INTEGRATING INFORMATION SYSTEMS TECHNOLOGY COMPETENCIES INTO ACCOUNTING – A COMPARATIVE STUDY

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by

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بسم الله الرحمن الرحيم

This thesis is dedicated to the memory of my

Mother.

Without her love and sacrifices it would not have

been possible.

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In the Name of Allah, Most Gracious, Most Merciful

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PAPERS EXTRACTED FROM THE THESIS

A- The following papers extracted from the thesis and been presented in the following conferences as follow:

1. British Accounting Association Annual Conference, Glasgow, UK: 29-31 March 1999

The title of the paper is:

"A FRAMEWORK FOR INTEGRATING IT/IS SKILLS/KNOWLEDGE INTO ACCOUNTING PROGRAMMES IN EGYPT"

2. The 10th Annual CTI-AFM Conference, Brighton, UK. 7-9 April 1999

The title of the paper is:

"INTEGRATING INFORMATION TECHNOLOGY SYSTEMS COMPETENCE INTO ACCOUNTING EDUCATION- USA SURVEY FINDINGS"

3. The 22nd European Accounting Association (EAA) Congress, Bordeaux, France. 5-7 May 1999

The title of the paper is:

A FRAMEWORK FOR INTEGRATING IT/IS SKILLS/KNOWLEDGE INTO ACCOUNTING PROGRAMMES IN BRITISH UNIVERSITIES.

B- The following papers submitted to different journals and are under review:

1- LEVEL OF IT/IS SKILLS IN ACCOUNTING PROGRAMMES IN EGYPTIAN AND BRITISH UNIVERSITIES.
2- INFORMATION SYSTEMS TECHNOLOGY COMPETENCES IN ACCOUNTING- COMPARISON BETWEEN EGYPT AND USA.
3- DELIVERING IT/IS SKILLS/KNOWLEDGE IN ACCOUNTING- COMPARATIVE BETWEEN USA, UK, AND EGYPT.
4- THE CURRENT STATUS OF INFORMATION TECHNOLOGY SKILLS IN ACCOUNTING EDUCATION- A COMPARATIVE STUDY.
5- WHAT ARE THE PRACTITIONERS NEEDS: INFORMATION TECHNOLOGY SKILLS- ON-LINE FOCUS GROUPS RESULTS.
6- OBSTACLES FACING INTEGRATING IT/IS IN ACCOUNTING EDUCATION- A COMPARATIVE STUDY.

ABSTRACT

The coming millennium brings many different challenges and opportunities for the accounting profession. One of these challenges is Information Technology/Information Systems (IT/IS). Both academics and practitioners have recognised the value and importance of IT/IS in the achievement of success in the competitive business world and IT/IS skills as being essential to long-term success for accountants. Therefore, accountants should possess strong skills and knowledge in the IT/IS area than ever before. In addition, computer-based accounting information systems are of vital importance to modern organisations. The challenges facing organisations in the 1990's require the skills of a special kind of accountant which this study called "The hybrid accountant".

The present study seeks to determine initially, opinions about the current state and the future for IT/IS in accounting programmes. Secondly, what IT/IS skills and knowledge should accountants possess, which employers expect and would prefer them to have? Thirdly, what is the level of IT/IS skills which is included in accounting programmes now and three years in the future? Fourthly, how should IT/IS skills be integrated into accounting programmes? Finally, a set of hypotheses related to the level of IT/IS NOW and three years in the FUTURE in three samples (USA, UK, Egypt) is tested.

The achievement of the above aims involved the establishment of the following set of objectives:

A. Determining what and how IT/IS skills/knowledge should be integrated into accounting education in the USA.
B. Determining what and how IT/IS skills/knowledge should be integrated into accounting education in the UK.
C. Determining what and how IT/IS skills/knowledge should be integrated into accounting education in Egypt.
D. Testing a set of hypotheses related to the level of IT/IS skills in accounting programmes.

The fulfilment of the above aims and objectives required several stages:

1) conducting a comprehensive literature review which was done in developed countries related to the impact of IT in accounting education and accounting practice;
2) Adopting a sound research methodology to collect field data about the views, attitudes and perceptions toward IT/IS knowledge and skills which should be integrated into accounting education. These views were collected by using on-line focus groups and questionnaires from three groups in three countries USA, UK and Egypt.
3) Adopting a sound way of analysing the collected data to give a clear picture about IT/IS knowledge and skills which should be integrated into accounting programmes related to what and how.
4) Drawing conclusions based on the comparison between the current state in developed countries and the current state in Egypt, with the aim of making recommendations for improving the accounting profession in Egypt as a result of integrating IT skills in the accounting education system in Egyptian Universities.

The conclusion of this study is that the accounting educational program should provide students with a firm foundation in the functional areas of business and a foundation in computing technologies that will enable graduates to pursue both technical and managerial careers incorporating leading edge technologies in public and private organisations. The integration of IT into the accounting curriculum should be designed to provide students with the knowledge and skills required by graduates entering employment. The emphasis should be on the application of Information Technology rather than on traditional computer science. Furthermore, it should seek to educate and to provide the knowledge needed for these people to plan for and to adopt IT techniques in business and management.

The results of this study with regard to opinions about the current state and future for IT/IS accounting programmes show accounting education does not equip students sufficiently with IT/IS skills for their role beyond graduation in their employment. A gap exists between IT/IS skills that students currently learn in accounting at University level and what accountants do in the real world. The business community and those involved in accounting education must decide what the objectives are with regard to IT training. Communication between the business community and Universities need to be improved so that IT training can more closely match needs. Accounting education within the Universities should give students the opportunity to acquire both IT/IS knowledge and IT/IS practical skills for information processing and communication. It should also increase accountants' IT competency and their awareness of technological developments and applications. The programmes should also build on a strong education in systems and Information Technology alongside the core of the business program to prepare students for the social and technical analysis, design, development, implementation and management of systems.

This study also considered findings regarding the level of five sets (General, User, Manager, Designer, and Evaluator) of IT/IS skills/knowledge which may be integrated into accounting programmes and how IT/IS can be integrated into accounting programmes.

Table of Contents

Table of Contents Contd.

Table of Content Contd.

Table of Content contd.

Table of Content contd.

List of Tables

List of Tables contd.

List of Tables contd.

List of Tables contd.

List of Figures

LIST OF ABBREVIATIONS USED IN THE THESIS

General Information Technology Knowledge

SKILLS/KNOWLEDGE	CODE
1-Information Systems Technology for example, components of information systems technology (H/W, S/W), information systems processing methods in organisations, structure of information systems in organisations .etc.	**G1**
2-Computer-Based Accounting Systems for example expert systems in accounting and auditing, technology and financial systems etc.	**G2**
3-Files/Databases (file organisations. Database Management Systems (DBMS), database concepts, controls and security .etc.)	**G3**
4-Communication Technology (data communication and networks, communication technology, design, communication controls, business Telecommunications (LAN, WAN, INTERNET)	**G4**
5-Role of information within business and Information Management For example, Transaction Processing System (TPS), Management information system (MIS), Decision support system (DSS), Executive information system (EIS), -Expert system (ES), neural network (NN)	**G5**
6-Electronic Commerce (Telecommunication in Business On-line Resource) (Electronic Data Interchange (EDI), Electronic Payment Schemes, electronic markets and catalogues, Point Of Sale (POS), Electronic Funds Transfer System (EFTS)	**G6**
7-Administrative issues (reporting relationships of the IT/IS department, approaches to staffing, personnel development and performance evaluation)	**G7**

IT/IS skills/knowledge for the accountant as a USER of information technology

SKILLS/KNOWLEDGE	CODE
1-Hands-on exposure to major program products (day-to-day application) for example word processors, spread sheets, statistical packages, database management system, .etc.	**U1**
2-Ability to use Accounting Systems packages 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.	**U2**
3-Ability to use database service and Internet for financial reporting and disclosure	**U3**

List of Abbreviations used in the thesis contd.

4-Ability to search On-line Public Access Databases such as use on-line retrieval services for tax case research from CD-ROM or WWW	**U4**
5-Ability to understand the structure of typical computerised accounting systems and subsystems, including the flow of transactions, data file organisations, and programmed accounting procedures, financial modelling, general ledger systems packages, revenue/expenditure/Payroll cycles	**U5**

IT/IS skills/knowledge for accountant as a MANAGER of information systems

SKILLS/KNOWLEDGE	CODE
1-Data Resource Structures for example, data resources and information, applications of data administration, management of system maintenance and change	**M1**
2-Management of Accounting Information Systems for example, management of end-user computing, information resources management principles, information concepts and requirements .etc.	**M2**
3-Global Information Management 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	**M3**
4-Executive Information Systems Management (executive decision-making, executive direction of information systems, strategic application of information systems, executive information systems and control of information)	**M4**
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	**10**
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**

List of Abbreviations used in the thesis contd.

12-Decision Support Systems (roles of decision support systems, approaches to decision support systems, decision support systems development)	**M12**
13-Strategic considerations in IT/IS development (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)	**M13**
14-Administrative issues (reporting relationships of the IT/IS department, approaches to staffing, personnel development and performance evaluation)	**M14**

IT/IS skills/knowledge for accountant as a DESIGNER of information systems

SKILLS/KNOWLEDGE	CODE
1-Information Systems (IS) Design and Implementation (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)	**D1**
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 such as linear programming, statistical tools, simulation packages, and network models for enhancing managerial decision making.	**D5**
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**

List of Abbreviations used in the thesis contd.

9-Algorithm Concepts and Information Management (algorithm planning and processing information systems, algorithm validation concepts, algorithm technology and database management)	**D9**
10-Knowledge in the role of information in organisation design and behaviour (For example data bases and data base management systems, system development life cycle (SDLC) .etc.)	**D10**
11-System design techniques (for example, data flow diagrams, entity-relationship model, decision tables and trees, prototyping, computer aided software engineering methodology (CASE) .etc.)	**D11**
12-System acquisition/development life cycle phases, tasks and practices and maintaining control over system development processes (for example, investigation and feasibility study, requirements analysis and initial design, detailed design specification/documentation, hardware evaluation and acquisition, software evaluation , acquisition, development	**D12**

IT/IS skills/knowledge for accountant as an EVALUATOR of information systems

SKILLS/KNOWLEDGE	CODE
1-Internal control in computer-based systems (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.)	**E1**
2-Understanding of characteristics of EDP systems, their major components , and methods of operation	**E2**
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 (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)	**E6**
7-Accounting systems internal control (for example, purpose of internal controls, classification of internal controls, system documentation standards, computer systems controls, control costs and benefits etc.)	**E7**

List of Abbreviations used in the thesis contd.

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

LIST OF APPENDICES

List of Appendices contd.

CHAPTER ONE

INTRODUCTION TO THE RESEARCH

Chapter Structure

1- INTRODUCTION:

Nobody today can avoid Information Technology (IT). With this short statement I will start my research project. IT is an integral part of society today, both professionally and personally. For example, the Internet, particularly the World Wide Web, which is rapidly providing people with access to information, products, and personal contacts that would be virtually impossible without it (Nash and Hoffman, 1995; Seybold, 1993). Society is moving closer and closer to truly becoming a global village. The fast pace at which society is being bombarded with new technological advances requires that members of society be somewhat familiar with computers (Jones et al., 1996) Information Technology (IT) is changing today at a rapid pace and affects most aspects of our lives. In the years "B.C."("Before Computer"), literacy meant the ability to read and write. By extension, it also meant the ability to perform arithmetic calculations. In more recent years it has been used in the phrase "Computer Literacy" to denote an ability to understand and use computers (Barger, 1983). Emerging technologies include not only new hardware, software, and data communications for the use of applications but also planning and development tools for Information Systems (IS) professionals. In fact, the rate of IT change appears to be increasing dramatically. New products seem to surface with greater alacrity than ever before in the history of computing (Benamati, et al., 1995)

The use of Information Technology 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 Information Technology (IT). Concepts, applications, problems, and potential for the future have been discussed and assessed both by researchers and practitioners. Each group has recognised the value and importance of IT in the achievement of success in a very competitive business world and IT skills are essential to long-term success for accountants. As systems become more "open", such as the Internet, communication becomes less likely to involve physical movements. Audits will be done from the audit firm's office. Meetings will use video conferencing facilities in addition to e-mail. Many large organisations are integrating core business process throughout the

supply chain by implementing Enterprise Resource Planning systems (ERP) such as SAP R/3 (Jenson, 1998). These comprehensive systems assist organisations in reengineering business practices, maintaining on-line communication and database linkages across the organisation's supply chain. Wyer (1993) notes that changes in technology, among other factors, have increased the difficulty of the work performed by accountants. Therefore, accountants should possess strong skills and knowledge in the IT/IS (Information Technology/Information Systems) area than ever before. At this time, commerce and industry seem to be driving the evolution of these practices, with education recognising the changes afterwards. Perhaps there should be more recognition of the growth of communication systems and their increasing adoption by business globally by increased emphasis on communication alternatives in the syllabus (http://www.ifac.org/EducationNetwork/Vol3-Num1). At no time has the need for effective management of information resources been so important as in recent years. Particularly since an increasing number of firms are realising the true power of Information Technology Systems in providing information and assistance to decision-makers at all levels of national and international organisations.
However, the need for proper management to utilise these resources has not been considered important until very recently. This is mainly due to the fact that more and more firms have realised the significance of computer-based information systems in providing information and assistance to decision-makers at all levels of an organisation.

Over the past several decades, the advancement of Information Technology (IT) 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 Information System (IS) personnel with strong basic accounting skills along with technical skills. The IT 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 IT in accounting education (Easton, et al. 1995). Top manager's perceptions regarding the present skill profile of IS managers and the importance of information as a major corporate resource has not been reflected in the current IT curricula used to train the future accountants of the corporate world.

In the past, the use of Information Technology in business has increased rapidly to permeate the organisation at every level, meaning closer integration of IT into everyday business functions. The Information and Communication Technology (ICT) revolution represents such a fundamental change - no less than changing the engine which drives human society from one based on physical assets to one based on knowledge assets - that no part of any nation, its culture and its social institutions will escape untouched (Feinstein, et al. 1995). In this circumstance it is axiomatic that human resource development and information and communication technology are integrally linked and must be developed simultaneously.

There is a growing need for those interested in accountancy to understand the nature of this technology and the way it can best be harnessed to provide information for business functions. The world is changing and work is being carried out using new tools. The growth of Information Technology in the past twenty-five years has been so extensive and so pervasive that hardly any area of social life has been left untouched. Through technology, information is now to be found in electronic form, not just between covers on a bookshelf. A computer literate person can find and use this electronic information. Computer utilisation is becoming more widespread on the college level as well as in the business world (Bialaszewski, et al., 1986). It has been readily apparent since late 1970s that Information Technology will have a fundamental impact on the nature of office-based work (Carr, 1985).

Accounting was the first successful, far-reaching application area of business computing. After years of little change in traditional transaction processing, accounting has again recently found itself to be the target of many technological innovations. Imaging, EDI, integrated client/server systems, workflow systems and electronic commerce have all made dramatic impacts on transaction-oriented accounting information systems (AIS). The Year 2000 problem has also created difficulties for transaction processing systems. The complexity of AIS has placed increased pressure on accountants to maintain proper controls to ensure the security and integrity of transaction databases. The demand for traditional accounting and audit services has diminished. For example, financial statements including external audit reports do not carry the same weight with investors as they have in the past, thanks to the widespread demand for and availability of real-time financial data. Auditors may need to move to a continuous audit function and diversify their consulting techniques in order to avoid becoming extinct. These shifts in professional activity will be accompanied by significant changes in the systems that support actual transaction processing, the flow of operational work throughout the value chain, and the organisational support systems employed by auditors as they redefine work processes, work groups and their scope of business (http://www.isworld.org/ais.ac.98/minitracks/ais.htm). Accountants who are working in this technological environment should ideally have a new set of skills and knowledge.

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. These include 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 on the part of IT 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). Business schools have continued to graduate students who lack basic knowledge in the Information Technology Systems skills/knowledge that are crucial in today's competitive, global marketplace.

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 program builds on the core of the business program to prepare students for the social and technical analysis, design, development, implementation and management of systems.

The education of accountants at undergraduate, postgraduate and professional levels must recognise their need to understand the impact of information technology 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 IT 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? What is the place of Information Technology in accounting education?

The challenges facing contemporary organisations require the skills of a special kind of accountant which, this research called "The hybrid accountant" (Combining IT/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 business person 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 term "Hybrid" was originally coined by Peter Keen in the mid 1980s, but received its precise and most quoted definition by Michael Earl (Earl, 1989).

> *"A person with strong technical skills and adequate business knowledge or vice versa.... Hybrids are people with technical skills able to work in user areas doing a line job, but adept at developing and implementing IT application ideas"*
>
> (http://www.skyrme.com/insights/6hybrid.htm)

As well as business and accounting technical knowledge one of these skills/knowledge is Information Technology Systems skills/knowledge.

Recent developments in the computer industry promise to revolutionise business of most countries. The accounting profession operates in a rapidly changing environment. Computer requirements are an essential part of many accounting jobs in both the public and private sectors where accountants can be employed in public practice, industry, commerce, education or government. The IT knowledge and skills of graduate accountants is an important area to potential employers, tertiary institutions, and the societies that monitor and maintain the standards of the profession. Relevant, appropriate Information Technology (IT) education for accounting graduates is a prerequisite for accounting, as a major service industry, to be able to exploit the opportunities provided by IT to achieve significant productivity increases (Weber, 1988). Computers have become an efficient, necessary tool in the business world.

The benefits of Information Technology (IT) use include profit increase, cost reduction or displacement, time saving, improved information, professional performance, staff satisfaction, reliability, speedy data transfer, strengthening competitive position, and better or new client services (Xiao, et al., 1996). A dynamic social and technological environment is changing the way accounting data is accumulated and accounting information is presented (O'Donovan, 1996). The accountant must deal with various computer systems and equipment (Parmley and Parmley 1986) in order to do this. Are the accountants skilled enough to take advantage of opportunities which Information Technology presented? Have they learnt to swim with the tide or are they to be swept to one side and replaced by a new kind of information specialist born of the Information Technology revolution? (Carr, 1985).

In recent years there has been considerable international debate, or more bluntly, criticism, concerning the form and nature of accounting education in Universities. Some of the most visible expressions of concern have been made in the United States, where the accounting profession has called for a fundamental re-appraisal and restructuring of the current accounting education systems in Universities (Humphrey,.et al., 1996). Various bodies of practitioners and academics have encouraged the University to reorient or re-engineer accounting education towards the development of problem solving, critical thinking, communication skills, and Information Technological knowledge and skills (see AAA, 1986; Arthur Andersen et al., 1989; AECC, 1990a, 1990b)

A need in the accounting education curriculum is for the understanding of the nature of Information Technology and of its development. Accounting academics should re-examine the core skills that are taught in undergraduate accounting education to keep in touch with information technology. The accounting curriculum should be more oriented towards providing the academic background necessary to become an effective accounting professional with IT skills upon completion.

The integration of IT into the accounting curriculum should be designed to provide students with the knowledge and skills required by graduates entering employment, and the emphasis is on the application of Information Technology rather than on traditional computer science.
The present study seeks to examine whether or not an 'expectation gap' exists between the skills and knowledge of IT acquired by accounting students at University and the IT skills/knowledge which employers expect and would prefer them to have. This will be done by examining the accounting educators in Universities and accounting practitioners asking them what IT skills/Knowledge should accountants possess and how it should be delivered into accounting programmes?

Several studies have been carried out recently to look at the role Information

Technology is currently playing, and should play in the future of the accounting profession. Many of these studies have been carried out in the USA, but the topics explored are common to most developed countries such as the UK. In particular, the present position with regard to the use of Information Technology in business and accounting is very similar between the USA and the UK. A comparison with other developed countries, especially those within the EU, suggests that American and British Universities are somewhat ahead of the field (Bukhari and Meadows, 1992). Therefore, the research will take a sample form the both countries (USA and UK). This topic has not been studied or investigated in accounting profession in developing countries (sometimes distinguished as "third world". Therefore, this study will be comparative between USA, UK (developed) and Egypt (developing).

2- BACKGROUND.

