue to provide similar services, albeit in an IS context. This may be as a member of an in-house team or task force working to establish business system requirements, as a member of an in-house system development team for an employer, or as an external advisor helping to design a business system for a client. The position of accountants in Egypt is not clear when the computer science personal has this role. The expected level of the same skills /knowledge in three years is expected to be low/Moderate. As a result accountants in developing countries have more of a role as a designer of accounting information systems.

IS skills/knowledge for an accountant as an evaluator of information systems
IS skills as an evaluator included fourteen skills. The level of these skills NOW in Egypt is no knowledge. In the future, Egypt's average is expected to be reach a moderate level.

From the discussion above, there are vast differences between the levels of IS skills and knowledge in Now and the Future. In addition, in the future the gap may become too great to be bridged if the government and policy makers in developing countries do nothing to increase the skill levels in these countries. One solution is for IS skills to be delivered in the universities, since the professional and business organisations are not willing to train the students as they are not qualified enough in this matter.

Concerns regarding the movement of information technology tools from developed countries to developing countries should be expressed, and the need for further development of IS in developing countries should be highlighted. The need for multilateral organisations to provide support for building information production capacity in developing countries and for enhancing local IS organisations' capacity has been underscored. The benefits of community computer networks and local information and multimedia programmes should be highlighted. A model for best practice in helping communities to learn how to select appropriate technological solutions for local problems should be devised.

Another important aspect of this paper comes from the national shortage of accountants who are equipped with the necessary skills and knowledge of the IS in the context of business and industry and how the understanding of the application of IS can enhance their performance. Integrating this knowledge and skills into accounting programmes will help them to do their work in the Egyptian economy in a more efficient and effective way. This is important when Egypt is moving from a centralised economy to a market economy through privatisation. Therefore, accountants and auditors in Egypt are expected to play a leading role in the economic transfer stage. In the absence of the qualified accountants in the local market the jobs will done by expatriates.

XI.   Suggestions for Further Research

This study should be seen as only a preliminary research into accounting and IT in developing countries. It has revealed a lack of IS skills and knowledge in accounting programmes in one of these countries (Egypt) but it has also raised many questions, which are beyond its scope to answer. Further studies are required as follows:

1- The need for accountants to use IS skills in the real world. A study could clarify the extent of this need via more investigation.
2- The need to integrated IS skills into accounting training programmes. The decision about the right person to deliver these skills requires further investigation.
3- Further study is needed for other developing countries.
4- The feedback from practitioners and accounting educators concerning the results of this study should be examined to improve and update integrating IS skills and knowledge into accounting programmes.
5- As we have multinational companies with international investment across the globe, an international study should investigate the level of IS skills that the accountant should possess.
6- The views and opinions of recent accounting graduates on the usefulness of their IS education at university should be studied to ascertain that what they are learning in the universities relates to what they need in the real world in the short term.
7. Further study is needed for how IS skills and knowledge should be delivered in accounting education

References

AACSB (2010) Eligibility procedures and accreditation standards for business accreditation, Tampa, FL: AACSB International: The Association to Advance Collegiate School of Business.

Accounting Education Change Commission (1990). Objectives of education for accountants: Position statement no. 1. Issues in Accounting Education, 5(2), 307–312.

Accounting Education Change Commission (1996). Position and issue statements of the accounting education commission. Sarasota, FL: American Accounting Association.

Adel Ahmed, (2003) "The level of IT/IS skills in accounting programmes in British universities", Management Research News, Vol. 26 Issue: 12, pp.20-58, https://doi.org/10.1108/01409170310783709

Albrecht, W., & Sack, R. (2000). Accounting education: Charting the course through a perilous future, Accounting education series #16. Sarasota, FL: American Accounting Association.

American Institute of Certified Public Accountants, (AICPA) (1998). CPA vision project identifies top five issues for the profession. The CPA Letter, 1, 12.

Benamati, J; Lederer, A; Singh, M (1995): The Impact of Rapid Change in Technology on the Information Systems Organization. Proceedings of the AIS Inaugural Americas Conference held in Pittsburgh, PA in August, 1995.

Cheng, K. W. (2005). A research on the inherent limitation for enrollment in accounting education in Taiwan universities. The Business Review, *Cambridge, 4(2),* 114-122.

Cheng, T. W. (2002). Going back to the original function of accounting. Accounting Research Monthly*, 203,* 12.

Chabrow, E., & Hayes, M. (2001). Changes in accounting education. InformationWeek, http://www.informationweek.com/story/IWK20010614s0024

Collins, A. (1988). Cognitive apprenticeship and instructional technology. Technical Report No. 6899, BBN Labs Inc., Cambridge, MA.

Earl, M (1996): Information Management - the Organisational Perspective. Oxford University Press.

Easton, A; Liou, I; Valacich, J; Jankowski, D (1995): Innovations in Teaching the Information Systems Curriculum. Association for Information Systems Conference, August 25-27, 1995 Pittsburgh, PA.

Forristal, T. (2002). CAP Forum: The future of accounting education: The response of charted accountants. Canadian Accounting Perspectives, 1(1), 80–88.

Frederickson, JR; Pratt, J (1995): A Model of the Accounting Education Process. Issues in Accounting Education Fall (10), 231-246.

Gelinas, U.J. and Gogan, J.L. (2006) "Accountants and Emerging Technologies: A Case Study at the United States Department of the Treasury Bureau of Engraving and Printing," Journal of Information Systems, 20, pp.93-116.

Gill, J. (1998). Accounting for teaching and learning in the 21st century. Charted Accountants Journal of New Zealand, 77(7), 38–45.

Greenstein, M. and McKee, T.E. (2004) "Assurance practitioners and educators' self-perceived IT knowledge level: an empirical assessment," International Journal of Accounting Information Systems, 5, pp.213-243.

Hartnett, N., Ro¨mcke, J., & Yap, C. (2003). Recognizing the importance of instruction style to students' performance: Some observations from laboratory research – A research note. Accounting Education, 12(3), 313–331.

Herrington, J., & Oliver, R. (2000). An instructional design framework for authentic learning environments. Educational Technology, Research and Development, 48(3), 23–48.

Hewett, WG (1997): The whys and whats of an IT specialisation within a generalist management tertiary education. In: The Place of Information Technology in management and Business Education. Chapman & Hall ed. (Eds: Ben-Zion Barta; Arthur Tantnall; Peter Juliff), London, .

Holcomb, T., & Michaelsen, R. (1996). A strategic plan for educational technology in accounting. Journal of Accounting Education, 14(3), 277–292.

International Federation for Accountants (1992): The Impact of Information Technology on Accounting Profession. IFAC, 1992.

International Federation of Accountant (IFAC) (1994): Education Committe Discussion Paper, 2000 and Beyond:A Strategic Framework for Prequlification Education for the Accountancy Profession in the Year 2000 and Beyond., NEW York: IFAC.

International Federation of Accountants (1995): Integrating Information Technology Across The Accounting Curriculum:The Experience of the Certified General Accountants' Association of Canada.

International Federation of Accountants (1996): Implementing International Education Guideline 11: Information Technology in the Accounting Curriculum. Strategies of the American Institute of Certified Public Accountants.

International Federation of the accountants (IFAC) (1995): International Education Guideline: Information Technology in the Accounting Curriculum.

Ismail, N. and Abidin Z. 2009, "Perception towards the Importance and Knowledge of Information Technology among Auditors in Malaysia", Journal of Accounting and Taxation (1:4), pp 061-069.

Jampol, J (1996): IT at Forefront of MBA Curriculum.(Information Technology; Master of Business Administration Degree). The European Jan 11, No.296, 23.