Historically, accountancy has been looked upon as a profession that plays an important role in all societies and professional accountants should make greater contributions to society than ever before. There are different classifications of accountants: - the accountant as a manager-employee working within organisations to provide information and advice for planning, control and decision making (Collier, 1984); the accountant as a professional general practitioner working in a mixture of locations providing accounting services (Carr, 1985); the accountant engaged in auditing, taxation and provision of accounting and consultant skills to business; finally the accountant as a professional employed in practice or industry. Whatever the accounting domain, accounting is concerned about the acquisition, storage and dissemination of useful information relating to an organisation's economic activity, where there is a symbiotic role of accounting in the economy. It was prepared in recognition of the fact that Information Technology (IT) has grown so extensively that it is now a discipline which is intimately interconnected with accounting (AICPA, 1996). Information Technology continually affects the commercial community at an ever-accelerating rate (Bhaskar and Williams, 1986).

The coming millennium 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, 1996). There are speedy shifts in the influence characteristic of the environment in which professional accountants work. One of these is Information Technology (IT) which is advancing at a rapid pace. Over the last thirty years, the various computer revolutions and IT developments have had a major impact on the business community across the globe (Salleh and Williams 1997).

Information Technology is changing the nature and economics of accounting activity (IFAC, 1995). Where the IT revolution has been highlighted, the various roles of accountants are as follows: (Kaye, 1986)

- Service Function; Known services drawn upon as and when required e.g. auditing, stewardship, taxation, and trusteeship.
- Marketing; Marketing of services and extensions into brokerage, advisory, consulting activities.
- Consultant; Expert in specific financial and related services.
- Expertise; providing specific expertise. like the doctor providing a range of roles and a point of initial advice.
- Manager; Managing accounting information services, financial resources or other functions, as per production and sales managers in their respective functions.
- Participant in power game, whether within the organisation or a wider stage.

The spread of Information Technology will affect auditing work as mentioned above. The audit has been affected in two ways, firstly, the audit will become more complex and challenging as organisations move towards on-line and "paperless" systems. Secondly, the auditor will be faced with the opportunity of using the technology itself to increase the efficiency and effectiveness of the audit (Carr, 1985). Evidence of the impact of change is sparse and has been limited to studies of small practices (Bhaskar and Williams, 1986), management accountants (Collier, 1984), Information Technology and the accountant (Carr, 1985) and the chartered accountant in the Information Technology age (Clarke and Cooper (ICAEW), 1985).

Computer systems which include information systems, decision support systems, and business data processing applications permeate virtually every aspect of business activity (Cronan and Fries, 1986). Current designs and project development philosophies require business users to become increasingly involved in the development of systems they are requesting (Richardson et al 1980). Many accounting job recruiters now seek accounting graduates who have been trained to use electronic spreadsheets in various fields of accounting (Parmely and Paremly, 1986). There is general agreement that University courses should not lag behind events in the business world particularly in the turbulent environment of Information Technology (IT) and accounting education should incorporate the practical applications aspects of IT into modules and courses generally (Crawford and Barr 1997). Accounting education should prepare students for the workplace of today and more importantly of tomorrow and students must have the skills to adapt and change as the workplace demands.

As a result, it is essential that business graduates in general and accounting graduates in particular should possess basic knowledge and skills of computers and computer systems. Universities and colleges must offer computer training that will prepare accounting graduates to operate in a technology driven accounting profession. Action is urgently needed to develop the skills of professional accountants over a range of new roles such as a user of information technology, as a manager of financial computerised-information systems, as a designer for accounting information systems and as a evaluator for computerised accounting systems either external or internal auditor.

In response to demands from industry and the American Assembly of Collegiate Schools of Business (AACSB) and the Board of Accreditation of Accountancy Educational Courses BAAEC requirements in UK, many schools and instructors have introduced the microcomputer into their accounting courses (Bialaszewski et al. 1986). Waller and Gallun (1985) surveyed 36 accounting firms and companies to assess the hardware and software currently being used, the microcomputer applications currently being performed, and the computer knowledge and skills needed by accountants.

Accounting education in the 1990s faces a very significant challenge: how to educate accountants in a complex and rapidly changing environment that has the explosion of Information Technology and increasing levels of competition, globalisation, and more stringent requirements for legal liability. This challenge has implications for both accounting educators and the accounting profession (Frederickson and Pratt, 1995). Accounting practitioners and academics should work together to re-examine the core skills that are taught in undergraduate accounting education. Nevertheless, despite ambiguous results thus far, computer use in accounting education is growing as Thomas 1983, and Hart et al. 1984 show the urgency of computer integration into accounting education is increasing as organisations increase their use of computing, especially for accounting and auditing functions. This has increased the need for information technologies to be included in the educational mainstream (Borthick and Clark, 1987).

The career plans of professional accountants and future training relating to systems must be based on a realistic view of the changing nature of accounting. The accountancy profession's changing role in providing services to business, government and the community at large must be supported by the knowledge and skills required for future success as a professional accountant. Some IT skills, such as the ability to use and understand spreadsheets, are now indispensable. Professional accounting bodies must ensure that candidates possess the core of IT skills before they qualify as members of those bodies. Additionally, since an increasing number of professional accountants are engaged in providing IT-related advisory and evaluative services, it is important that professional accountancy bodies maintain the quality and credibility of these services through both pre-qualification and post-qualification education requirements (International Federation of Accountants (IFAC, 1995).

However, Wu (1984) concludes that accounting students are not well prepared to deal with computer applications in accounting. For example, a survey by Williams (1987) found that, although computing facilities were available to students, their primary usage was limited to programming. Beechy's (1980) survey of university accounting programs in Canada revealed that computers were virtually ignored in most programs and most areas (i.e., financial, managerial, tax, and auditing). Boardman and Boardman (1983) surveyed two-year collegiate institutions and found principles of

computers were in a majority of accounting courses. Thomas (1983) surveyed an extensive sample of North American College and University accounting departments to determine how, and the degree to which microcomputers were used. About 70 percent of the 250 respondents did not use microcomputers in teaching accounting. Similarly Hart et al, (1984), in a survey of computer usage in accounting education at AACSB-accredited institutions, found a low computer usage in both undergraduate and graduate accounting classes.
Such changes have obvious detrimental implications. Preparing students adequately for the future involves not only providing the training necessary for them to work in an increasingly automated environment, but also exploring the broader societal implications of computer technology.

Information Technology (IT) is pervasive in the world of business. Competence with this technology is imperative for the professional accountant (IFAC, 1995) and the competence of individuals becoming professional accountants must be enhanced.
Information Technology plays a vital role not only by supporting the activities of profit-oriented but those of non-profit making organisations too. Professional accountants, in addition to extensively using various types of information technologies, often play important managerial, advisory and evaluative roles in connection with the adoption and use of various information technologies by organisations of all types and sizes. The body of knowledge and skills required of professional accountants include a variety of important areas. IT is one of the core competencies of professional accountants and requires special attention due to its explosive growth and its rapid rate of change (IFAC, 1995). Information technologies are positively affecting the way in which organisations operate. In some cases the changes are dramatic. While there is a continuing need for sound business system design practices and effective financial and management controls, the business planning and design process and internal control requirements will, of necessity, change with changes in information technologies. Traditionally, professional accountants have been entrusted with the tasks of evaluating investments in business systems, evaluating business system designs and reporting on potential weaknesses.

Increasingly, extensive organisational restructuring around such technologies support

Information Technology departments. To maintain the accountancy profession's credibility and capability in supporting new Information Technological initiatives, the competence of professional accountants must be maintained and enhanced so that public trust and confidence in the professional accountancy bodies is maintained (IFAC, 1995).

Accounting education systems within Universities should give students the opportunity to acquire both IT knowledge and IT practical skills for the processing, analysing and communication of the information. Automatic data -processing equipment and the corresponding power to gather analysis and report data are an important part of the operational administrative setting. Most managers in non-profit, profit and government sectors have available a configuration of computer hardware and software, ranging from service bureau assistance to more sophisticated on-line applications. Microprocessors at a modest cost are increasingly being used in the management of many enterprises. Accounting tasks, both routine and periodic, are regularly implemented using a wide range of computer technology. Most certified public accounting firms now have an on-line computing capability for their audit, tax, and management services staff. Similar capabilities are available in the offices of controllers and financial managers throughout the country. (Petersen and Grimlund, 1983).

The present study will address the following two questions:

- What IT skills and knowledge are expected of graduating accounting students?
- How should the IT skills and knowledge be delivered in accounting curriculum?

The above two questions will be answered by gaining insight into accounting educators in the business schools in three countries as well as accounting practitioners in order to collect perception and views with regard to the level of IT skills/knowledge that the accountants should possess and how it should delivered.

3- THE AIMS AND OBJECTIVES OF THE STUDY

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 IT so they can be taken to organisations for more effective use of information technology systems in modern organisations, this study aims to:

- Determine what IT skills and knowledge the professional accountants should possess.
- Determine how IT skills and knowledge should be delivered in accounting education
- Compare the integrating of IT/IS skills/knowledge in accounting programmes in one of the developing countries (Egypt) and of two developed countries (USA and UK).

The proposed IT/IS skills and knowledge, which will be presented in this thesis, is the result of use of an inter-disciplinary method. The researcher will use information systems (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 using computer science literature for the general skills and knowledge which the accountants should possess.

The achievement of the above aims involves the establishment of the following set of objectives:

A. Determining what and how IT/IS skills/knowledge should be integrated into accounting education in USA.
B. Determining what and how IT/IS skills/knowledge should be integrated into accounting education in UK.
C. Determining what and how IT/IS skills/knowledge should be integrated into accounting education in Egypt.
D. Testing set of hypotheses related to the level of IT/IS skills in accounting programmes.

The fulfilment of the above aims and objectives required a set of steps:

1) Conducting a comprehensive review of literature carried out in developed countries related to the impact of IT in accounting education and accounting practices.
2) Adopting a sound research methodology to collect field data about the views, attitudes and perceptions toward the Information Technology Systems knowledge

and skills, this should be integrated in accounting education. These views will be collected from three groups in three countries USA, UK, and Egypt.

3) Adopting a sound way of analysing the collected data to give a clear picture about what IT knowledge and skills should be an integrated part of an accounting programme.
4) Drawing conclusions based on a comparative analysis of the current state in developed countries and the current state in Egypt, with the aim of making recommendations for improving accounting profession in Egypt as a result to integrating IT skills in the accounting education system in Egyptian Universities.

4- THE IMPORTANCE OF INFORMATION TECHNOLOGY FOR ACCOUNTING PURPOSES

Technological developments and advancements are now a considerable feature in accountancy in the second half of this century and it is believed to be the most important environmental variable. As a result, today, professional accountants work in an exciting and complex environment, which is constantly changing. This is because progress in Information Technology occurs at an ever-increasing rate (Fogarty, 1997). Business organisations are changing their methods of operational management structures to meet the demands of an increasingly competitive environment. The economic and legal environment where accountants work is also changing in unpredictable ways (American Accounting Association (AAA), 1986). Most companies can now afford to use Information Technology to access information easily and cost effectively and to manipulate data to meet specific requirements. Information Technology has actually contributed to improving business operations and product development. The role of management accounting is changing from accumulation, analysis and preparation towards interpretation, evaluation, control with greater involvement in decision making (Collier, 1984).

All of these environmental changes require that today's accounting student is better prepared than ever before to enter the challenging world of the accounting profession and there is a great need for accounting students to keep up to date with the dynamic, expanding, and complex accounting profession (Andersen et al, 1989). Accounting education in business studies should design their programmes to keep pace with the latest scientific developments in the world. It should also fulfil the needs of Society by providing them with individuals who are qualified scientifically and have the intellect for leadership characteristics. Accounting graduates should be able to combine modern trends with heritage and be able to face present and future challenges

Accountants need managerial skills for deciding how technology ought to be applied, but acquiring these skills requires knowledge of technological capabilities and implementation constraints. Accounting education must also prepare students to use artificial intelligence where, the purpose of accounting classes is not to teach accounting, but rather to teach student to become accountants. Accounting is more than just the mechanical application of accounting rules (Bandy, 1990).

Accounting education is in a period of its greatest change. A number of recent critiques, including those of the "Bedford Committee" (American Accounting Association Committee 1986), the Big 8 "White Paper" (Perspectives on Education 1989), and the Accounting Education Change Commission's Position Statement Number One (AECC 1990b), call for dramatic, substantive change in the knowledge and skills that are taught in accounting education. A common aspect of most recent calls for change in accounting education is an increased emphasis on knowledge and skills related to information technology, computing and accounting systems. For example, both the Bedford Committee (1986, p 182) and AECC's position statement number one (1990b, p 309) identify the " design and use of Information Technology " as a core dimension of basic accounting education. Similarly, the AECC's Position Statement Number Two (AECC,1991, p 250) argues that the first course in accounting should include coverage of "...the principles underlying the design, integrity, and effectiveness of accounting information systems". Many public accounting firms now expect incoming accounting graduates to have both a general knowledge of accounting systems and a set of specific skills related to Information Technology (Stone, et al., 1996). For example, a spokesperson for Coopers & Lybrand (New accountant 1992, p.6) observes:

> *" The new staff member should have a conceptual understanding of accounting information systems and the ability to use generally accepted micro-based tools (e.g., Spreadsheet and word processing software).*

Experience with other applications software and experience with information systems in the business world is a plus"

Many accounting academics have responded to these calls for an increased focus on Information Technology knowledge and skills. For example, AECC sponsored undergraduate accounting curriculum innovations at Arizona State University (Williams and Sundem, 1990), Brigham Young University (Albrecht et al., 1994), North Carolina A & T State University (Williams and Sundem, 1990), The University of Massachusetts (Williams and Sundem, 1990), and the University of Southern California (Diamond and Pincus, 1994) all heavily emphasise the development of accounting systems knowledge and computer-related skills (Stone et al., 1996)

5- RESEARCH PROBLEM

As has been argued above, many organisations have recognised that we now live in a rapidly changing technological environment and the need to respond to that change is vital to maintain market share. Therefore, the accounting profession either in public accounting firms or private business organisations is faced with the challenge of rapid developments in information technology. Thus, the question is how the accounting education will change and how course content will facilitate developments in information technology. In other words, how will accounting education maintain a minimum difference between the competencies demanded by accounting employers- (what the accountants do or what newly graduated accountants need to know for practice of their chosen profession)- and competencies possessed by accounting graduates?

The present study will address the above questions by gaining insight into the faculties of commerce in Egypt and business schools in USA and UK to collect academic's perception and views. The study will gather views from accounting practitioners via focus groups on the Internet. These views will include what IT skills/knowledge should the accountants possess and what level of it and how should it delivered.

6- IMPORTANCE OF THE RESEARCH TO EGYPT

The use of Information Technology can provide many benefits to developing countries, Egypt, for example, but only if we get some early gains and demonstrated successes. Many question the use of expensive Information Technology in developing countries with so many basic needs. Only through well-planned, solution-oriented implementation can we mitigate these fears and demonstrate the true value-added that information systems can bring.
It has always been apparent that information, analysis and communication are fundamental to the management and growth of any organisation or country. The increasing power and decreasing cost of computers coupled with the expansion of the internet now makes it possible to provide essential management tools to developing countries. This trend will continue to offer enormous opportunities for improvement in nearly every aspect of development.

While human resources are Egypt's main asset for any development in general and for technological development specifically, therefore, the research deals actively with the development of one kind of these human resources i.e. accountants, through integrating the latest Information Technology skills and knowledge into accounting education in Egypt. The importance of this research is to answer emerging internal needs and to satisfy the huge demand in industry and commerce for accounting graduates who are able to apply and manage Information Technology in a business environment. Egypt wishes to be an "IT-rich" society rather than an "IT-poor" society and this will include changes brought by IT, which affect accountants' qualifications. There is much evidence of a gap in understanding between computer professionals and non-technical users like accountants and it is a very important factor in the development record of information systems and technological advances in business organisations. This has led to calls for the training of `hybrid accountants', that is, people with skills in both accounting and IT, who can understand how IT supports business organisations. It is important that graduates develop an understanding of how business organisations operate, how the various business functions are organised and interrelated, what responsibilities business accountants have in their different roles of information systems in business, such as manager of information systems, user of information systems, designer of it or evaluator for information systems. Additionally, the level required skills and knowledge should have to carry out these different roles in business information systems.

Another important aspect of this thesis comes from the national shortage of accountants who are equipped with Information Technology skills and knowledge in the context of business and industry and how their performance can be enhanced by the understanding of the application of Information Technology. Integrating this knowledge and skills into accounting programmes will help them to do their work in the Egyptian economy in an efficient and effective way. Particularly in this period of time where Egypt is going to transfer from the centralised economy to the market economy through privatisation. Accountants and auditors in Egypt are expected to play a leading role in this economic transfer stage.

Since the early 1980s, there has been an extensive move towards privatising government enterprises and functions (such as the post office, telephone system, etc.). Privatisation, as a transfer of assets or functions from the State to the private sector, is to be accompanied by a radical reallocation of available productive resources, a restructuring of the institutional setting in which production and services takes place, and the introduction of new methods of corporate governance, freed from strong political intervention or control. A major aim of privatisation has been to increase efficiency in the economy while fostering economic growth and development through the removal of unprofitable enterprises and functions from a government's budget.

In assessing privatisation, the accounting system and its data and the audit methodology play a critical role. The roles of financial systems, which includes the output of accounting systems, help decision-makers and planning and policy makers. Good decisions are not possible without strong financial systems which come from competent accountants who are equipped with the latest tools in IT in order to do their work in an efficient and effective manner. This thesis is introduced as a contribution to how the Egyptian economy can develop its market orientation. Integrating IT skills and knowledge into accounting programs will emphasise applications and methods, rather than the science of computing.

The aim of the research programme is to advance knowledge of accountants in the effective application of IT in Business, Industry and public practice. The research will deal with how the well-educated accountant in IT/IS will work in computer-based systems and accounting applications and how that will help the decision- making process within organisations with consequences in the whole economy and provide a basis for policy-making at a national level. Information Technology is used by a wide variety of businesses and service organisations over a broad range of applications therefore well-trained accountants in this field will be useful in the decision-making process.

7- RESEARCH QUESTIONS

There is increasing demand in the business environment that accountants should possess IT/IS skills and knowledge. The business world awaiting graduating accounting students is one that demands some level of IT/IS skills and knowledge. Therefore, integrating IT/IS skills into the curriculum in accounting education is important to the aim of helping students acquire the appropriate knowledge and skills relevant to the understanding of the role of IT in accounting work. The research will identify the IT competencies that reflect the changing practice environment.

Therefore, fundamental research questions emerge and are addressed as follow:

♦ **RESEARCH QUESTIONS FOR ACADEMICS** *(Accounting educators in USA, UK, and Egypt)*

The accounting educators represent the supply side for accountants and for employment of accountancy work. Therefore the study will call the academics' viewpoint the supply Perspective

The questions will be:

- What level of Information Technology skills and knowledge are expected of graduating accounting students?
- How should IT skills and knowledge be delivered in the accounting curriculum?

The current research will emphasise two questions:

Firstly, what level of IT knowledge and skills should professional accountants possess?

Secondly, how they can be delivered in accounting programmes?

The above two questions will be answered from the practitioners and three accounting academic groups in three countries USA, UK, and Egypt.

8- METHODOLOGY OF RESEARCH

The above questions should be answered by linking the academic world and the world of practice, where accounting practitioners and accounting educators should co-operate with each other in re-examining the IT core skills and knowledge that are taught in accounting educational programmes. The research view believe that a mix of academic and non-academic education and training in IT skills and knowledge is required. Therefore, This research will use two methods in order to collect the data:

8-1- Focus Group

The purpose of the Focus Group is to implement the first step in gathering data from three groups, accounting educators, accounting practitioners, and learning technology people. This focus group was formed to collect 3 sets of information: what is the current state, in accounting education and accounting practice and learning technology in general, for Information Technology skills and knowledge; What IT skills should accountants and students in accounting programmes possess; Thirdly, what IT skills which will be needed in accounting practice and accounting education in the future?

The focus groups (Appendix one) were conducted on-line via the Internet where the researcher created a web site, which included the questions targeted at the three focus groups. The URL address were:

http://www.livjm.ac.uk/~busaahme/ (for introduction)

http://www.livjm.ac.uk/~busaahme/education.html (Accounting educators group)

http://www.livjm.ac.uk/~busaahme/practition.html (Accounting Practitioners Group)

http://www.livjm.ac.uk/~busaahme/learning.html (Learning Technology Group)

8-2 Questionnaire Method

Feedback from two processes: literature review and focus groups, were used in designing the final questionnaire which included a set of IT knowledge and skills which accountants should possess. The source of these sets was the responses to the Focus Group and literature review in different disciplines (and inter-disciplinary) and includes information systems (IS), Information Resource Management (IRM), and Electronic Data Processing (EDP), which deal with IT skills and knowledge in accounting.

The set of IT skills/knowledge in the final questionnaire consists of five groups of skills/knowledge and are as follows:

⇒ General IT educational requirements,

⇒ The accountant as an end user of Information Technology

⇒ The accountant as a manager of information systems

⇒ The accountant as the designer of business systems (alone or as part of a team)

⇒ The accountant as the evaluator of information systems.

The source of the first group is from computer science as fundamental computer skills/knowledge. Second group is from end-using computer literature. The third group is obtained from Information Resources Management curriculum (IRM).

The fourth group is borrowed from Information Systems (IS) curriculum.

The fifth group is from Electronic Data Processing EDP literature.

The study included sending out the questionnaire, which examined the views of the accounting educators in USA, UK, Egypt, to the accounting educators who are interested and have expertise in Information Technology and accounting. The study will emphasise the use of IT knowledge and skills from the perspective of its usefulness, application, and impact where the study's approach will focus on harnessing the power and use of IT, rather than focusing on technology as an end in itself. In other words, the study will try to present a framework for IT skills and knowledge that exists in accounting education to learn how to use IT in accounting work, rather than learn IT itself.

This study will employ three kinds of methodology for data collection, as follows:

The first method is to survey the relevant literature in order to achieve the following:

- To gather data about the impact of Information Technology on the accounting curriculum in business schools in developed countries such as USA and UK
- To explore the impact of Information Technology on the accounting profession in the developed countries of the USA and the UK.

Secondly, focus groups and the use of a questionnaire method to collect academic's and practitioner's perception and views with regard to what IT skills/knowledge should accountants possess, what level of these skills and how they should be delivered. It will be used to collect opinions about the current state and the future of IT/IS in accounting programmes. Questionnaire will be sent out to three groups who have IT/IS expertise in accounting:

-Group one: the questionnaire will be sent out to a sample of members of accounting educators in the accounting department at the business schools in the Florida State region (USA).

-Group two: the questionnaire will be sent out to a sample of accounting academics in Accounting Education at UK Universities.

-Group three: the questionnaire will be sent out to a sample of staff members in accounting departments in faculties of commerce in Egyptian Universities.

Thirdly, the interview method either by personal visit or electronic mail. Visits will be carried out with members of staff in accounting departments in USA, Egypt, and UK. These visits will be in order to pre-test and re-test the questionnaire.

9- THE SIGNIFICANCE OF THE STUDY.

The significance of the study lies in its being the first study which explores directly what the accountants need in the real world in Egypt with regard to IT skills and knowledge and examines what levels of IT knowledge and skills should integrated into education in the accounting curriculum in Egyptian Universities and how they will deliver this knowledge and skills. Egypt now has an increasing investment both from national and international sources as a result of the privatisation program. The transfer of government ownership in 314 public sector enterprises to the private sector offers tremendous opportunities for expansion in the capital market. An organised stock market is an excellent mechanism for smooth and fair transfer. At present there are two stock exchanges in Egypt. The accounting profession in Egypt should play a big role in providing financial data and information for the decision making process in investment and performance evaluation. As a result, accounting education should supply the Egyptian environment with accountants who are well prepared in Information Technology because accountancy now depends substantiality on the use of technology.

Accounting education and the accounting profession have long enjoyed a symbiotic relationship in that accounting programs have historically supplied accounting graduates into the profession, which in turn has continued to hire these graduates and provide monetary and non-monetary support. Accounting education must realise, however, that the profession can obtain qualified people by means other than through accounting programs, and such means will become increasingly attractive if these programs fail to produce graduates who possess the requisite competencies. Indeed, some accounting firms already hire non-accounting graduates and train them " in-house" (Williams, 1993). Thus, in order for accounting programs to maintain their symbiotic relationship with the profession, and thereby maintain their standing within Universities, they must continue to produce graduates who possess the competencies demanded by accounting employers.

As Information Technology products, like microcomputers and spreadsheet software, become more and more indispensable to accounting practice in the business world, accounting education will have to teach them in the classroom in order to stay in line with technology. Without incorporating Information Technology applications into accounting education to some degree, accounting programs in every school may face the danger of becoming obsolete.

10- THE ORGANISATION OF THE STUDY.

The study is organised into seven chapters.

CHAPTER ONE

INTRODUCTION TO THE RESEARCH

This is an attempt to introduce a preliminary discussion of the importance of Information Technology skills in accounting practice and the relationship between accounting education and the accounting profession. This has been followed by a brief discussion of the aims and objectives of this study and the steps which the researcher will take to achieve them. In addition this chapter provides a research problem, the significance of the study, the research questions, a brief methodology of the study, and the organisation of the study.

CHAPTER TWO

INFORMATION TECHNOLOGY AND ACCOUNTING LITERATURE REVIEW (1)

This chapter will be devoted to the review of the literature available in the developed countries such as USA and UK related to Information Technology in accounting practice and accounting education. This chapter will be devoted firstly to the accounting education process and to IT definition and the development of Information Technology, which will affect accounting work. The chapter will deal with why IT should be integrated in accounting education?

CHAPTER THREE
INFORMATION TECHNOLOGY AND ACCOUNTING LITERATURE REVIEW (2)

In this chapter the researcher will continue to present other aspects for integrating IT/IS into accounting education. This chapter will target three main issues: firstly, what IT/IS skills and knowledge should accountants possess? Secondly, how should IT skills be integrated in accounting education? Thirdly, the chapter refers to literature related to the problems that face the integrating process in accounting curriculum.

CHAPTER FOUR
METHODOLOGY OF RESEARCH

This chapter will explain the research methodology design and describes the major methodology used to collect the data which will be used to answer the research questions and, which will be used to accomplish the study's objectives. It will clarify the scope and nature of the study, and discuss research techniques. This chapter will cover justification for the methodology in terms of the research problem and the literature review. The chapter will present the unit of analysis and subjects who are the source of data from the questionnaire. It will cover instruments used to collect data describing the focus groups which will be conducted on the Internet. The questionnaire design will be given with the pilot study, procedures, and sampling procedures and data collection and how the researcher administered the questionnaire.

CHAPTER FIVE
DATA REPORTING

This chapter reports the findings of the focus groups and describes and summarises the data description from the questionnaire survey of accounting educators in accounting departments at the Universities in three groups representing three countries, USA, UK, and Egypt. The aim of this chapter is to provide a summary of the data collected via the survey in the USA sample, UK sample, and Egyptian sample. Statistical tests analyse and test the hypotheses for the data and comparative analysis between the three samples are left to the next chapter (chapter six).

This chapter will present the pattern of results including their relevance to the research questions. Frequent summary tables and figures of results are essential, so that the reader can easily see patterns in the mass of data presented in this chapter. Tables of statistical data will be presented and descriptive data about the subjects is provided. The data for each research question will be presented as well.

CHAPTER SIX

DATA ANALYSIS

This chapter is focused on the analysis of data which was gathered from three samples. This chapter will focus mainly on testing the hypotheses, which are introduced in the methodology chapter (chapter four), either individual hypotheses or comparative ones. Therefore, this chapter will be split in to seven sections. The first three sections will deal with individual countries as follows: Firstly the analysis of USA data, secondly, analysis of UK data, thirdly, analysis of data from Egyptian sample. Sections from four to seven will concentrate on comparative analysis between three groups as follows: Section four is a comparison between USA and Egypt. Section five is a comparison of UK against Egypt. Section six is a comparison between USA and UK. Section seven deals with USA and UK as one sample representing developed countries against Egypt as a developing country.

This chapter will be restricted to presentations and testing the hypotheses both individual and comparative ones depending on the collected data from the three samples without drawing general conclusions, which will appear in chapter six.

CHAPTER SEVEN

CONCLUSIONS AND IMPLICATIONS:

This chapter will provide the final summary and conclusions of the study and findings for each research question and the hypotheses. Therefore, the study will deal with conclusions with regard to the research questions such as what IT/IS skills should be included in accounting programmes and how they should be delivered. This chapter will explain how the thesis contributes to knowledge and illustrate the limitations of the study. At the end of this chapter, it will make recommendations for further research.

CHAPTER TWO

INFORMATION TECHNOLOGY AND ACCOUNTING LITERATURE REVIEW (1)

Chapter Structure

1- Introduction

2- Accounting educational process

3- Information Technology definition and development features

4- Integrating IT skills and Knowledge in Accounting education: WHY

5- Summary

1- Introduction.

This chapter will present the review of literature that has been published in developed countries. To the researcher's knowledge, there is no published literature in developing countries that is related to Information Technology and accounting in. As evidence, the researcher did a survey in the majority of accounting journals.

This chapter will be addressing firstly the accounting education process and next the definition of IT and its development which will be affect accounting work. After that, the chapter will be devoted to a review of the literature available in the developed countries such as USA, UK and Australia that is related to Information Technology in accounting practices and accounting education. The chapter will also deal with why IT should be integrated into accounting education.

With regard to the other aspects, such as what the IT/IS skills are, which should be integrated and how these skills delivered will be dealt with in the following chapter

Therefore, this chapter will be divided into the following parts:-

2- The accounting educational process.

3- The definition of Information Technology and development features.

4- Integrating IT skills and Knowledge in Accounting Education: WHY.

2- The accounting educational process

2-1-Introduction

Accounting education in the 1990s faced a very significant challenge: How to educate accountants in a complex and rapidly changing environment that has seen the explosion of the information technological age and increased levels of competition, globalisation, and legal liability. There is a growing awareness of the need to develop a broad range of competencies in accounting undergraduates (Gloria and Jeffrey, 1997). There is a requirement for a radical rethink of the nature and content of accounting education in general and University courses in accounting to meet the needs of organisations in particular and the society at large. IT skills and knowledge is one of the most important competencies that an accounting student should possess.

The goal of accounting education must be to produce competent professional accountants, capable of making a positive contribution in their lifetimes to the profession and society in which they work. Preparing students to become both productive members of the workplace and valuable members of the community are other goals. 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). Both great challenges and great opportunities have marked the last ten years in accounting education (http://www.be_lab.udel.edu/factory/complete.html).

2-2 The need for change in accounting education:

In recent years there has been considerable international debate, or more bluntly, criticism, concerning the form and nature of University accounting education. Some of the most visible expressions of concern have been made in the United States, where the accounting profession has called for a fundamental re-appraisal and restructuring of the current University accounting education systems (Humphrey, et al, 1996). Hollander et al. (1996) point out that accounting has for many years been referred to as the language of business. Nowadays business processes have changed by the use of IT tools.

Therefore the accounting profession should change as well to meet the re-examining and re-engineering of the business process. Clearly the nature of the first job and the nature of the career for accountants are undergoing dramatic change unless accounting educators respond successfully to these change. Otherwise, the profession will be forced to seek entry-level talent elsewhere (Williams, 1996). Various bodies of practitioners and academics have encouraged the University to reorient or re-engineer accounting education toward the development of problem solving, critical thinking, communication skills, and Information Technology knowledge and skills (see AAA, 1986; Maggiolini, 1986; Helmi, 1986, Arthur Andersen et al., 1989; Hermanson, et al. 1989, AECC, 1990a, 1990b, May et al., 1995). In 1984, the American Accounting Association appointed a committee to study the future structure, content and scope of accounting education (the Bedford Committee), which issued a report titled, "Future Accounting Education: Preparing for the expanding Profession", in 1986. The American Institute of Certified Public Accountants (AICPA) issued a revision of its *Education Requirements for entry into the Accounting Profession* in 1988.

In 1989, the chief executives of the Big Eight accounting firms (now Big Five firms) jointly issued a white paper entitled *"Perspectives on Education: Capabilities for Success in the Accounting Profession"* (Arthur Anderson et. *al., 1989). This* publication expressed concern about the quantity and quality of accounting graduates. The partners of the then eight largest international accounting firms in this document specify the capabilities required for successful practice in the public accounting profession, capabilities that should be developed through the educational process. The Perspective discussed the current environment in which the accounting profession and accounting education must function. In response to the position adopted by the large CPA firms, the American Accounting Association established the Accounting Education Change Commission (AECC) to lead the effort to change accounting education in USA.

The blame for accounting education programs being out-of-date has tended to be placed on accounting educators and educational institutions (see AECC, 1990b, p.330; IFAC, 1994, p.21). The solution, the IFAC suggests, lies in the accounting profession taking a leadership role in fostering change in accounting education by, for example, promulgating curriculum guidelines, promoting supportive administrative structures and encouraging students to "identify with the profession and be concerned with developing the knowledge, skills and values of its members" (IFAC, 1994, p.5). The desire for change in accounting education has not, however, just been expressed by professional accounting bodies. Some leading accounting academics have been actively involved in promoting the AECC's initiatives in the United States (Humphrey, et al., 1996)

The goal of the accounting education process is to produce accounting graduates who possess competencies that match the competencies demanded by those who employ them (Frederickson and Pratt, 1995). Hence the accounting education process must demonstrate a relationship between the educational objectives and the accounting curriculum structure in general, and the accounting course content in particular. Both curriculum and course content should be formulated so that students' achieve the competencies as stated in the curriculum or course objectives. There are challenges of change in accounting education (Williams, 1991). The experiential component in education in Information Technology should be strengthened to improve future accountants' ability to make intelligent use of technology (Walker and Denna, 1997). One of the educational objectives is that graduate accountants are able to meet the profession and business organisation needs.

May et al. (1995) in their accounting educators' survey, pointed out that a whole faculty agree regarding the need for change in the accounting curriculum as well as co-operation, reasonableness, and a spirit of moving forward together will enable us to achieve the goal we all are seeking: a quality accounting education program for our graduates.

2-3 The relation between accounting education and accounting practice

The extent that current educational content has maintained relevance to accounting practice is debatable (Dillard and Tinker 1996). Accounting practice is highly dynamic; offering a great opportunity to those prepared to accept the challenge that this entails. This challenge has implications for both accounting educators and the accounting profession. In recognition of the changing business environment and the need for curriculum modification to accommodate the new demands of the corporate workplace, the Institute of Management Accountants (IMA) and the Financial Executives Institute (FEI) sponsored a study that was conducted by the Gary Siegel Organisation (GSO) in the USA. The purpose of this study was to determine and explore the educational needs of entry-level accountants from the point of view of corporate America.

One of the results shows that Corporate America believes Universities are doing a less than adequate job of preparing people for entry-level work in accounting. Respondents to this study believe that entry-level accountants are falling short for several reasons: lack of practical experience, little understanding of the big picture or how the real world works, poor communication skills, and insufficient preparation in Information Technology knowledge and skills (Siegel and Sorenson, 1994).

An important theme in the reform of accounting education is the collective mission of keeping the educational content in touch with current accounting practices

As a result accounting education requires reorientation or re-engineering.

2-4 The components of the accounting education process

The educational processes in accounting refer to the environment in which the educators in accounting including the institutions, the faculties, the students, and resources which are available, the curriculum, and the courses' contents. All these factors affect the production of accounting graduates. Williams et al. (1988) developed a descriptive framework for accounting education research. The five major components of the framework are students, faculty, administration and constituents, the educational process, and outcomes. The framework treats students and faculty staff as inputs into the educational process, which in turn produces individual, institutional, and societal outcomes. Administration and constituents are viewed as providing structure to the process. Herring and Izard (1992) extend this framework by viewing accounting education as an ongoing process, emphasising the importance of establishing educational objectives in terms of student outcomes and by continually assessing these outcomes ensuring that objectives are being met. They propose a model of accounting education that contains the following five steps:

1-establish educational objectives,

2-deliver a curriculum in accordance with the objectives,

3-select students for admission who are capable of successfully completing the curriculum,

4-continuously teach, react with, advise, and evaluate students during the college experience, and

5-assess the outcomes of the program, and then re-evaluate the objectives, curriculum, and students.

The authors judge that accounting programs have generally accomplished step 2 and 3, and are improving in step 4. They note further (Herring and Izard 1992, P15):

> *"What is surprising, however, is that these steps have been accomplished without clearly defined educational objectives (step 1) or assessment of the product (step 5). If educational objectives were established when the curriculum was developed, the rapidly expanding profession has obsolesced them"*. P.5

Deppe et al. (1991) provide direction for accounting educators by focusing more specifically on outcomes of the accounting educational process and identifying those competencies needed to be successful as a professional accountant and the points in the educational process at which these competencies are being acquired. They provide a list of 27 competencies that can be categorised into seven areas:
1-communication skills,
2-information development and distribution skills,
3-decision-making skills,
4-knowledge of accounting, auditing, and tax,
5-knowledge of business and the environment,
6-professionalism, and
7-leadership development.
The 1992-93 report on outcomes assessment by the teaching and curriculum section of the American Accounting Association emphasise both the importance of establishing educational objectives and a continual assessment of outcomes. It states on page 15:

> *"Although specifying goals and objectives of the accounting program is a difficult task, it is essential in order to provide the framework for an accounting program that delivers the curriculum, selects those students with the overall goal of measurably improving the student during the college experience. It should be the planned and specified objectives that are driving the accountancy program. Assessment should be a tool to provide feedback and improvement suggestions for the process of delivering those objectives"*.(AAA, 1993, P.15)

Accounting education is an ongoing process that requires the identification of a set of objectives expressed in terms of desired competencies for graduating students. It is important that the actual competencies of these students be continually assessed and compared to those that are desired, providing feedback that can be used to institute changes in the process that serve to direct the outcomes toward the objectives.

Frederickson and Pratt, 1995 presented in their paper *"A model of the accounting education process"* a model that depicts the accounting education process as a constrained optimisation problem, where the goal is to produce accounting graduates who possess competencies that match the competencies demanded by those who employ them. Decision parameters under the control of accounting educators include admission and recruitment policies, curriculum, course content, and instructional methods. While student, faculty, and institutional limitations impose constraints on the process itself.

The model that was presented by Frederickson and Pratt, 1995 is a normative goal and develops a mechanism through which accounting educators can attain it, using the framework primarily to identify areas where future education research in accounting can be focused usefully. The objective of the educational process is to maintain a minimum difference between the competencies demanded by accounting employers and the competencies possessed by accounting graduates. Achieving this goal depends on curriculum, course content, and instructional methods. A student, before graduation must complete where the curriculum refers to the number, nature, and order of courses. It includes the determination of the relative number and nature of general knowledge courses (e.g., English, math, history), pre-business courses (e.g., statistics, economics), non-accounting business courses (e.g., finance, marketing), and accounting courses (e.g., financial accounting, managerial accounting, auditing, and taxation) that student must complete each aspect in order to satisfactorily graduate with a degree in accounting (Frederickson and Pratt, 1995).

Mock et al., 1991 discuss various approaches to curriculum development such as accretion, goal-orientation, and a systems approach. If the re-engineering of the accounting curriculum is to be as comprehensive, the first step in this comprehensive curriculum revision should be set broad, comprehensive objectives for the accounting curriculum. Documents such as the Bedford Committee Report and Perspectives paper offer a vast array of potential objectives, but it was deemed impractical to incorporate an exhaustive set of these objectives in planning a curriculum revision (Ainsworth.and Plumlee, 1993). They developed the following objectives to be met by the accounting program that deals directly with the accounting curriculum:

- To provide accounting students with sufficient technical and professional knowledge to form the foundation for a successful career in accounting.
- To provide accounting students with the skills necessary to implement their knowledge in the professional accounting environment.