Janczewski, LJ (1997): Information Systems:Co-operation Between University and Industry. Proceedings of the 1997 Information Resources Management Association International Conference, p 323-326.1997, Idea Group Publishing.

Jenson, RL (1998): Reengineering as a Framework For Accounting Systems study. The Review of Accounting Information Systems 2 Number 4, 1-7.

Jones, G; Terry, M (1988): Information technology and the new accounting. McGraw - Hall, 1988, .

Jones, M; Berry, R; Beatty, R (1996): Knowledge about Information Technology. Americas Conference on Information Systems 1996.

Kalton, Graham (1983): Introduction to Survey Sampling. Sage Publications, inc, California, USA. 96 pages.

Kaplan, RS (1983): Measuring Manufacturing Performance: A New Challenge for Managerial Accounting Research. The Accounting Review October, 686-705.

Kaye, GR (1985): Teaching Strategies in Computers and Accounting. British Accounting Review 17, 22-36.

Kaye, GR (1986): The Impact of IT on Accountant. Institute of Cost and Management Accountants ed., London.

Kaye, GR; Bhaskar, KN (1985): Computers and Accounting- Courses: A Reply to Collins. Accounting and Business Research Summer, 239-240.

Kaye, RG (1987): Proceedings of Computers in Accounting Education Workshop. CIMA ed., London. 110 pages.

Kelliher, C; Fogarty, T; Goldwater, P (1996): Introducing Uncertainty in the teaching of pensions: a Simulation approach. Journal of Accounting Education 14 no. 1, 69-98.

Kent, PE; Linnegar, GH (1988): Integrating Computers into Accounting Education: A Survey of Australian Universities and Colleges. Accounting and Finance November, 81-91.

Kirk, D., & McDonald, D. (1998). Situated learning in physical education. Journal of Teaching in Physical Education, 17, 376–397.

Lai M.L. and Nawawi N.H.A. 2010, "Integrating ICT Skills and Tax Software in Tax Education: A Survey of Malaysian Tax Practitioners' Perspectives", Campus-Wide Information Systems (27:5), pp 303.

Lave, J., & Wenger, E. (1991). Situated learning: Legitimate peripheral participation. Cambridge, MA: Cambridge University Press.

Lymer, A (1995): The Integration of Expert Systems into the Teaching of Accountancy: A Third-Year Option Course Approach. Accounting Education 4 (3), 249-258.

Lymer, A; Sangster, A (1997): Accounting and Finance Education and the World Wide Web: Possibilities for Teaching Innovation. Selected Paper-CTI-AFM Annual Conference, 8-9th April 1997, Newport, Wales, UK.

Ma, C. M. (1996). Suggestions for the improvement of the current accounting education. Education Change Correspondence, 17, 55.

Maggiolini (1986): Office Automation Benefits: A Framework. Information & Management vol. 10, no 2, .

Marriott, N (1992): The Effectiveness of Using SpreadSheets to Teach Financial Accounting. Accounting Education 1 (2), 137-150.

Marriott, N (1997): A Longitudinal Study of Student Attitude Towards, and Ability to Use, Computers in Higher Education. CTI Accounting Finance and Management.8th Annual Conference. 8-9 April 1997.Newport, Gwent.

Mgaya, K.V. and Kitindi, E.G. 2008, "IT Skills of Academics and Practising Accountants in Botswana", World Review of Entrepreneurship, Management and Sustainable Development, (4:4), pp 366-379.

Mohamed, E.K.A. and Lashine, S.H. 2003, "Accounting Knowledge and Skills and the Challenges of a Global Business Environment", Managerial Finance, (29:7), pp. 3-16.

Nash, JF; England, TG (1986): Computerizing the Accounting Curriculum. T.H.E.Journal September, 89-91.

Nash, K; Hoffman, T (1995): Banks Hit Info Highway at Different Speeds. Computerworld August, 1995, .

Novin, A. M., Fetyko, D. F., & Tucker, J. M. (1997). Perceptions of accounting educators and public accounting practitioners on the composition of the 150-hour accounting programs: a comparison. Issues in Accounting Education, 12(3), 331–352.