The Accounting Education Change Commission (1990) set out their views on the objectives of education for accountants. The Commission defines the accounting profession broadly. It includes career paths in accounting as practised in large, medium, and small firms, corporate accounting (including financial management, controllership, treasury, financial analysis, planning and budgeting, cost accounting, internal audit, systems, tax and general accounting), government as well as non-profit accounting.

Accounting programs should prepare students to become professional accountants, not to be professional accountants at the time of entry to the profession. At the time of entry, graduates cannot be expected to have a wide range of knowledge and skills of experienced professional accountants. To achieve and maintain the status of a professional accountant requires continual learning. Therefore, pre-entry education should lay the base on which life-long learning can be built. In other words, graduates should be taught how to learn. The base on which life-long learning is built has three component skills, knowledge, and professional orientation.

2-5 Skills

To become successful professionals accounting graduates must possess good communication skills and have intellectual ability in addition to interpersonal skills. Communication skills include both receiving and transmitting information and concepts including effective reading, listening, writing and speaking. Intellectual skills include the ability to locate, obtain and organise information and the ability to identify and solve unstructured problems in unfamiliar settings and to exercise judgement based on a comprehension of an unfocused set of facts.

Accounting graduates should have general knowledge, organisational and business knowledge as well as accounting knowledge. General knowledge will help the accounting professional to understand the complex interdependence between the profession and society and to interact with diverse groups of people.

Professional accountants must understand the work environments found in organisations. Because organisations are affected by a rapidly increasing dependency on technology, accounting professionals must understand the current and future roles of Information Technology in organisations.

Professional accounting education has four components: general education, general business education, general accounting education, and specialised accounting education. The creative use of technology is essential.

2-6 Learning to learn

Accounting educators are faced with the challenges of developing students' technical accounting skills as well as developing their independent learning skills so they can plan and undertake future learning. This latter focus called the phrase "learning to learn".

The process of learning to learn is nurtured through learning activities that empower and enable students to undertake their own learning. The idea is to change students from being passive recipients to active participants. The enabling process occurs as a result of developing generic learning skills-i.e., team building, critical analysis, creative thinking, and communication-and by fostering appropriate learning attitudes-i.e., a willingness to initiate action, accept alternative points of view, and understand personal limitations.(http://www.ifac.org/EducationalNetwork/vol-3-Num2). Learning is often defined and measured in terms of the knowledge of acquired facts, concepts or principles. This "transfer of knowledge" approach to education has been the traditional focus of accounting education. One goal of the Accounting Education Change Commission is to change the educational focus from knowledge acquisition to "learning to learn" that is, developing in students the motivation and capacity to continue to learn outside the formal educational environment. Learning to learn involves developing skills and strategies that help students to learn more effectively and to use these effective learning strategies to continue to learn throughout his or her lifetime.

Academic programs focused on teaching students how to learn must address three issues: (1) content, (2) process, and (3) attitudes.

The content of the program must create a base upon which continued learning can be built. Developing both an understanding of underlying concepts and principles and the ability to apply and adapt those concepts and principles in a variety of contexts and circumstances is an essential part of life long learning.

A focus on memorisation of rules and regulation is contrary to the goal of learning to learn. The process of learning should focus on developing the ability to identify problems and opportunities, search out the desired information, analyse and interpret the information, and reach a well reasoned conclusion (AECC, 1990).

3- Information Technology definition and development features

3-1 IT definition:

There is an extensive supply of literature describing the various aspects of Information Technology: computing and telecommunications. Zorkoczy, 1990 suggested that IT was synonymous with " new technology " for many people, but that the technology being referred to went back a long time. IT is both topical and controversial as the consequences of its use are unclear (Kaye, 1986). The definition of terms as found in the Oxford English Dictionary is as follows: Technology is defined as "the practice of applied science" and information is defined as " items of knowledge "

The term " Information Technology" was coined to describe the phenomenon created by the convergence of the technologies associated with computing, communications and office systems (Carr, 1985). IT is a branch of technology, the function of which is to process and communicate information. Some instances of IT only communicate information - telephone, fax machine, printing and broadcasting. Others, process information - computer-based technologies (Xiao, et al., 1996). Thus Information Technology cuts across traditional organisational boundaries and has an impact on all aspects of information handling whether in the form of data, text, images or voices. The processing of data into information and the capture, storage, processing and retrieval of information are the primary aims of Information Technology. Clarke and Cooper (1985) suggest that a middle course would lead to the use of technology to process, store and transmit information in various forms (text, data, image and voice). The two words, Information Technology, used together, have acquired special meaning in the last few years. If we had heard them used separately or even together we probably would not have attached to them this special meaning (Hawkridge, 1983). The nature of the benefits originating from Information Technology depends on the nature of information technologies themselves. Information Technology is a term collecting many kinds of applications different from each other, needing so many different approaches to benefit assessment (Francalanci, et al. 1994). At that time, perhaps technology signified materials, tools, systems, and techniques because technology meant art or craft. In popular parlance, information was facts, knowledge, data, and news. Libraries, the printing industry, telephone exchange, television studies, and computers all encompassed some aspects of Information Technology, but scarcely anyone used these two words in everyday conversation. In the western industrialised world, Western Europe, North America and Japan in particular, people are becoming more aware of this, the new Information Technology (Hawkridge, 1983). Information is an essential part of our lives, from the time we are born, we begin to acquire information about the world around us. Information Technology is the way which we process and communicate this information. About 7,000 years ago, the Egyptians stored information in the form of a picture language that developed into a system of symbols known as hieroglyphics (Lambert, 1990).

Information Technology can be seen as a coming together of computing and telecommunications for the purposes of handling information. The merging has been made possible by recent developments in microelectronics (Romney, 1984). Information Technology has two categories. The first category comprises the Information Technology that is part of the production process of either the product or service provided by the firm; examples are robots, numerical control machines, process control machines, automatic teller machines, and so on. The second category comprises the Information Technology that is exploited for management purposes, in a broad sense, of the production process of either the product or the service provided by the firm; examples are accounting applications, personnel management programs, electronic mail, teleconferencing, electronic sheets, decision support systems in general, executive information systems (EIS) (Francalanci et al. 1994). I think the term Information Technology will refer to the second category, which will be appropriate to this study. Information Technology is relatively recent and perhaps not a particularly well chosen addition to the English language (Zorkoczy and Heap, 1995). It has its counterparts in the French " informatique " and the Russian " informatika " (Zorkoczy and Heap 1995). For many people, " Information Technology " is synonymous with " the new technology "- the use of microprocessor-based machines, such as, microcomputers, automated equipment, and word processors.

To qualify as a technology, in the sense of being, "a practice of an applied science" (Oxford English dictionary), there has to be a recognised science of information.

There are a number of reasons why Information Technology is becoming a subject of wide-ranging discussion and study. Each of these reasons is significant on its own, but by acting together, as they are doing at the present time, they are adding urgency to the need to understand the technical and social issues involved.

From a social point of view, Information Technology promises changes in the way we communicate and reach decisions. Even in the era before the computer, progress in telecommunications- for example, telephone, radio and television-opened up horizons for individuals and society at large, and so placed at the disposal of people information about distant events and new ideas. This has helped us to understand some of the complexities of the surrounding world, but has in turn increased that complexity by making possible a greater degree of interaction among people.

The application of the computer for information handling has contributed a new tool and a new dimension of complexity, through its ability to store and process vast amounts of data at high speed. For many decades now, data gathering devices have increasingly extended the accessible portion of the physical world and added to the already vast stock of scientific and technical information. Improved technological tools for collecting data about people have encouraged the use of administrative applications utilising Information Technology (Zorkoczy and Heap 1995).

The range of application utilising Information Technology is as wide as the range of activities where information is used. Therefore, the Information Technology that affects the office environment, document preparation-document distribution-document storage and retrieval-visual presentations-spoken words-management aids is called the electronic or automated office. The term " Office automation" is now largely used to describe that branch of Information Technology which most directly concerns office work (Carr, 1985). In addition, Information Technology is found in manufacturing industry like intelligent robots and in the publishing and printing business. It also includes finance and commerce, military applications, communication and transport services, health care, education and training, and the home as well (Williams and Barry, 1991).

There are four main reasons usually advanced for investment in Information Technology (Earl, 1989)

1- to gain competitive advantage;

2- to improve productivity and performance;

3- to facilitate new ways of managing and organisation;

4- to develop new businesses.

Information Technology (IT) today handles information in every conceivable form, whether music, video, graphics, speech, data, text. It also embraces an increasing range of technologies.

Information Technology is the use of modern technology to aid the capture, processing, storage and retrieval, and communication of information, whether in the form of numerical data, text, or image (Carter, 1991). Information Technology has been defined in Carr's study " Information Technology and the accountant " in 1985 as:

> " *The acquisition, storage and dissemination of vocal, pictorial, textual and numerical information by a microelectronics-based combination of computing and telecommunications* " (Carr, 1985, p.165)

There was a debate in ISWORLD (discussion group about IT and IS) regarding the definition of IT. Appendix twenty-three shows some of this debate.

There are many more complicated definitions, but they all say much the same thing that Information Technology is the study of information handling and its use in society by means of modern technology. This includes the acquisition, processing, storage and communication of information in any form by appropriate means. Within Information Technology there is an identifiable body of subject content, skills and activities. This common core is transferable, relevant to other curriculum areas and has wide application in society.

The Information revolution has not only changed the way we live and the technology we use, it has also altered the way we think (Carter, 1991). Words such as input and output have become a part of our everyday language now and we think in a the systems way.

The technological revolution has meant that the physical size of computers has decreased, while performance, ability and capacity have dramatically increased (Bhaskar, and Housden, 1990)

Information Technology refers to any aspects of computing and telecommunications concerned with the generation, process application and transfer of information in digital form (Earl, 1993).

This study will take the International Federation of Accountants' definition that Information Technology or IT as follows:

> *"Computer-based technology which encompasses hardware and software products, information system operations and management process for the acquisition, storage, processing and communication of information. And the skills required to apply those products and process to the task of information production and information system development, management and control".*

The size and diversity of Information Technology in the marketplace is obvious to even the most casual observer. It is broadened even further by our view that the term "Information Technology" encompasses not only hardware and software products but also all the management techniques and skills required in applying those products to the task of information management. (IFAC, 1992)

3-2 Information Technology development features

The rapid advances of Information Technology in the past two decades have been staggering, but a look into future applications is like reading a science fiction thriller. There continues to be a rapid advance in IT and this opens up new opportunities for accounting and more broadly based information management (King et al., 1991).

The following IT trends are particularly noteworthy: (IFAC, 1995):

1. A wide availability of powerful yet inexpensive computer hardware.
2. A wide availability of powerful, inexpensive and relatively user-friendly software with graphical user interfaces.
3. A shift from custom-tailored systems to pre-packaged software.
4. A new data capture and mass strong technologies leading to increasing computerisation of data/information in text, graphic, audio and video formats and emphasis on managing, presenting and communicating information using multi-media approaches.
5. An increased availability of computerised data for access in real or delayed time both locally and through remote access facilities.
6. A shift from mainframes to small stand-alone computers used alone, or increasingly, as part of a network devoted to information resources sharing and co-operative computing.
7. The convergence of information and communication technologies and the increased use of networks to link individuals, intra-orgnizational units and inter-organisational units through the systems such as electronic mail (e-mail) and the Internet, transaction processing systems such as electronic data interchange (EDI) and electronic funds transfer systems (EFTS).
8. The mass marketing and the distribution of IT products and services such as computers, pre-packaged software, on-line data retrieval services, electronic mail, and financial services.
9. A reduction of barriers to systems use, encouraging wider penetration of information systems into profit-oriented and not-for-profit organisations of all sizes for accounting and broader management and strategic purposes and increasing the role of end-user computing.

10. A wider penetration of information technologies such as computer-assisted design and computer-assisted manufacturing (CAD/CAM), computers imaging systems, executive information systems (EIS), and electronic meeting systems (EMS).
11. New system development techniques based around information technologies such as computer-assisted software engineering (CASE), object-oriented programming (OOP), and workflow technologies.
12. Continuing development of intelligent support systems incorporating expert systems, neural networks, intelligent agents, and other problem solving aids.
13. New business re-engineering approaches based on effective integration of information technologies and business process.

The International Federation for Accountants presented in its study *" The Impact of Information Technology on Accounting Profession", 1992* some of the developments likely to be of interest to most accountants within the next 10 years are: (IFAC, 1992, P.5)

- Improvements in the price/performance in communications and computers.
- A shift from mainframe computing to a focus on workstations accessing corporate data stores, providing greater processing power to the users.
- Extended access to information drawn electronically from outside the organisation either via a network or disk.
- Rapid growth in technologies leading to more "mobile computing".
- Graphic/image, audio and video information will be increasingly incorporated with text and numeric data in Information Technology applications.
- New technologies will provide alternatives to keying data into the computer.
- Application of technologies such as fuzzy logic, expert systems and robotics.
- Developments in intelligent networks and distributed data stores will result in new network services.
- Developments in software engineering will offer greater modularity of systems, facilitating the re-engineering of business systems.

There are a number of trends in the use of Information Technology, which are driven more by competitive market forces than technical developments, which will reduce prices and increase flexibility in systems planning and management. These include:

- An increase in the use of " open systems" or hardware brand independent systems.
- Increase use of packaged software for a wide range of business functions.
- Mass marketing and distribution of Information Technology.

Information Technology is likely to impact on organisations in the decades ahead via individual work support, which helps people to accomplish their daily tasks more efficiently. This technology includes high bandwidth portable computers which will be more powerful than the portables of today. With the proper clearance code, this computer will connect to any computer network around the world, at any time and in any place, through the international, wireless, wide-band communication network.

3-3 Global Computer Networks and the accountant:

Since the mid-1980s more and more accounting academics have learned to ride the superhighway, otherwise known as surfing the internet. This is often described as the world's largest network of computer networks and they use it to communicate world-wide with their colleagues either on a one-to-one basis or via special interest group bulletin boards, in addition, searching external databases. The Internet is a global network of computer users (Danos and Measelle, 1990). At a more complex level, it is the network of networks that ties together tens of thousands of smaller computer networks with millions of computers all over the world (Asman et al., 1995). It provides the connectivity infrastructure upon which services such as electronic mail and the World Wide Web are hosted. The Internet provides a rich environment for research, communications and the conduct of business. An increasing number of accounting professionals are using the Internet for email communication with clients and for public relations. Email provides a particularly efficient means of communicating with clients. Questions can be answered easily and quickly without all of the problems presented by telephone tagging. It is much easier to work with and to store information than fax communications. A reply to a client's question can incorporate both the question and the response and can readily be copied to other members of the organisation. The security of an email is higher and has structure control than that of a fax as it is truly person-to-person communication. If the client has a question that the addresser cannot answer, it can be forwarded to another person in the firm for advice and reply - and that person could be down the hall, across the country, or across the world (Asman et al, 1995).

In terms of public relations, a number of accounting firms, both large and small, are beginning to build Web home pages to promote their activities and provide visibility in their quest for competitive advantage on several levels, including recruiting the best accounting graduates and advertising their technological and technical sophistication.

In the future, the accounting profession could be affected dramatically by the use of the Internet. In auditing, it will be possible to offer more services at a more competitive price through the use of file transfer and remote auditing activities (Asman et al., 1995). Staff can work together on audits at a distance using the Internet to communicate. They can use the Internet to move electronic working papers instantaneously around the world for review and consolidation. The Internet allows a partner in Ohio to undertake file review of an audit being conducted in Sydney and to undertake background research on the risks associated with the client's business domain and customers (Asman et al., 1995). Client services will not need to be so office focused as they are now. In systems and tax consulting, it will be possible to monitor and advise clients more closely and with less travel and more focused expertise. The integration of " GroupWare " software such as Lotus Notes, which has become prevalent in the larger firms, with the Internet will enable the melding of private " Knowledge bases " with the wider information resources of the Internet. The use of the Internet can facilitate better communication between partners and managers in remote locations, and offer immediate access to research facilities and information from more diverse sources. It will also allow the opening up of electronic advice to auditors and consultants all over the world.

The Internet will also make other support activities possible, such as the delivery of just-in-time training. Using the Web is relevant to technical areas such as taxation and accounting and auditing standards. The Internet can also be used to generate "Knowledge Income" from clients as firms can open up some of their private information database to their customers on a fee-for-service basis.

4- Integrating IT skills and Knowledge in Accounting education: WHY

4-1 INTRODUCTION

Business organisations have become increasingly dependent on Information Technology (IT) and are confronted with many new and fast developments in this field. Information Technology skills are required nowadays by nearly everyone not only in their work and studies but also, in their private lives (Litecky and Arnett, 1993).
The rapid integration of IT into all aspects of business and the great advancement of Information Technology during the past few decades have created a demand for professional accountants who are not limited to knowledge of the technical side of accounting, but who also possess a broad understanding of information systems skills /knowledge and how these systems work in accounting functions.

The increased use of technology in all areas of business has caused a shift in the occupational skills required in many areas. Specifically, as typewriters were replaced with computers, a secretary who typed correspondence became an information manager required to use greater cognitive skills to manipulate and interpret information using word processing applications, database, desktop, and graphics applications. Undoubtedly computer technology has made significant changes in conducting business activities.

As information systems technology matures by providing more advanced equipment for information procęssing and facilitating the operation of computer-based information systems, more attention is given to the managerial aspects of MIS personnel and AIS accountant. The orientation of MIS and AIS management in many organizations is changing in the direction of greater user involvement. Consequently, MIS managers, rather than serving as the technical custodians of computer hardware entities, now function more as agents between MIS resources and end-users. Additionally, the trend toward decentralisation of IS duties and downsizing of hardware from mainframe processing to networked end-user PCs, has further led to the fundamental change in the traditional role of IS managers and the function of IS within many organisations (Lee et al., 1995; Bulkeley, 1990; Goldberg, 1986; Guimaraes, 1986; Maglitta, 1993, and http://www.hbg.psu.edu/Faculty/m1k/crclm919.html)

In general, many information processing professionals perceive that resources of computer-based information systems are limited only to hardware and software components. This perception has been partially promoted by restricted views given by information systems education of the past. Today, information resources consist of many more resources than the computer hardware and software used to manage information within organisations. This requires an increased understanding of these resources and their applications (Liscouski, 1991).

The commercial world has moved into an environment in which business is using computing in almost all of its functional areas, and organisations are continually looking for further advances so as to enhance their competitive edge. (Lymer, 1995). Computers are an everyday tool of the working accountant and accounting has always been a front-runner in IT use. Banerjee and Lloyd (1995) in their survey about the management accountants and Information Technology pointed to the increasingly crucial role computers play in the provision of information within organisations and management accountants are clearly playing an important part in the information process.
If degrees are to prepare students for their careers after they graduate, courses must incorporate IT skills and knowledge into the syllabuses. Today's accounting educator is being challenged to update the curriculum so that it reflects recent changes in the business and professional accounting environments. Both the American Institute of Certified Public Accountants' (AICPA) paper, *Strategic Thrusts for the Future: Report of Accounting Planning Committee* (AICPA, 1988), and the Accounting Education Change Commission's (AECC) monograph, *Objectives of Education for Accounting* (AECC, 1990) highlight the need for accountants to keep abreast of new developments in Information Technology. The managing partners of eight major accounting firms (Kulberg et al., 1989) have also published a call for modernisation of the accounting curriculum. They mention that accounting graduates should have the ability to locate, obtain, and organise information from both human and electronic sources. Computer systems including information systems, decision support systems, and business data processing applications permeate virtually every aspect of business activity (Cronan and Fries, 1986).

4-2 CONCERNING THE USE OF COMPUTER IN ACCOUNTING EDUCATION

There are concerns with the use of computer in accounting education since 1970s. American Accounting Association presented the following reports:

1963 AAA Committee on accounting systems instruction.

The committee was asked to consider whether a systems course should be a part of accounting curriculum, including whether the course should be required or elective. The committee concluded that an important and substantial body of specific, teachable systems subject material did exit, and that such a course should be required of all students planning to enter the field of accounting. In their review of this body of knowledge, the committee presented a broad outline of possible subject matter, ranging from very general concepts to rather specific techniques. Although no specific recommendations or guidelines for relative emphasis were presented, the pervading spirit of the report was toward the broad overview approach (AAA, 1964).