Oppenheim, AN (1966): Questionnaire Design and Attitude Measurement., London.

Paquette, LR; Schwarzbach, HR (1991): Integrating A Cd-Rom Database in the Accounting Curriculum. Journal of Accounting Education 9, 373-379.

Parmley, JE; Parmley, WK (1986): Required Computer Skills. New Accountant November, 16-19.

Pears, D (1972): What is Knowledge. Allen Publisher Co.

Rai, P., Vatanasakdakul, S. and Aoun, C. (2010) "Exploring perception of IT skills among Australian accountants: An alignment between importance and knowledge," Americas Conference on Information Systems (AMCIS 2010) Proceedings, Association for Information Systems.

Richard, L. D. (1993). They can add but can they communicate. *Business Forum,* 24-26.

Romney, M; Cherrington, JO; Denna, EL (1996): Using Information Systems as a Basis for teaching Accounting. Journal of Accounting Education 14 no. 1, 57-67.

Romney, MB (1984): Teaching Accounting Information Systems Using a Case Study Approach. Journal of Accounting Education vol. 2 no. 1 spring, 145-154.

Tudor, G; Gheorghe, M; Oancea, M; Șova, R. (2013): An Analysis Framework For Defining The Required IT&C Competencies For The Accounting Profession, Accounting and Management Information Systems, Vol. 12, No. 4, pp. 671–696, 2013

Tu, J. J. (1989). An analysis of differences in theory and practice. Accounting Research Monthly, 60,50-51.

Sangster, A (1991): Expert Systems in the Accounting Curriculum: A Textbook Review. British Accounting Review 23, 171-178.

Sangster, A (1995): The Integration of Expert System Within the Accounting Curriculum. Accounting Education 4 (3), 211-216.

Sangster, A (1995): World Wide Web - What can it do for education? Active Learning 2, pp 3-8.

Sangster, A; Wilson, R (1991): Knowledge -based learning within the accounting curriculum. British Accounting Review 23 no. 3, 243-261.

Schmidt, R. J. (1993). Accounting curriculum responses to the 150-hour requirement. Journal of Accounting Education, 11(1), 15–41.

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

Straub, DW (1989): validating instruments in MIS research. MIS Quarterly June, 146-169.

Sundem, G. L. (1992). Changes in accounting education in the United States: The impact of the accounting education change commission. In A. Anyanentow (Ed.), International handbook of accounting education and certification. New York: Pergamon Press.

Van Lint, WJ (1982): Computer & Accounting Education. Annual conference, Accounting Association of Australia and New Zealand.

Van Meer, G (1993): Accounting Information Systems Course Curriculum - A Comparative Emiprical study of the views of New Zealand Academics and Practitioners'. AAANZ Conference Darwin.

Wallace, R; Mellor, C (1988): Nonresponse Bias in Mail Accounting Surveys: A Pedagogical Note. British Accounting Review 20 No. 2, 131-139.

Watson, S. F., Apostolou, B. A., Hassell, J. M., & Webber, S. A. (2003). Accounting education literature review (2000–2002). Journal of Accounting Education, 21(4), 267–327.

Weisberg, H.F; Bowen, B.D (1977): An Introduction to Survey Research and Data Analysis. W. H. Freeman and Company, USA. 243 pages.

White, C (1995): An Analysis of the need for ES and AI in accounting Education. Accounting Education 4 (3), 259-269.

Williams, D. Z. (1994). Strategies for change in accounting education: The US experience. In J. O. Burns & B. E. Needles (Eds.), Accounting education for the 21st century (pp. 207–211). New York: Pergamon Press.

Author

Adel Ahmed, PhD, FHEA
Associate Professor, Department of Accounting and Finance & Banking, College of Business Administration, Al Ain University of Science and Technology, UAE, adel.ahmed@aau.ac.ae