1964 AAA Committee on Electronic Data Processing in Accounting Education.

Directed to study the future role of electronic data processing in accounting education, both at undergraduate and graduate level, and to make pertinent recommendations, this committee's conclusions departed somewhat from those of its predecessor committees in an increased emphasis on the computer and computer systems. In particular, the committee concluded that accounting students at undergraduate level should be exposed to electronic data processing in three stages:

1- Concurrent with or prior to the introductory accounting course, students should receive instruction in a basic programming language, and should be able to write simple computer programs in that language.

2- Accounting instruction in a variety of subject-matter courses should incorporate some computer-oriented problems, where subject matter is conducive to formulation; but such instruction should convey the principles basic to the understanding of the profounder, non-technical issues to which computer solutions are being applied.

3- The traditional accounting systems course should continue to include coverage of electronic data processing as one of the aids to accounting profession.

Computers are being used in all areas of accounting and in all sizes of organisation. An accountant can no longer avoid coming into contact with a computer. The use of computerised accounting systems; spreadsheets, database and word-processing packages, are an everyday part of the accountant's world (Romney et al. 1996). It is thus essential for students to be familiar with such software in terms of their functions and applicability to accounting tasks (Francalanza,. 1997). Accounting firms and other business organisations that hire accounting graduates are buying micros by the hundreds (Romney, 1983). According to Carr, 1985, Information Technology benefits in the office environment can be viewed under three categories: cost displacement; time saving and improved quality of work. Each category contributes either to efficiency or to effectiveness: i.e. doing what we do now but with fewer resources or doing what we do now but doing it better. Cost displacement arises when Information Technology replaces existing procedures by rendering them unnecessary or automates all or part of a continuing procedure. Time saving arises from the application of technological aids to a task or group of tasks with the result those objectives are met more quickly. Improved work quality can occur in a number of forms; better presentation, better service and improved information quality. Students in vocational and higher education should learn Information Technology, information management, and communication skills that meet the needs of a fast-changing and increasingly networked working life (http://www.minedu.fi/infostrategy/luku1.html).

Like accounting professionals, today's accounting students need to acquire the skills and knowledge necessary to excel as accounting professionals in the Information Technology age (Hollander et al. 1996). Accountants today need to be computer literate, i.e., to be able to make effective and efficient use of computers (Benke, 1996). The design of information systems, particularly that of computer-based information systems has an important role in accounting (Wan and Choo, 1988). The importance has been highlighted in a report by Australian Society of Accountants' taskforce(1984), which asserts that *"since accountants will be developing their own information systems, fundamental skills in systems analysis and design will become essential for all accountants"*

The significant changes in the accounting environment resulting from the expanding use of microcomputers suggests a need for an evaluation of the changing requirements placed on universities in education accounting students (Waller and Gallun, 1985). Accounting education needs to be responsive to developments in IT and pro-active in its attempts to guide best practice (Reynolds, 1991). As accounting educators, we are charged with the responsibility to prepare our students to become the professional accountants of the future (AECC, 1990, IFAC, 1994). The integration of microcomputers in the accounting curriculum is required by the American Association of Collegiate Schools of Business (AACSB), the principal accrediting body of business schools in the USA. According to Bandy (1990), that is the purpose of accounting education, not to teach accounting to students, but rather to teach students to become accountants. We need to ensure that we provide them with the skills and knowledge necessary if they are to be able to operate effectively and efficiently in what has become a rapidly changing working environment. (Brown et al, 1995). The business community and the accounting profession are awaking to the rapidly accelerating pace of new developments in the IT revolution. They are becoming aware that the rapid changes now occurring require a vigorous response (Bhaskar and Williams, 1986). Clowes (1982) in his article "Audit Education-Behind the Times" mentions that accounting students, who are potential chartered accountants, should begin computer training at the University level.

The increasing use of microcomputers by the accounting profession formed the catalyst to stimulate the incorporation of computers into accounting classrooms. The arrival of more sophisticated technology such as high level programming and authoring tools, multimedia capabilities, the internet artificial intelligence, expert systems, etc, has provided new opportunities for the integration of computers into accounting education (Salleh and Williams 1997). The World Wide Web represents a new concept in technology. The development of the Internet as a global information delivery tool has the potential to revolutionise education (Lymer and Sangster, 1997). Hatherly and Fraser (1988) assert that because expert systems are being used in the profession, accounting students should become familiar with these tools. The increasing use of expert systems for accounting tasks in accounting practice, industry and non-for-profit organisations is a signal that future accountants should begin learning about artificial intelligence during their undergraduate studies (Morgan, 1995).

Computer usage in accounting education began in the late 1960s' where, computer use in accounting education has been recommended by reports of the American Accounting Association (1964, 1968, 1970, 1985, 1986, and 1987) and American Institute of Certified Public accountants (1968) and The Board of Accreditation of Accountancy Educational Courses (BAAEC) published its new accreditation Guidelines at the end of 1996 where, the Guidelines make the use of IT much more explicit than hitherto. Australian professional accounting bodies have called for accounting graduates possessing computing skills that enable them to act as information managers and communicators with users of this information. (Kent and Linnegear, 1988). The necessary skills allowing accounting graduates to act as information managers and communicators with those using this information are not provided by traditional computer science courses (Danos and Measelle, 1990).

Integration of computers into the accounting curriculum has received tremendous attention in the recent years. The impressive technological developments in computer processing and the endorsement of the computer in the accounting classroom have convinced many that the most fruitful avenues for the change of accounting education lie in computer application (AACSB, 1984). With an increasing use of microcomputers in business, there has been a high demand for college graduates who have hands-on experience in microcomputer business applications. The drive for efficiency in the higher education sector is providing us with incentives to use technology in our teaching to reduce staff student contact times in order to cope with increased student numbers and reduced units costs and students are also encourage to develop transferable skills which may enhance their employment prospects (Stoner, 1996)

The early use of computing in accounting education appeared in Sale (1972), Edwards (1973), and McKeown (1976) initially on mainframe computers and later on microcomputers. In the last few years, microcomputers or, personal computers (PCs), have become the machine of choice in accounting education. Virtually all new textbooks in principles of accounting and intermediate accounting are accompanied by computerised practice sets, and software firms are targeting schools with a variety of other products related to accounting education (Nash and England, 1986). The accounting profession should consider the appropriate use of computers in the classroom and faculty should give serious consideration to how and to what extent computers should be used in accounting courses (Cronan and Fries, 1986).

As each computing development became available, proponents hoped its use would revolutionise accounting education by improving student learning, or reducing instruction time or cost. For documented cases of computer use in accounting education, progress toward achieving these goals has been mixed. Improvements in learning, if any have been modest, and computer use in accounting education has often been time-consuming and costly. From the research on computing in accounting education, the only definitive conclusion is that different methods of computer integration have different learning values for different topics (Borthick and Clark 1987) The Accounting Education Change Commission (AECC), in its first position statement, encouraged the creative use of technology and the accounting students should learn by doing (AECC, 1990)

As Seddon, 1987 explained, there are several conflicting reasons for using computers in teaching: namely the need to teach students about IT and how to use it (computer literacy); accounting information systems (teaching about computers); and demonstration of accounting principles and concepts (teaching with computers). While there are these three separate goals in relation to computing and accounting education, they cannot always, nor indeed need they, be kept in separate, watertight compartments. A course that teaches about computers and information systems will necessarily teach students how to use computers, the operating system and some application software. Similarly, if students are using computers as a computational tool to learn accounting concepts, computer practice issues relevant to each exercise can be included to raise the awareness of working in a computerised, as opposed to a manual, environment. (Shaoul, 1990). Edwards (1973) advances two reasons for the introduction of computers into accounting courses in this way:

(a) The student may gain an improved understanding of analytical techniques in accounting through the use of the computer as a problem-solving tool.

(b) The computer may reduce the computational millstone involved in analysis and thereby increase the range of approaches that may be made to a problem. Consequently the student can spend more time on substantial issues (such as problem formulation and interpretation of results) and less on the detailed arithmetic calculations. This may lead to a better understanding of the analytical and theoretical aspects of the problem. Marriott, 1992 in his study *"The effectiveness of using spreadsheets to teach financial accounting"* presented four reasons for integrating computers into accounting education as follows:

1- the role of higher education in preparing students for the work environment should include an introduction to software packages that are now commonplace in the business world.

2- The skills developed on one software packages are deemed to be "transferable", i.e. if a student can use Lotus 123, then these skills enable other spreadsheets to be used with the minimum of effort such as Excel. Therefore teaching students how to use a spreadsheet is giving them a skill that they can use through their careers.

3- It provides the opportunity to develop further the computer literacy that many students have already obtained from their secondary education.

4- the computational aspects of a syllabus can be dealt with more efficiently by using the computer's ability to perform routine and complex calculations, allowing students to use the time saved to enhance their understanding of underlying concepts.

According to Bhaskar (1982) there are two advantages of using the computers in accounting education:

1- an improved understanding of the *"analytical technique"* in accounting may be gained, as students are forced to organise their thoughts and state their communication "with a certain precision".

2- the computational burden is reduced and students are able to spend more time on problem formulation and analysis of the results. It was anticipated that this might lead to a better understanding of the theoretical and analytical aspects of the problem.

Microcomputers can be a very useful tool in accounting education. Not only are the students and faculty members using current technology, but also the concepts taught in accounting classes can often be easily reinforced using micros. The microcomputers as a teaching tool are not without problems, but if a school can muster the funds to acquire and support the microcomputers, the remaining problems are usually solvable. The future is a world filled with computers of all kinds and the micro is a very powerful tool that has many futures uses in accounting. Unless accounting educators start training students in their accounting uses, they may well be missing one of the most significant trends in American business. Accounting graduates must be computer literate; we as accounting educators must provide that training (Borthick and Clark, 1987). Accounting educators must train their students in the use of the microcomputer since failure to do so would result in their missing one of the most significant trends in American business (Romney, 1983)

The accounting profession operates in a rapidly changing environment. Professional accountants should understand the role of Information Technology in solving business and accounting problems (Albrecht et al. 1994). Computers have now become an efficient and necessary tool in the business world.

Microcomputer use in recent years has increased tremendously in the accounting industry as well as within business in general. Several studies have already documented the extensive use of microcomputers in the accounting industry. Connors (1983) found in a survey of national association of accountants (NAA) members that 60% of his sample used microcomputers to perform daily business applications and, of those using microcomputers, 82% were using spreadsheets. Golden and Golden (1984) reported that 50% of surveyed accounting firms were using spreadsheets in auditing work. Fleenor and Danos (1985) reported that 82% of the CPAs they surveyed had a microcomputer in their office and used it for applications ranging from audit and tax to database management. A study in the Journal of Accountancy (1983) reported that out of 2800 US companies, about 33% were using microcomputers (Salimi, 1990).

The accountant must deal with various computer systems and equipment (Parmley and Parmely, 1986). Accounting software packages, similar to those used in accounting practice, can provide good experience, although the number of available options may confuse the novice accounting student (Borthick,Clark,1987). Clowes (1982) mentioned that accounting students who are potential chartered accountants should begin computer training at the University level (Thomas, 1984). A useful exercise for the more advanced student is to accumulate and pre-process data in, for example, an accounts receivable package and then to transfer the summary data to the general ledger and prepare financial statements. Such an exercise helps students to understand the integration of modern automated accounting systems. (Borthick, Clark, 1987)

The major benefits deriving from the use of computers are concerned with their ability to manipulate large volumes of numbers at high speed. Essential computer literacy must be acquired (Collins, 1983)

The impact of Information Technology (IT) on our way of life cannot be ignored and can be found in many areas of accounting (Kaye and Bhaskar, 1985). From a practitioner's point of view, the use of computers in accountancy (excluding the auditing function) falls into two main categories. Firstly, there is the routine processing of transactions through the accounting system and the preparation of financial and other reports from the data stored by the accounting system. This may be termed the accounting system usage of computers. Secondly there are a variety of uses, which are concerned with aiding the decision making and financial planning processes. Examples include financial modelling, forecasting and operations research tools. This may be termed the decision support usage of computers. (Bhasker, 1983)
Bhasker (1983) reported that within both the accounting system and decision support areas, one could find computer science, CAI, or CCT as examples.

Integrating computer technology into the curriculum at all levels has become a requirement of the 1990s. Romney (1983) points out that microcomputers are one of the most important trends in business and society today and we must prepare our students to use the technology effectively.

With microcomputers and electronic spreadsheet software rampant in the business world, accountants no longer spend the majority of their working hours in the accounting cycle and mechanical accounting procedures (Connors, 1983; Mansfield, 1983. Smith and Castrovilla, 1983; Ijiri, 1983) Instead, they concentrate on analysing accounting data and providing better information for managerial planning and control (Backes and Glowacki, 1983). Indeed, the business environment surrounding management accounting systems has undergone substantial change for the last 25 years. Despite this fact, managerial accounting research and education remain largely unchanged (Kaplan, 1983)
Romney (1983) stated that accounting educators should train their students in the use of microcomputers since failure to do so would result in missing out on the most significant trend in American business.
Under the general objective of integrating the use of the microcomputer into the accounting information systems course, there were several specific objectives. These were:

- To determine students' ability to operate individual systems modules of an overall management decision system;
- To determine whether students can prepare a computerised program and supporting documentation for a system module within the time frame allocated for a class project, and
- To determine if the necessary instruction can be given without unreasonable demands on the instructor's time.

Colleges and Universities across the country have not moved as quickly to introduce their students to the new personal and small business computers. This is unfortunate because accounting educators must prepare accounting graduates for the environment they will face, especially since the trend is towards the increased usage of PCs in business. If we, as educators, fail to train our students in the use of the micros, we will be missing one of the most important trends in American business. The masses move to personal and small business computers. (Romney, 1983)

Microcomputers can be a very useful tool in accounting education. Not only are the students and faculty members using current technology, but also the concepts taught in accounting classes can often be easily reinforced using micros. (Romney, 1983). By 1970 both the American Institute of Certified Public Accountants (AICPA, 1968) and the American Accounting Association (AAA, 1970) recognised the impact on the accounting profession of technological advances in computers and recommended integration of computers within the accounting educational program By 1986, American Assembly of Collegiate Schools of Business (AACSB, 1986) standards required that *"Students shall receive instruction in the design use, control, and audit of computerised information system. Students are expected to use the computer in accounting courses"* . Other than these broad statements, educators have received little specific guidance.
Graduates must not only know how to use computers and understand how they work but also how they are used in industry. They should be able to evaluate the security of the system. They should understand the best methods for computer auditing and the risks that are present (Bean and Medewitz, 1987). Computer courses have long been required for most business and accounting students and basic computer literacy is now required of all students in many state University system (Nash and England, 1986)

The rise of the microcomputer use within the accounting industry has created a demand for microcomputer literacy among graduates of accounting. In a response to industry, accounting instructors have incorporated microcomputer applications into their classes (Salimi, 1990).

Overall, it appears that accounting students will become computer literate, leading to further increase in the use of computers in the accounting profession. (Salimi, 1990). Today's accounting educator is being challenged to update the curriculum so that it reflects recent changes in the business and professional accounting environments. Both the American Institute of Certified Public Accountants' paper (AICPA) *"Strategic Thrusts for the future: report of the strategic planning committee" (AICPA, 1988)*, and the accounting education change commission's monograph (AECC), *"objectives of education for accounting"* (AECC, 1990) highlight the need for accountants to keep abreast of new developments in Information Technology. The managing partners of eight major accounting firms (Kulberg et al.,1989) have also published a call for modernisation of the accounting curriculum. They specifically mention that accounting graduates should have the ability to locate, obtain, and organise information from both human and electronic sources

In 1986, American Accounting Association "Bedford Committee" issued its report stating: (the Bedford committee, 1986, p 172, 173).

> *"Accounting services are becoming both broader and more specialised. Services demanded of accountants are no longer simply those based on understanding, interpreting, and applying standards. Creativity and innovation increasingly required to meet the changing demands of an internationally competitive world".*

The report concluded that current University accounting programs have failed to recognise the extensive change taking place in technology.

In April 1989, the partners of the then eight largest international accounting firms issued Perspectives on education: *"capabilities for success in the accounting profession"* specifying the capabilities required for successful practice in the public accounting profession-capabilities that should be developed through the educational process. The conclusions expressed in perspective reiterate those of the Bedford report. Subsequent to the perspective paper, the accounting education change commission (AECC) was created, funded by a $4 million contribution from the eight largest CPA firms. The AECC has funded curriculum change projects at ten Universities and two community colleges.

Integration of computers into the accounting curriculum has received tremendous attention in the recent years with the increasing use of microcomputers in business; there has been a high demand for college graduates who have hands-on experience in microcomputer business applications. Many accounting job recruiters now seek accounting graduates who have been trained to use electronic spreadsheets in various fields of accounting (Parmely and Paremly, 1986). Additionally, the American Assembly of Collegiate Schools of Business (AACSB) recognised the need for instruction of computers into the accounting classrooms by revising its accreditation standards. According to these standards, computer facilities for accounting education shall be of sufficient capacity and accessibility to encourage development of computing skills on the part of students (AACSB, 1984) in order to meet the market demands and to comply with the AACSB requirements, many colleges and universities across the country, in the early 1980s, started to experiment with computer-assisted instruction in their accounting programs (Romney, 1983).

Australian professional accounting bodies have called for accounting graduates possessing computing skills that enable them to act as information managers and communicators with users of this information. (Kent and Linnegear, 1988). Skills allowing accounting graduates to act as information managers and communicators with those using this information are not provided by traditional computer science courses.

If the accountants are aware of IT skills, this will improve their position when joining the marketplace or labour market in the future.

The accountancy profession as a whole has the obligation to ensure that candidates for membership possess the required breadth and depth of knowledge and skills and the credibility of the accountancy profession depends on its success in fulfilling this obligation (IFAC, 1995).

Professional and academic accountancy bodies throughout the world are grappling with the need to define the body of knowledge and skills that must be possessed by their members. Attempts at defining a common body of knowledge and skills are complicated by several important factors which must be recognised, including the fact that the accountancy profession is a diverse profession. Members operate in several domains, within which professional accountants may be engaged in a variety of roles, and that the spread of IT and related accounting services is not uniform throughout the world. (IFAC, 1995).

5- SUMMARY

IT has increased in importance since the 1960s. Computer usage in accounting education began in the late 1960s'. The early use of computing in accounting education appeared in Sale (1972), Edwards (1973), and McKeown (1976) initially on mainframe computers and later on microcomputers. In USA computer use in accounting education has been recommended by reports of the American Accounting Association (1964, 1968, 1970, 1985, 1986, and 1987) and American Institute of Certified Public accountants (1968).

In the UK the Board of Accreditation of Accountancy Educational Courses (BAAEC) published its new accreditation Guidelines at the end of 1996. The Guidelines make the use of IT much more explicit than hitherto. Australian professional accounting bodies have called for accounting graduates possessing computing skills that enable them to act as information managers and communicators with users of this information. The necessary skills allowing accounting graduates to act as information managers and communicators with those using this information are not provided by traditional computer science courses. Integration of computers into the accounting curriculum has received tremendous attention in recent years. IT is an integral part of society today, both professionally and personally. For example, the Internet, in particular the World Wide Web is rapidly expanding and providing people with access to information, products, and personal contacts that would be virtually impossible otherwise. Society is moving closer and closer to truly becoming a global village. The fast pace at which society is being bombarded with new technological advances requires that members of society be somewhat familiar with computers. The impressive technological developments in computer processing and the endorsement of the computer in the accounting classroom have convinced many that the most fruitful avenues for the change of accounting education lie in computer application. With an increasing use of microcomputers in business, there is a high demand for college graduates with hands-on experience in microcomputer business applications to join the profession. In the last few years, microcomputers or, personal computers (PCs), have become the machine of choice in accounting education. Virtually all new textbooks in principles of accounting and intermediate accounting are accompanied by computerised practice sets, and software firms are targeting universities with a variety of other products related to accounting education.

This chapter presented the literature review that has been done in developed countries. To the researcher's knowledge, there is no literature already published in developing countries related to Information Technology and accounting in these countries. As evidence for that, the researcher did a survey in accounting journals either published internationally or nationally.

This chapter considered firstly, the accounting education process and the environment in which the educators work including the institutions, faculties, students, resources which are available, curriculum, and course content. The goal of accounting education must be to produce competent professional accountants capable of making a positive contribution over their lifetimes to the profession and society in which they work. Preparing students to become both productive members of the workplace and valuable members of our communities are other goals. The goal is to produce accounting graduates who possess competencies that match the competencies demanded by those who employ them. There is a need for change in accounting education following criticism concerning the form and nature of University accounting education. Some of the most visible expressions of concern have been made in the United States, where the accounting profession has called for a fundamental re-appraisal and restructuring of the current University accounting education systems. The relation between accounting education and accounting practice, and the extent that current educational content has maintained relevance to accounting practice is debatable.

This chapter also considered secondly, IT definition and the development of Information Technology which will be involved in accounting work. The chapter established that there is an extensive supply of literature describing the various aspects of Information Technology. The term " Information Technology" was coined to describe the phenomenon created by the convergence of the technologies associated with computing, communications and office systems. There are many more complicated definitions, but they all say much the same thing.

There are a number of trends in the use of IT, which include an increase in the use of " open systems" or hardware brand independent systems, increased use of packaged software for a wide range of business functions and mass marketing and distribution of Information Technology.

The rapid advance in IT will open up new opportunities for accounting such as a wide availability of powerful yet inexpensive computer hardware, a wide availability of powerful, inexpensive and relatively user-friendly accounting software with graphical user interfaces. There will also be a shift from custom-tailored systems to accounting pre-packaged software including new data capture methods leading to increasing computerisation of data/information in text, graphic, audio and video formats. There will be an emphasis on managing, presenting and communicating information using multi-media approaches. This will help accountants to fulfil their roles efficiently and effectively. There is a shift from mainframes to small stand-alone computers, or increasingly, as part of a network devoted sharing of information resources. The convergence of information and communication technologies will lead to the increased use of networks to link individuals, intra-organisational units through systems such as electronic mail (e-mail) and the Internet, transaction processing systems such as electronic data interchange (EDI) and electronic funds transfer systems (EFTS).

Information Technology is likely to have an increased impact on organisations in the decades ahead via individual work support, which helps people to accomplish their daily tasks more efficiently and from remote locations. This technology includes high bandwidth portable computers which will be more powerful than the portables of today. With the proper clearance code, this computer will connect to any computer network around the world, at any time and in any place, through the international, wireless, wide-band communication network.

The chapter is devoted thirdly, to a review of the literature in the developed countries such as USA, UK and Australia and is related to the reasons for integrating IT/IS skills into accounting education. The rapid integration of IT into all aspects of business during the past few decades has created a demand for accountants who possess a broad understanding of information systems skills /knowledge.

The next chapter will deal with the other aspects related to integrating IT/IS into accounting programmes such as what are IT/IS skills, how these skills should be integrated and the problems facing the integration process.

CHAPTER THREE

INFORMATION TECHNOLOGY AND ACCOUNTING LITERATURE REVIEW (2)

Chapter Structure

1- Introduction.

The previous chapter was devoted to giving an introduction about the accounting educational process, Information Technology definition and its development features are considered. The chapter includes the first aspect for integrating IT/IS skills and knowledge in accounting programmes which is called (WHY). Why should IT be integrated in accounting education?

In the current chapter the researcher will continue to present other aspects for integrating IT/IS into accounting education. This chapter will target three main issues: firstly, what IT/IS skills and knowledge should accountants possess? Secondly, how should IT skills be integrated in accounting education? Thirdly, the chapter provides literature related to the problems that face the integrating process in the accounting curriculum.

Therefore, this chapter will be split to the following parts

2- Integrating IT Skills and Knowledge in Accounting Education: WHAT

3- Integrating IT skills and Knowledge in Accounting Education: HOW

4- Integrating IT skills and Knowledge in Accounting education PROBLEM

2- integrating IT Skills and Knowledge in Accounting Education: WHAT

2-1 Introduction

Accounting educators are aware of the need to integrate computer skills/knowledge into the accounting curriculum to prepare accounting graduates for the work environment they will be entering (Austin, 1990; Heagy and Gallun, 1994). For example, The Department of Accounting in Loyola College in Maryland has a commendable computer literacy policy, which states that:

> *"Graduate accounting majors should be literate in the use of the following hardware: mainframes/super-minis, IBM-PCs and printers. Their software literacy should include: spreadsheet, word-processor, database's program, micro to mainframe communications package, graphics packages, general ledger software, statistics' packages, electronic mail and basic programming. They should know how to locate and retrieve information by using the Internet"* (http://pacioli.loyola.edu/acctgdept/literacy.html)

Information Technology will not substantially change the employment prospects for qualified staff or the nature of their work but it will change significantly the knowledge and skills needed to carry out that work. The question is what are the appropriate knowledge and skills in IT that need to be acquired by a student of accounting? It is difficult, however, to ascertain what these skills should be. What IT skills are required for the accounting workplace of today and tomorrow. We must decide what accountants need to know about computers, and in particular, what students should be required to do with the computers.

2-2-The difference between Knowledge and Skills:

Distinguishing between the concepts of "knowledge" and "skills" should be ascertained before we considering what skills and knowledge the accountants should possess.

In his classic book "What is Knowledge," Pears (1972) defines knowledge by providing the following typology:

(1) Knowledge of facts; (2) knowledge of acquaintance; and (3) knowledge of how-to-do things.

(1) Knowledge of facts can be expressed in terms of statements that can be either true or false. Pieces of such knowledge may or may not reside in our heads as sentences but

they can be expressed when required to do so. Sentences consist of words and these words stand for something out there. That is, in these sentences, words stands as symbols for objects in the real world.

(2) Knowledge of acquaintance consists of knowing particulars such as my neighbour, or universals such as the notions of combustion or acceleration. Knowledge of facts and acquaintances often coexist.

(3) Knowledge of "how to do" is often described as skill. This type of knowledge is rarely verbalised. Sometimes a person knowing how to do things will also be able to state how he/she is doing it. But this is not common. I may know how to ride a bicycle or spot market opportunities or manage ambiguous situations without being able to describe how I do them (Chaudhury et al., 1996). . The nature of this knowledge is best described as responding in a discriminating way appropriate to circumstances. Aptitude related to this knowledge cannot be stored and internalised as symbols.

Chaudhury et al., 1996 introduced a similar distinction between knowing-how and knowing-that to differentiate between knowledge of facts and acquaintances and knowledge of how-to-do things. On the basis of the above we might say that knowledge is a wider concept than skill. Knowledge consists of knowing-that and knowing-how. The part of knowledge that is knowing-how is synonymous with skill. Knowing-that, the part of knowledge that is different from skill, is called content-knowledge.

The two kinds of knowledge: skill and content-knowledge have markedly different properties. In terms of the computer metaphor, content-knowledge is in the form of declarative memory and appears to decay more rapidly than skill which is like procedural memory or a compiled program (Dewey, 1992). Content-knowledge, as declarative memory consisting of symbols, will be forgotten if not often put into use. Procedural memory or skill also appears to be more specific to the mode of communication in which it is initiated. If I am very effective when dealing with irate customers on the phone, I may not be so effective in written responses. In this case the skill learned in one mode may not be available, if the triggering information is presented in another mode.

In the context of professional education, knowledge is the state of knowing something, while skills is the ability to use one's knowledge to perform a task (Romiszowski, 1981). Knowledge is considered dichotomous (i.e., either present or absent) whereas skill exists in many levels (Stone, et al., 1996). Knowledge is what one knows but skill is what one can do. In psychology, (e.g., Davis and Soloman, 1989) the word " knowledge " is similar to " Declarative knowledge " and the word "skill" is similar to " Procedural Knowledge ". Knowledge is considered necessary but not sufficient for skill; skill cannot exist without knowledge. In other words, knowledge is what one knows; skill is what one can do. Instruction that emphasises knowledge is primarily concerned with increasing the students' ability to recall and communicate specific facts and concepts. Instruction that emphasises knowledge and skill is concerned with increasing the students' ability to use facts and concepts to accomplish specific tasks, or to increase students' ability to apply abstract principles to specific problems (Angelo and Cross, 1993).

The importance of and distinction between, accounting-related knowledge and skills have been recognised by accounting academics (Stone, et al., 1996). For example, both the Bedford Committee, 1986 and the AECC's position Statement Number One, 1990 distinguish between the knowledge and skills necessary for accounting practice. Similarly, Deppe, et al., 1991 identify an expanded set of competencies for accounting practice that distinguish between accounting-related knowledge and skill. In addition, many recent descriptions of accounting curriculum innovation distinguish between knowledge and skill-related objectives (e.g., Ainsworth and Plumlee, 1993; University of Illionis, 1990).

2-3-WHAT aspects of IT need to be integrated in accounting education

The aim is to provide students with general and transferable skills in the use of key application packages with reference to the role of decision support systems in general. It is not enough for students simply to be familiar with how accountants use IT (Reynolds, 1991). IT/IS skills are much broader and students require an understanding of how accounting information systems fit within an organisation's overall information systems infrastructure. There have been many attempts in the western countries like USA, UK, and Australia, either by accounting bodies or by individuals, to determine computer literacy, competency, or Information Technology skills and knowledge which should be integrated into accounting programmes.

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)*

There has been empirical and theoretical research on this issue during the past two decades. The Canadian Institute of Chartered Accountants (1974) study reported that the Chartered Accountants should have an expert knowledge of audit techniques for computer systems and of various controls used in EDP systems, based on the ability to develop an audit plan for a variety of accounting applications processed on one computer system. They must also possess a general knowledge of computer capabilities in such fields as statistics, simulation, linear programming, on -line real-time operations, shared use, etc.

Daniel, (1967) concluded that four general areas of computer technology in the curriculum have been developed in the overall effort to provide the student with an ability to use computers in handling management problems. These areas are

1- Coverage of computing concepts, systems analysis, design, and programming through a course required of all students early in their academic programme.

2- Coverage of the applications of computers through incorporating of this material into the functional area of courses.

3- Coverage of computer capabilities for aiding decision making in computer-oriented business games.

4- Coverage of integration and the optimisation of computer applications through a course on design and implementation of a sophisticated, computer-based management information system.

The computer is not just a high-speed calculator. Its high speed, when coupled with the stored program, stored data, and a diversity of peripheral devices, has completely altered the scope, feasibility, and economics of information processing. The trend is clearly toward a more intensive use of computers in complex man-machine systems with an increasing use of interactive, immediate processing. The computer is not an end in itself; it is a tool for use in analysis and it is a central part of any advanced management information system.

There is a need by accounting students for instruction about the computer at two levels:

1- Instruction for all accounting students

2- Instruction for accounting students who wish to study computer data processing in more depth.

The first level of instruction is necessary because every accountant should be prepared to act effectively in situations in which he is a user of information, that has been processed on the computer and a user of prewritten (canned) programs for analysis and processes and operations that are to be carried out using a computer, and as an auditor who must evaluate the processes and results of computer data processing. The second level of instruction should be available for students who will be engaged in the design and implementation of computer-based management information systems.

The four activities that accountants may need to have a knowledge of computer data processing are as user, specfier, auditor, and designer and each require differing scopes and details of EDP competence.

Based on the knowledge objectives, all accounting students should be provided with the ability to use the computer as an effective tool for analysis at an early stage in their education, preferably no later than the point at which they complete their elementary accounting sequence. The accounting student should also be provided with a general orientation to the computer environment, the orientation material should include introductory instruction on the following topics;

Analysing and planning for computer processing, computer hardware, computer software, flowcharting programming, data processing approaches, operation and management of computer data processing.

Additional instructions should be available to accounting students on computer-based information processing systems and on internal control and auditing in an EDP environment. Additional courses may be offered for students who wish for further specialisation in certain areas.

The information processing systems course, the content of course to introduce students to computer hardware, software and programming is reasonably well specified in practice. This course include processing approaches (batch, on-line, time sharing), types of applications, theoretical concepts of systems, information, and information economics, analysis of information and processing requirements, approaches for systems analysis and design, data management, selection and implementation of new systems, system controls.

The computer aids to accounting instruction may be classified into six groups (AAA 1970):

Figure 3-1 Computer Aid to Accounting Instruction

Aid	Description
Basic accounting	The computer is used to process transactions according to specifications or instructions provided by the student
Specialised Accounting Application	The computer is used to process an accounting or auditing application (payroll, accounts receivable, audit sample, etc). Based on specification or instructions provided by the student.
General software packages	The standard statistical and business process are pre-written for use as a complete application or as a subroutine in student program
Decision simulations	There are a number of business games; several of these are oriented to accounting decisions.
Data banks	Many problems required the availability of a suitable data file, but almost no data bank is currently available for academic use.
Timesharing applications	Time sharing applications are classed separately because of the unique characteristics of the timesharing environment.

Wu (1983) surveyed 200 accounting instructors specialising in accounting information system (AIS) courses across the United States. The survey instrument consisted of a number of possible AIS topic choices which respondents needed to classify into necessary, optional and unnecessary categorisations. This survey identified nine main topic areas for AIS courses. These are:

1-General systems concepts

2-Data processing

3-Systems documentation devices

4-Business data processing

5-Systems life cycle

6-Internal controls

7-General ledger and budgetary controls

8-AIS for resource and feedback controls

9-Financial planning and budgeting models

The major limitation of this study was that it did not address the views of accounting practitioners on IT educational requirements of accountancy graduates. Furthermore, the topics chosen for inclusion in the survey instrument were from no definite source, and the survey did not address the level of IT knowledge graduates should have attained by the completion of the course.

Wu (1983) aimed to find out which standard topics should be covered in the AIS course and to demonstrate how computer programming is integrated into AIS materials for effective teaching.

A basic understanding of the concepts and applications of accounting using quantitative methods and management information systems including computer applications. This study reported that an AIS course should include the following:

1- A theoretical foundation of AIS's, including general concepts of systems, information, feedback control and organisation

2- Data processing technology, including computer hardware and software.

3- System documentation devices: systems flowchart and document flowchart.

4- Business data processing systems, including batch, real-time, database, and distributed systems.

5- Internal control, including methods of auditing computer-based AISs and computer frauds.

6- Systems life cycle, including systems initiation, evaluation, analysis, design, implementation and control.

7- General-ledger and budgetary control systems.

8- AISs for resources and feedback control, including order-filling, invoicing, and accounts receivable system, inventory control systems, payroll systems, fixed assets accounting systems, purchasing and accounts payable systems, and production planning, scheduling, and costing systems.

9- financial planning and budgeting models

This study recommended optional topics by AIS instructors include:

1-Historical development of data processing technology, including unit record equipment.

2- Strategic planning systems

3- Decision support systems

4- Information theory and Information evaluation.

This study also recommended three methods could be used to teach the AIS course:

1- Class lecture as the main teaching tool.

2- Case study as the first supplementary teaching tool

3- Programming as the second supplementary teaching tool.

In 1983/84, a significant study into IT requirements for accountants was performed by a joint task force from the Australian Society of Accountants (ASA) and the Institute of Chartered Accountants (ICA). The study identified three main issues concerning the IT knowledge requirements of accounting graduates. These were that: -

- Accounting graduates needed to be computer literate and aware of existing and potential functions and applications of software and hardware relevant to their needs;
- Graduates needed to show an interest in the design of information systems outside the strictly financial sphere, e.g. electronic mail, word-processing, telecommunications, and other similar topics;
- Graduates needed to be aware of potential information sources outside the organisation, i.e. national and international database of research and reference materials.

The results of this study provided input to course planning by tertiary sector institutions at the time. The results were also used by professional societies to provide a basis on which to accredit the IT component of accounting courses at tertiary institutions. However, the work of the study is now over 10 years old and therefore its relevance to current courses for young accountants needs to be reaffirmed and confirmed.

Waller and Gallun (1985) attempted to determine the desired range and depth of knowledge or skills in terms of broad programs or topics and the desired depth of coverage in terms of more sophisticated microcomputer concepts.

Armitage and Boritz (1986) listed (see appendix two) the broad skills desirable for accounting students, including knowledge of and ability to use state-of-the-art system analysis and design techniques, "hands-on" exposure to major program products, e.g., word processing, spreadsheets, statistical packages, database management systems, report writing, modelling packages, and accounting packages. They stated that specific skills should be presented in different courses. In Financial Accounting, the ability to understand the structure of typical computerised accounting systems and subsystems, including the flow of transactions, data file organisations, and programmed accounting procedures, the ability to evaluate and use specific or general-purpose software packages for consolidations, foreign currency translation, current value accounting, lease accounting, etc., the ability to use database services for financial reporting and disclosure research. In Managerial Accounting/Information Systems, the ability to participate as part of a systems development team with an appreciation of information systems development theories and methods, behavioural consequences of system changes, and principles of project management, the ability to design and use financial databases for planning and control purposes as well as to design and use decision support aids and financial modelling tools such as linear programming, statistical tools, simulation packages, and network models for enhancing managerial decision making. In auditing, the ability to specify, identify, and document financial and operational controls in computer-based systems, ability to evaluate effectiveness and efficiency of management and operations in computer-based system, to design and apply computer-assisted auditing techniques for a variety of audit purposes. In taxation, ability to use computer-assisted tax planning tools and to use on-line retrieval services for tax case research.

Bean and Medewitz (1987) asked accounting graduates of 15 Universities to rate computer skills relative to their own educational preparation and the importance of these skills to a professional accountant. In general, the respondents perceived that their preparation on the computer was low. They felt most prepared in programming skills, minimally prepared on software skills, and least prepared in network and computer communication skills. In terms of importance to a professional accountant, however, software skills were perceived as being most important and programming skills as the least important.

Edmonds (1988) surveyed accounting practitioners in the public accounting and private industry to obtain their perceptions of the micro-computing needs of accounting students. Spreadsheet programs were perceived to be the most important software applications for accounting students, although practitioners believe that less than 20% of new-recruits possessed adequate preparation for work on spreadsheet programs. Computer languages and word-processing programs were not viewed as being important topics for accounting majors, while respondents were indifferent concerning the importance of covering database programs in a microcomputer course. Edmonds in his study reported that there are microcomputer applications that have potential usefulness to accounting professionals. These applications are:

(1)- word processing
(2)- database systems;
(3)- computer graphics;
(4)- spreadsheet applications;
(5)- general ledger packages including accounts receivable, accounts payable, and Payroll programs; and
(6)- programming languages.

In Australia, Wan and Choo (1988) addressed the problem of the representatives of this prior study by surveying all tertiary institutions and 'big-eight' chartered accountancy firms for their views on which topics were essential to students of accounting information system courses in Australia. Their survey instrument was based on 15 main topics identified in the prior study of Wu (1983), and it used a similar rating scale to Wu (1983). Wan and Choo's study concluded that the majority of respondents identified six necessary topics from the original 15 provided in the survey instrument. A summary of these topics is:

1-Systems life cycle and resources management
2-Business data processing systems including batch, real-time and distributed system
3-General system concepts
4-Data processing technology

5-Study of internal controls

6-Feedback control in AIS

A major finding of the Wan and Choo study was that there was a considerably different view of necessary topics between educators and practitioners. In particular, those topics considered necessary by practitioners are presented in the following:

1-General system concepts*

2-Data processing technology*

3-System life cycle and resource management*

4-Business data processing system**

5-General ledger and budgetary systems**

6-Financial planning and modelling

7-Decision support systems

* **Ranked** equal **1st** in importance

** Ranked equal 2nd in **importance**

The Wan and Choo work presented views of accountancy practitioners. However, their results could not be extended to the requirements of chartered accountancy firms. Most certainly their results could not be applied to the IT requirements for accounting and finance graduates thinking of moving into government, commerce and industry, or public practice. Their study was limited also by the fact that there was no definitive basis for the selection of the original set of topics to be included in the survey. No assessment of the knowledge requirements of graduates in each of these topic areas was obtained either. This study, and the prior study of Wu, failed to distinguish between theoretical aspects of IT and practical applications of IT in the topic choices presented in their respective surveys.

Er and Ng. (1989) presented the following topics seem to be necessary for an understanding of computing and computers and their utilisation in accountancy:

1- computer programming 2- microcomputer applications 3- computer systems and systems programming 4- computer-based accounting information systems 5- computer auditing 6- expert decision support systems.

1-Computer Programming:

It is felt that accounting students should not merely treat a computer as a black box, and hence some understanding of the internal working of a computer is essential. The best way to learn about controlling a computer is to program it. Experience gained in computer programming will greatly enhance understanding of the various software to be used later. Moreover, the computer-programming course will expose accounting students to algorithmic thinking which is totally different from the illustrative approach commonly used in introductory accounting course. It is suggested that 3 hours of supervised laboratory class per week are needed to give students the necessary practical experience in computer programming in addition to formal lectures. On top of that, another 9 hours per week are expected to be spent by each student to complete laboratory exercises and assignments at his or her own pace.

2- Microcomputer applications:

Working accountants commonly use word processing to prepare reports, spreadsheets to perform calculations, and fourth generation languages to retrieve accounting information from databases. Thus this course is absolutely essential to make accounting students acquainted with various kinds of software, which have become accountants' essential tools in the workplace.

3- Computer systems and systems programming:

The demystification of computers cannot be considered complete until one gains an elementary knowledge of the machine architecture and the workings of compilers, operating systems, computer networks, and data communications. This course is essential for making accounting students unafraid of computer technology, and to some extent, knowing where to look for further information about computer technology.

4- Computer-based accounting information systems:

This component is absolutely essential and should be included in accounting information systems courses, which also includes the manual systems. Students should be taught the various internal controls for computer-based accounting information systems in the context of both big corporations and small business.

5- Computer auditing:

For practising accountants, computer auditing is increasingly performed at installations of computer-based accounting information systems. As such, computer auditing should be taught to accounting students, some of them may become practising accountants in the future. Students should be taught how to use computers to carry out the compliance and substantive tests in an EDP environment.

6- Expert decision support systems:

Expert systems and decision support systems have been increasingly used in practice to assist decision making in auditing, taxation, financial planning, and risk assessment. The increasing mergers of expert systems and decision support systems create new breeds of software, generally called expert support systems. In these contexts, the computer is being used as an intelligent assistant/tool rather than as a computational tool as suggested by Bhaskar (1982,1983). In the light of the unavoidable challenge posed by the Japanese fifth generation project (Feigenbaum and McCorduck, 1983), accounting students should be taught expert systems, decision support systems, expert decision support systems so that they can use these tools to raise the quality of decisions made.

In 1989, BIS Sharpnel Ltd reported on a study that it had undertaken on behalf of the ASCPA. This study, however, was designed to elicit from members information on what IT services (viz. Software product evaluations, telephone help lines, and the like) they require from the ASCPA. It did not address the question of what IT skills accounting and finance graduates needed to be professional members of the ASCPA now and in the future.

In 1992, a joint project team from the ASCPA and ICA presented a report to the International Federation of Accountants (IFAC). The report presented views on, inter alia, the likely impacts of advances in Information Technology over the next decade on the education and work of accountants.

As a direct result of this submission, the IFAC Education Committee issued a discussion paper in November 1993 considering the minimum skill levels in Information Technology required by professional accountants. This document rates each topic on two dimensions: the importance of the topic and the required knowledge level. Each dimension uses a two-level rating scale for each of these issues. The topics rated by the committee as importance level 1 and knowledge level A (the highest rating on both dimensions) were information systems control concepts and auditing/information systems control techniques.

Van Meer (1993) overcame some of these limitations in a study of AIS course curriculum in New Zealand in 1992. His study provided a more representative assessment of this issue by surveying all New Zealand accounting academics involved in AIS programs in Universities together with a random sample of 200 experienced practitioners. In addition, the study assessed both the necessity of, and the graduate knowledge levels considered appropriate to 82 A1S topics categorised into nine groups.

The Van Meer work was the first of its type in that it distinguished between the theoretical and practical application aspects of various AIS topics. The study identified spreadsheets as the only essential topic, which required a level of advanced knowledge from graduates. A further 28 topics were evaluated as essential, but all of these required only intermediate graduate knowledge levels. The remaining 53 topics were rated by respondents as optional with 16 topics requiring intermediate knowledge levels and the remaining 37 requiring only introductory knowledge requirements. Summaries of findings of Van Meer appear in appendix three)

Hewett (1993) provides an excellent summary of recent publications on the impact of IT on the activities of accountants. While not contributing any new evidence to the field, he concentrates on reviewing the work in the IFAC (1992) report thoroughly, and he synthesises a six-unit major in IT for Universities to implement within their business/commerce degrees *'to prepare students to take their place in the accounting profession in the IT impacted work environment'* (Hewett, 1993:19).

Another study by Doolin et al. (1994) empirically examined the impact of IT on management accounting in Canada, Australia, and New Zealand. While this study was not directly investigating IT education for accountants, its results have implications for the education of accountants, and, in particular, prospective management accountants. Two hundred and sixty-six Australian companies (from the 'Top 1000') were surveyed, with 106 usefully responding. Of the 106 responses, 79 came from accountants. Doolin et al. (1994: 33, 34) report that,

> *Not surprisingly, spreadsheet (77 %), word processing (58 %), and graphics (40%) applications were used by most accountants ... Almost all accountants who*

responded agreed that the use of IT by accounting staff adds value to the services they provide to the company, and IT use is cost-justifiable.

Heagy and Gallun, (1994) in their study "Recommended microcomputer knowledge for accounting graduates ", conducted a survey to describe the desired knowledge of broad and specific microcomputer topics for entry-level accountants from the perspective of accountants both in public practice and industry alike. They outlined the broad topics such as spreadsheets, database management systems, telecommunications, accounting systems, systems development, and other topics like word-processing and programming language (Details in appendix four)

Accounting education should focus on teaching students the functional skills that are essential to thrive in a workplace and a society increasingly filled with technology and teamed with the basic principles of how a computer organises and accesses information. IT knowledge and skills one of the most important element should be integrated in accounting education. In fact, what accountants should possess with regard to computer technology should come from those who employ the graduates after graduation. In other words the needs means what the practitioners wanted in the real world. A number of studies have already detailed the impact of employer needs on educational institutions. Waller and Gallun (1985) for example, have reported on microcomputer competency requirements for accounting graduates as defined by public accounting firms and industry. Waller and Gallun found that the firms surveyed wanted Universities to provide curricular coverage of operating systems, electronic spreadsheets, and data base programs. Other applications, such as word processing, were also desired by most of the respondents. Similarly, Parmely and Paremaly (1986), in a survey of public accounting firms, found that a high percentage of respondents wanted their beginning or new accountants to be capable of applying computer skills and the ability to use technology in practice areas such as tax, bookkeeping, auditing, and management advisory services (MAS). The percentages varied from 63% for bookkeeping to 21% for MAS. 86% of those surveyed said they wanted

Additional computer applications are taught within auditing accounting courses. Heagy and Gallun, (1994) conducted a study to determine the desired knowledge of broad and specific microcomputer topics for entry-level accountants from the perspective of accountants in public practice and in industry. The broad topics included were spreadsheet, database management systems, telecommunications, accounting systems,

systems development, and other topics like word processing and programming languages.

The American Assembly of Collegiate Schools of business (AACSB) has revised its accreditation standards to now read:

1) *students shall receive instruction in the design, use, control and audit of computerised accounting systems ... and*
2) *students are expected to use the computer in accounting courses* (AACSB, 1984, P.44).

The Board of Accreditation of Accountancy Educational Courses (BAAEC)[1] in UK published its new accreditation guidelines at the end of 1996. The following are the new IT requirements relevance to the various subjects at Foundation level:

-Financial Accounting course should be include essential knowledge and skills using accounting software like input accounting data using an accounting software package, Describe the range of outputs of which the software is capable and produce financial statements from the software (BAAEC, 1996, P.19)

-Management accounting course should include skills in use of spreadsheet software such as set up a simple model for producing cash flow forecasts and use the model to generate forecasts based on different assumptions (BAAEC, 1996, P.24).

-Quantitative Methods should include use of mathematical/statistical software. Essential Knowledge and Skills like input statistical / mathematical data using an appropriate software package, construct different types of data presentations using computer graphics software, and apply statistical/mathematical techniques using appropriate spreadsheet and database software (BAAEC, 1996,P.30)

-Information Management course should be include skills in use of spreadsheets to set up models and apply sensitivity analysis to data, use a word processing package to produce reports and presentations, use database software to apply mathematical methods and organise business data, and use accounting packages to input transactions and to produce accounting statements (BAAEC, 1996, P.33).

IT personal-productivity skills are essential for today's accountants. These include proficiency in using tools such as spreadsheets, word processing, presentation graphics,

[1] BAAEC operates a joint accreditation process on behalf of:
- The Institute of Chartered Accountants in England and Wales (ICAEW)
- The Institute of Chartered Accountants of Scotland (ICAS)
- The Chartered Institute of Management Accountants (CIMA)
- The Chartered Institute of Public Finance and Accountancy (CIPFA

and databases to enhance personal efficiency and effectiveness for accountants (Hollander et al. 1996).

Australian Professional accounting bodies have called for accounting graduates possessing computing skills which enable them to act as information managers and communicators with users of this information (Kent and Linnegar, 1988).

In a survey of microcomputer competence requirements in the accounting industry, Waller and Gallum, 1985, found that most accounting firms desire coverage of relational database, word processing, spreadsheets and computer networks should be taught in the accounting programme if it incorporates any computing components at all. It seems that the skills and knowledge in operating software and hardware are more relevant to the day-to-day work of practising accountants than the long list of topics proposed by Bhaskar, 1983 (Er.and Ng, 1989)

Bean and Medewitz, 1987 in their computer education survey identified four categories of compute skills:

1-Programming (FORTRAN, COBOL, and BASIC);

2-Software (Statistical packages, accounting applications, spreadsheets, databases, and word processing);

3-Hardware (micro, mini, and mainframe); and

4-Networking and computer communications skills.

Seddon, 1987, p.271 stated

> *"Accountants need to be computer literate, where computer literacy means being able to use a computer effectively and efficiently when the need arises. For an accountant today, the words effective and efficient certainly mean being able to use a spreadsheet program on a PC, possibly being able to use a word processor (some would include a database packages too), and probably being familiar with the operating system of some large computer. Experience with different sized computers is important "*

In response to industry demands in real world needs and AACSB requirements with regard to IT skills, the accounting associations presented more studies related to IT skills and knowledge. IFAC, 1995 established a framework for organisation IT-oriented education for professional accountants, and the core areas of knowledge and skill to be covered. IFAC's study identified the IT education requirement for professional accountants under five main headings:

* General IT education requirements,
* The accountant as user of Information Technology
* The accountant as manager of information systems
* The accountant as the designer of business systems (alone or as part of a team)
* The accountant as the evaluator of information systems.

Core IT knowledge and skill requirements may be viewed from the perspectives of both breadth and depth. In IFAC's study 1995 the breadth requirements are addressed by using work domains as a way of categorising knowledge and skill areas. The depth requirements are addressed by distinguishing two levels of depth -

- A pre-qualification level, requiring only general familiarity with topics, and
- A post-qualification level, requiring mastery of those topics.

Requirements pertaining to the depth of knowledge and skills are further addressed by dividing the educational requirements into three building blocks aimed at providing an increasing depth of coverage of core IT knowledge and skill sets:

- a set of general IT education requirements
- a set of user-oriented education requirements
- a set of role-related education requirements associated with the manager, designer, and evaluator roles.

The USER Role

Professional accountants as users of IT are exposed to a wide array of information systems architectures, hardware, software and data organisation methods. Information systems are common in a variety of forms because they are designed to suit the needs of specific organisations. While no user could be an expert in every type of information system architecture, hardware, software or data organisation, there are nevertheless fundamental knowledge and skill sets that all accountants must have.

Professional accountants, as users of IT, must have the background knowledge and familiarity with information systems concepts and terminology that would enable them to make reasonable decisions in connection with simple systems such as defining their needs, identifying alternatives, deciding whether to acquire a pre-packaged system or develop the system using end-user tools such as spreadsheet packages or database packages, or outsource the development to another branch of the organisation or an outside consultant, and selecting the appropriate hardware, software, and supplier.

As users of IT, professional accountants must also know how to test and assess the acceptability of a particular system being acquired or being developed for their use and how to operate and manage such a system and keep it up to date.

Professional accountants must have the knowledge of basic processes used to keep their system resources organised, and of control processes and practices for safeguarding their systems and data against errors, theft, unauthorised use, software piracy, virus attacks, vandalism and system failure.

Nevertheless, there are certain fundamental skills that are widely regarded as the minimum set of skills that all professional accountants must have prior to qualification: Ability to use a word processing package, the ability to use a spreadsheet package, the ability to use a database package, and the ability to use at least one basic accounting package. The professional accountant should have experience with at least two different types of systems architectures, for example, a single-user stand-alone microcomputer in a business context and a multi-user local area network system.

In addition, the aspiring professional accountant should be able to use electronic mail and to access and retrieve information from an on-line or local database such as a professional research tool utilising CD-ROM or other data storage medium.

The MANAGER Role

The big success factor is realising that accountants are information managers. Mastery of technology is seen as an essential tool for the future. *"If you do not stay current with the technology, your career is in jeopardy"* (Jackson, 1998, P.24)

In modern organisations, information resources are now recognised as the single most important asset of the organisation and require effective management that is highly trained and educated in information resources management (http://www.hbg.psu.edu/Faculty/m1k/crclm919.html).

The accounting education should shed light intention on their IT curriculum

to prepare students to understand the concepts of information resources management and technologies, methods, and management procedures to collect, analyse and disseminate information throughout organisations in order to remain competitive in the global business world.

The accountant as a manager of information systems are sometimes referred to as an Information Officer in the 1990s must understand the issues which are raised in the information systems environment in the business, as well as having a comprehensive knowledge of Information Technology in order to operate effectively

Many professional accountants are involved in financial management roles, which bring them into contact with information systems. Although the growth of IT has spawned many new groups of professionals, including professional information system managers, many accountants in small and medium organisations fulfil information system management functions, in partnership with other managers, or as part of their overall responsibilities.

In this capacity, the professional accountant's responsibilities may include participation in strategic planning for use of information systems to support entity objectives, being part of the membership of an information systems steering committee, evaluating potential investments in information technologies, developing operational priorities, exercising control over information system productivity, service quality, and economy of information system use.

The professional accountant must have a conceptual understanding of information system technology issues of importance to different types of entities and environments, and in particular, the following:

- Strategic considerations in IT development
- Administrative issues
- Financial control over IT
- Operational issues
- Management of system acquisition, development and implementation
- Management of system maintenance and change
- Management of end-user computing

The DESIGNER Role

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 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.

Professional accountants' design activities will often emphasise the identification of user needs, consideration of costs and benefits of proposed solutions, the appropriate selection and combination of hardware, pre-packaged software, essential control features, and other system components, and the effective implementation and integration of acquired or developed systems with business processes. In this capacity, professional accountants need a sound understanding of business systems and the capabilities of various information technologies to support an organisation's objectives, whether it is a profit-oriented, not-for-profit or a public sector organisation.

In their design role, professional accountants must know the basic steps to be followed in the design of a system such as:

- The role of information in organisation design and behaviour,
- System design techniques,
- System development life cycle phases, tasks and practices, particularly maintaining control over system development processes, incorporating controls within systems, and maintaining controls over system changes

The professional accountant must be aware of standards and preferred practices, particularly internal control practices that could guide information system design practices. A professional accountant's knowledge of information systems must be developed in the context of gaining an understanding of organisations' business and service objectives and their environments. Thus, education programs and courses aimed at developing system design knowledge must have a managerial rather than a technical orientation.

The EVALUATOR Role

The role of the accountant as evaluator encompasses the functions of an internal audit; external audit and other evaluative roles filled by accountants, whether or not formally identified as audit roles.

In these capacities, professional accountants may be engaged for a variety of purposes, including determining the degree of information system effectiveness in achieving organisational objectives, determining the degree of information system efficiency in achieving organisational objectives, determining the fairness of financial representations and the accuracy and completeness of related accounting records, determining the degree of compliance with management policy, statutes or other relevant authoritative regulations, and evaluating internal control strengths and weaknesses, in particular with respect to financial reporting processes, asset safeguarding, data integrity, information security and privacy, and continuity provisions for information system processing.

In the evaluator role, professional accountants must possess knowledge of legal, ethical, auditing and control standards relevant to IT and must be able to distinguish between various information systems evaluation objectives and approaches such as:

- Evaluation of efficiency/effectiveness/economy of IT use
- Evaluation of compliance with management policy, statutes and regulations
- Evaluation of internal control in computer-based systems
- Evaluation of the fairness of financial representations and the accuracy and completeness of related accounting records

IT skills in connection with the accountant's role as evaluator would depend on the evaluation objective. For example, in a public accounting context the skill level requirements would focus primarily on the IT skills involved in a financial statement-oriented attest audit such as:

- The ability to obtain and document an understanding of the flow of transactions and elements of the control structure relevant to the audit
- The ability to test and evaluate relevant information systems controls over financial reporting processes and asset safeguarding

- The ability to test computer-based records to establish their accuracy and to substantiate financial representations

In a management accounting context less emphasis would be given to such requirements and more emphasis would be given to IT skills such as:

- The ability to evaluate effectiveness and efficiency of information systems
- The ability to assess the degree to which an information system meets the needs of users and serves the objectives of the entity

All professional accountants involved in an evaluative role at the pre-qualification stage must have the ability, with limited supervision, to plan, execute and communicate the results of an evaluation approach tailored to the specific types of evaluations relevant to their work domain in the context of specific circumstances that involve information systems.

All professional accountants involved in an evaluative role at the pre-qualification stage must also have the ability to plan, execute and communicate the results of applying at least the following computer-assisted auditing techniques:

- Audit software
- Test data

Crawford and Barr (1997) in their study *"Information systems: Curriculum Issues in British Accounting Degrees"* presented a short list of sixteen randomly selected topics (basic computer technology, the systems development process, documenting information systems, traditional data management vs. database approach, security of data held electronically, organisational and procedural controls over computerised accounting systems, strategic planning of information systems, recording economic events in terms of transaction cycles(revenue cycle, expenditure cycle etc.), conversion cycle (manufacturing) information systems, and their implications for accounting information systems , management decision making, decision support systems, end-user computing-implications for decision making and electronic data interchange. Practical experience is required of: accounting packages, spreadsheets, database management systems and asked the lecturers listed in the "BAA Research Register" which of the topics do you think should be part of an accounting degree?. And which of the topics are included in modules. Which are taken by students intending to graduate with an accounting degree? The highest response in Q1 was for the inclusion of spreadsheets (98%) and this is also the most likely topic to be covered (93%). Accounting packages, management decision making, Electronic Data Interchange (EDI), the manufacturing cycle, End-User Computing (EUC), transaction cycles, Decision Support Systems (DSS), and Strategic Planning for information systems (all 50% or less) were also listed.

The operation of the computer and computer programming should be an accounting information system topic according to the Committee on the Role of the Computer in Accounting Education (AAA, 1970), the Professional Development Committee of the Canadian Institute of Chartered Accountants (1974) and Gordon, (1976, 1979).
Future accountants will need to work extensively with databases, and it is important that they have experience in database search techniques via accounting education (Paquette and Schwarzbach, 1991).

The IT knowledge levels/skills of graduate accountants is an important area to potential employers, tertiary institutions, and the societies that monitor and maintain the standards of the profession. Obtaining feedback from practitioners on the IT skills required of graduate accountants, and using this information to review those formal education avenues whereby these graduates obtain so many of their IT skills needs to be a continuous process.
The Australian Society of Certified Practising Accountants, Information Technology Centre of Excellence presented a study title *"An investigation into the IT knowledge requirements of accounting and finance graduates in Australia"* in 1995
This study presents the results of one of the largest investigations into the views of practitioners on the issue of IT education for accountants during the last decade. Two thousand four hundred and eighty-eight members, 3.5 per cent of the 1994 ASCPA membership, were representatively selected and requested to participate in the study. An response rate of 31 per cent was achieved. Furthermore, the responses were almost perfectly representative of the overall membership when classified by years of experience, field of employment, and industry involvement. (Details of the levels of skills of ASCPA'study in Appendix five)

3- Integrating IT skills and Knowledge in Accounting education: HOW

3-1 Introduction

The corporate business environment is changing radically and rapidly regarding IT/IS tools. Unquestionably, accounting education must also change to accommodate the needs of corporate clientele. Enhancement of opportunities for career success in the fast-moving corporate environment necessitates continuous curricular modifications in accounting programs. But the question that comes up is how?

While there is general agreement regarding the need for computer literacy among accounting graduates, there is little information as to how such literacy should be developed (Edmonds, 1988). The means by which accountants obtain competence and skills for IT is through education either at University level or in continual professional training after graduation.

United States research indicates that computer integration into accounting curriculum has been at relatively low levels. It has been used in individual accounting courses instead of being part of an integrated developmental approach aimed at developing skills across a range of accounting courses (Armitage and Boritz, 1986). Australian and New Zealand research suggest that most students in accounting courses receive their computer exposure in computer science subjects rather than in accounting courses (Van Lint, 1982). Skills allowing accounting graduates to act as information managers and communicators are not provided by traditional computer science courses (McCrae, 1985)

With regard to how IT should be presented knowledge and skills in accounting education, the literature review has been broken up into two areas: Some literature presented a framework for integrating computers into accounting education as one means for students in accounting education to develop the knowledge and skills requirement.

A lot of very interesting experiments and research have been carried out about computers in accounting education. The last two decades have witnessed a wealth of attempts aimed at integrating computers into accounting education in different courses.

3-2-Background

The general debate on the use of computers in accounting education dates back at least to computer assisted learning projects like NDPCAL in UK and PLATO in the USA

(Collier; et. al 1990). A number of articles have appeared in the literature describing computer applications in specific accounting courses. There have been many studies done to assess the extent of computer utilisation in accounting classrooms (e.g., Thomas, 1984; Nash and England, 1986; Cronan and Fries, 1986; Kent and Linnegear, 1988). The results of most studies reveal that the computer is not used extensively in accounting courses in general. Research carried out in the United States indicates that computer integration into the accounting curriculum has been at relatively low levels (Kent and Linnegear, 1988). Most respondents feel that computers are important and should be incorporated by use of packages easily used by instructors of accounting. Kent and Linnegear, 1988 in their study *"Integrating Computers Into Accounting Education: A Survey Of Australian Universities And Colleges"* presented a report of a survey of the use of computer assisted learning in the accounting curriculum in Australian Universities and colleges, academics commitment to computer assisted learning and obstacles to further applications of computer assisted learning in accounting courses. The survey found that computer assisted learning has occurred mostly at an introductory level in the areas of worksheets and special purpose journals. Academics want to increase computer-assisted learning in their accounting courses but are hindered by lack of financial resources, staff time, staff expertise and educationally suitable software.

Currently, few accounting courses use the computer to a large degree. However, the first decade of sustained attempts to use the computer as a supplementary teaching tool has resulted in very mixed results (Kelliher, et al (1996). Respondents' comments, however, suggest that many accounting departments are moving in a direction that will require greater utilisation (Cronan.and Fries, 1986). Other studies disclosed that there are increases in the use of computers in accounting courses. For example, Salimi 1990, in his survey, indicated that microcomputers are being used by a significant percentage of instructors in almost every type of accounting course.

The applications taught and the software used vary from course to course; however, spreadsheets are by far the most popular kind of software used and are given the most importance by accounting instructors. Electronic spreadsheets can be used to perform sensitivity analysis in areas such as interest coverage (Togo, 1988), managerial control (Togo, 1991), and cash flow projections (Togo, 1992). The Salimi survey results indicate that there is no difference in the extent of microcomputer use between large and small universities, schools of business and accounting departments among the samples. Instructors at smaller schools are integrating the computer into their courses as frequently as instructors at larger schools.

The use of computers varies in different courses. It is highest in the courses such as AIS, auditing, and cost/managerial accounting, because the topics included in those courses lend themselves easily to computer applications, perhaps relating to the applied rather than conceptual nature of these courses. The relatively infrequent use of computers, however, in some courses does not arise from lack of software availability as some software is already available and much of it can be adapted for almost any use (Salimi, 1990).

3-3-The need to integrate computers in accounting education

There appears to be an upward trend in use of the microcomputer in accounting courses, and this trend will probably continue as more funds become available to schools for computer assisted instruction, more applications are designed that will be useful in accounting, and more accounting instructors become better trained in using the microcomputer for instructional purposes (Salimi 1990). The American Assembly of Collegiate Schools of Business (AACSB) recognised the need for instruction of computers into the accounting classrooms by revising its accreditation standards. According to these standards, computer facilities for accounting education shall be of sufficient capacity and accessibility to encourage development of computing skills on the part of students (AACSB, 1984). In order to meet the market demands and to comply with the AACSB requirements, many colleges and Universities across the country, in the early 1980s, started to experiment with computer-assisted instruction in their accounting programs (Romney, 1983).

Analysis of microcomputer use in specific accounting courses revealed that in the various courses, micros were being used for a variety of applications with different software. The usage in different courses depended on the suitability of the topics taught in that particular course for microcomputer use as well as the availability and suitability of existing software for those topics.

Several surveys have already been conducted on the usage of microcomputers in accounting curricula. Thomas, (1984) surveyed accounting departments and found that 31% of the sampled departments were using the microcomputer for teaching accounting at the time of the survey. Of those schools already using microcomputers, about threefourths employ an electronic spreadsheet; about two-thirds use some of the computerised practice set or a computerised accounting system. Cronan and Fries (1986) surveyed accounting departments to determine the relative frequency (in percentages) of computer use in teaching various accounting courses. They found a range from a high of 76.5% for accounting information systems to a low of 4.5% for non-for-profit or governmental accounting. Their survey also determined specific computer use in upper division courses to discover whether students were required to program or to use pre-programmed packages on-line accounting systems or existing databases. Paramley and Parmaly, (1986) conducted a survey of the use frequency of computers and the percentages in various accounting courses at accredited institutions. They found that the first cost accounting courses had the highest percentage of use with 40% and graduate managerial accounting the lowest, with 2%. They also found that 715 of their responding institutions were using computer applications in accounting courses while 29% were not.

Kocakulah and Wade (1988) reported that approximately 75% of faculty respondents from accredited undergraduate accounting programs indicated that the computer is integrated into the cost accounting course, although respondents did not view cost accounting as a computer course (58% of the respondents allocated less than 10% of the course grade to computer assignments. 87% of the respondents felt that using the computer improved student's job-related skills and understanding of cost accounting. However, 78% perceived that using the computer increased the time students spent on the course, but that this extra time was spent on the computer, not on cost accounting topics.

Salimi (1990) reported that 51% of US and Canadian accounting instructors who responded to a survey (n= 413) conducted in 1986 incorporated the microcomputer in their accounting course, with accounting information systems and auditing showing the highest percentage of use. The most common approach for integrating the microcomputer was to assign specific exercises, problems, and cases to be solved on the computer.

An American Accounting Association Report from the Committee on Integrating of the microcomputers into the financial accounting curriculum (AAA, 1985) delineates various pedagogical issues and system problems in using the microcomputer. The appendix of this report contains a list of microcomputer applications used in financial accounting. This list was developed from a survey of college professors and book publishers. Another AAA report, this one from a committee on integrating the microcomputer into the managerial/cost accounting curriculum (AAA, 1985), addresses similar issues and provided a list of available microcomputer applications in cost /managerial accounting.

One of the reasons for the use of computers in accounting courses is that accountants need to deal with computer-based accounting information systems and their subsequent auditing. In view of these practical needs, the importance of computers in auditing can not be over-stressed as it gives rise to the issue of appropriate internal controls of computer-based accounting information systems (Walsh, 1986; Bhaskar and Williams, 1986). Many authors have described different ways of running the accounting information systems and the computer auditing courses. Engle and Joseph, (1986) describe an experimental accounting information systems which allows students to experience the data entry and various internal control features of the system. Chandler, (1994) goes further to describe his experience in involving students in the actual design and development of an accounting information system with accounting controls. Vasarhelyi and Lin (1985) describe an interactive generalised audit software known as TREAT for the accounting information systems and the computer auditing courses are well accepted into accounting information systems and computer auditing from the core of the use of computers in accountancy.

3-4- Ways for integrating computers in accounting education

The advent of microcomputer technology, and subsequent progress both in hardware and software development, have given rise to very high expectations about the impact of informatics on the teaching and learning of accounting in education. Some of these studies cover a framework for integrating computers in accounting education (Bhaskar, 1982, 1983; Collier, 1984,1990; AAA, 1985, Er and Ng, 1989). Other have appeared in the literature describing computer applications in specific accounting courses like financial accounting and management accounting, auditing, financial modelling and accounting information systems (Marriott and Mellett and, 1994); Chandler and Marriott , 1994; Marriott, 1992; McCombie and Sangster, 1993; Alexander, 1996; Meer and Adams, 1996; Guinn, 1988). For instance, with the increasing use of microcomputers by both external and internal auditors, educators are faced with the problem of preparing students for their use in reality, Guinn (1988) surveyed auditing faculty members to determine how extensively microcomputers were being used in the first auditing course. Overall, 48% of the respondents reported using the microcomputer in the first auditing course, although computer usage was generally higher among accredited accounting programs. Microcomputers were most frequently used for analytical review, statistical sampling application, and preparation of working papers 64% of the respondents used software supplied by accounting firms, while 62% reported used some type of spreadsheet software.

Attempts have been made to develop materials to support accounting education using the computer; however, these attempts have usually centred around one of the following four kinds of applications (Petersen and Grimlund 1983):

1- computer-based management games in which the computer is used as a market simulator and data aggregation device for efficient response to executive decisions made in the classroom.

2- computer casebooks, providing the student with an opportunity to program a computer in a higher-level language, using case materials drawn from an accounting setting;

3- computer-based practice sets in which a fixed set of economic events is developed.

4- interactive educational applications that use the computer directory to aid accounting education.

The interactive educational approach allows the student to practise and verify his/her understanding of concepts and to receive feedback from the computer regarding the correctness of his responses.

The PLATO system, primarily developed by Professor McKeown of the University of Illinois, is a good example of these types of applications.

Armitage and Boritz, 1986 described a six-phase framework for integrating computers into the accounting curriculum. The six phases are selecting a strategy, gather information, generate "ideal" specifications, analyse resources and constraints, implement "actual" program and monitor systems. In more detail the set of computer-related skills or knowledge sets which when matched with their resources, would guide their subsequent implementation plan.

Computers can play several roles in an accounting course. Instructors can demonstrate computers, their modes of operation, and associated software, students can undertake assignments requiring the use of computers, or students can use computers as supporting tools in areas not directly related to computer topics for example, using word-processing software to prepare term papers (Nash and England, 1986).

While each of the above approaches has made a contribution to accounting education, none of them directly addresses the use of a computer to process and report information in a contemporary manner. In an administrative/accounting setting, the computer plays a primary role in assembling and recording data, and in preparing the management reports that are based on the reported data. Petersen and Grimlund 1983 described the Computer Assisted Data Recording and Analysis (CADRAS) that the authors have developed for instructional purposes. These programs allow a student to study accounting by using the computer in a manner similar to the way in which a computer functions in a "real world" administrative setting.

Bhasker (1982,1983) proposed a list of 26 topics, classified under three categories (computer science, computer as a computational tool, computer-aided instruction), for the use of computers in accounting courses.

Bhaskar 1982 presented a classification of the major types of computing that have been incorporated into accounting courses. Three ways in which computers may become involved in accounting education are as follows:

(1) Computer science (SC);
(2) Computer as a computational tool (CCT);
(3) Computer-Aided Instruction (CAI).

Briefly, the aim of the first category is to learn about the computer itself and the computer as an information-processing tool. In the second phase, the aim is to learn more about certain techniques such as mathematical programming or financial management, where the computer is simply used to perform a complex calculation. But in the third category the aim is simply to learn the generic term, CAL (Computer-Assisted-Learning), is sometimes used to cover both the above areas (second and third). Bhaskar gave more definitions for the above categories at greater length.

Computer science refers all aspects of computing, including both hardware and software, and of course all levels from an elementary introductory course in computer programming to highly advanced subjects such as systems programming and computer design.

Accounting courses should therefore make sure that the student gains an understanding and appreciation of the capabilities of the computer, what computers can do, what they can do well, what they do badly and what they can not do at all. Even though for many accounting students, only the elementary aspects of computing will be covered, it is still appropriate to term the subject "computer science" since the object of study is the computer.

Computer-Aided-Instruction (CAI) refers to the use of the computer as the medium of instruction. The most common form of computer-aided instruction is where the student sits at a computer terminal and interacts with a computer program-typically the program displaying questions and the student keying in responses. The computer plays the role of a teacher and may teach, test and monitor the performance of a student.

CAI often assumes that students have read the relevant material in a textbook and or attended a lecture on the subject, prior to beginning work on a terminal. The computer through a series of questions and answers, would present exercises and problems to the student, and would provide sophisticated a diagnostic aid when a student did not answer a question correctly. Additional questions can be automatically given in areas where the student is weak.

A considerable amount of research has been conducted in recent years on the effectiveness of computer-aided instruction (CAI). CAI packages help students become active learners instead of passive sitters, test takers, and clock-watchers. They are inspired to excel and become passionate about learning, not only for today, but also for life, which is indispensable for success in the workplace, and in the community (http://www.ca.gov/gov/gcit/it_cal.html). When CAI is used in education it provides equal learning opportunities for all students if they have access to the technology in and out of class. Prior research studies (Groomer, 1981; McKeown, 1976) have focused on comparing the performance of students instructed by CAI with that of students instructed by various other methods of instruction (e.g., lecture or programmed text). Abraham et al., (1987) compared the performance of students completing a computerised practice set with those students who did not. The research findings have been inconsistent and inconclusive. CAI has been found to be more effective, less effective, and equally effective as other methods (Ahadiat, 1992).

In 1990, four computer-based instruction (CAL) packages dealing with material taught in introductory and intermediate accounting courses were introduced in the UK. In an attempt to determine how and whether this new CAL material may be effectively integrated into accountancy courses, an experiment by Sangster (1991) was conducted at Aberdeen University in 1991 using a commercial package(the PEER statements of standard accounting practice (SSAPs) from Systems Dynamic Ltd) with second year accounting students. The package was used in two ways to supplant lectures on four SSAPs (i.e. it was the main source of reference and no lectures were provided), and to support lectures on the other five (students had open access to the software and could use it to add to the material given in their lectures). This experiment reported that no significant difference was found between student performance on the SSAPs taught supplantively and those taught supportively; nor was any significant difference found between the performance of those students who had used PEER supportively and those who had not; nor did the time spent using a module drop significantly when it was a supportive one

Computers as Computational Tools (CCT) is used here to describe the very wide area of computer applications in education which fall between the two extremes above that is cases where the computer is neither solely the object of study nor solely the medium of instruction. CCT activities use the computer as a computational technique in order to facilitate teaching a particular technique usually requiring a complex calculation, for example, in mathematical programming and budgetary simulation models.

The logical distinction between CAI and CCT is clear. The use of computers is to solve linear programming problems is an example of CCT for the subject of linear programming is logically separate from that of computers. However, in practice the computer has become such an efficient method for processing large quantities of information that is difficult to separate the subject of designing of large scale information systems from that of computing. Hence, it is probably realistic to classify the whole area of design of information systems as computer science.

Having defined three types of computer usage in the accounting educational process it is expedient to illustrate these uses with actual examples and learn of academic experience in using these innovative educational techniques.

Computers as Computational Tools (CCT)

The bulk of the literature corresponds to this type of teaching activity. A brief chronological summary of the literature now follows: Chambers et al (1971) developed a strategic planning model to allow students to experiment with dividend and financing policies. Lampe (1971) concentrated on financial accounting (depreciation provisions, bad debts and valuation of inventory) cost accounting (standard costing and price level adjustments) auditing and tax applications. Sale (1972) used comprehensive budget simulation models as teaching devices.

The use of computerised budgeting examples allows a greater number of parameters and variables, the incorporation of production and credit policy and involvement in the input assumptions. Sale (1972) in arguing for the use of (computerised) financial simulation models in accounting education advanced three reasons for the use of models in the real world:

(1) Provide a suitable method for studying the behaviour of the budgeting system under a variety of conditions;

(2) Provide insight into the interrelationships of the variables included in a budgeting system;

(3) Provide a valuable tool for experimentation with alternative sets of values for the decision variables included in the budgeting model.

A second paper concerning the PLATO IV systems was that by Burton et al (1978) and it dealt with the generation and administration of examinations on interactive C systems. There are several prerequisites for the use of computers in accounting courses. The use of computers must be properly integrated into a particular courses with teaching software, student notes, exercises and staff notes. Courseware is a new name has been given to the combined teaching package and material (Bhasker, 1983)

Computers may become involved in accounting education in three main ways. These are (Kent and Linnegar, 1988):

1-Computer science

2- Computer assisted learning and computer assisted instruction

3- Computer managed learning

The term computer science covers all aspects of computing including hardware, software, elementary introductory courses in computer programming, systems programming and computer design. In this case the object of the educational process is the computer itself (Bhaskar, 1982).

Computer assisted instruction and computer-assisted learning are sometimes used interchangeably in the literature although some authors perceive subtle differences in meaning. Rushby, (1979) defines both as teaching with the aid of a computer. Computer assisted instruction (or computer aided instruction) is a near synonym for computer assisted learning. Computer assisted instruction has different connotations in Europe where it can imply tutorial computer assisted learning whereas in Northern America it is used as a general description. Computer assisted learning is the term most commonly used in the UK. One form of computer assisted learning is where students use the computers as a calculator to reduce arithmetic calculations (Rushby, 1979).

Computer managed learning is defined as the use of the computer to assist teachers or administrators with routine management tasks in teaching and learning, such as assessment, guidance, record keeping and reporting. The computer is used to direct the students from one part of the course to another and the learning materials are not kept in the computer. A variation with computer assisted learning is that the learning material is presented to the students through the computer.

Bean and Medewitz, 1987 decided in their study that most but not all felt that the university should assume an active role. One recommendation was an accounting graduate should be required to have an extra semester of credits just devoted to computer courses. Another expressed the view that computers should be implemented into all accounting programs.

Accountants should have experience in writing or developing accounting related programs in several languages. It is very important to teach the students how computers and software are applied to accounting. Another recommendation that accounting control relies on systems and accountants too often do not comprehensively understand how an EDP system works.

Most of those commenting emphasised the importance of microcomputers. In general they indicated that developing microcomputer skills should be part of accounting education.

As expressed by Bean and Medewitz accounting students should have a good understanding of the microcomputer and have in -depth exposure to accounting spreadsheet programs. Another recommended is that PCs should be used in most courses after intermediate level: some homework should be done on spreadsheets. In addition to micros, several also emphasised the importance of mainframe and

minicomputers. As expressed by one respondent in Bean's study is that the ability to understand and to audit a mainframe or mini-based accounting system is essential.
The largest numbers of comments were about microcomputer software. Spreadsheet software was cited most often. But accounting, database, and word processing software were also frequently mentioned. A typical comment was that all accounting students should have at least one course devoted to the use of software on micros; emphasis of hands-on experience would provide students with a realisation of the wide range of applications available. Several recommended special courseware in off-the-shelf packages and user programming languages which do not require COBOL knowledge. Another recommendation was to emphasise the ability to evaluate the merits of software packages; i.e., what are the user's requirements, will the software meet those requirements, is there ease in input, what printouts can be obtained, etc.
Opinions on the importance of programming were the most diverse. Some felt that programming skills were not important, A typical comment from this group was: "programming is not necessary- FORTRAN, COBOL, or BASIC. An accountant needs to know how to use software packages." Others felt that proficiency in programming is an important part of an accounting student's education .One recommendation was "a two-semester course in programming a high -level language should be mandatory".
To summarise, the respondents agreed that computer skills are important in their professional work but had a diversity of opinion as to the most appropriate means of achieving those skills. Some felt that computer skills should be an important component of the university education while others felt that a university education should concentrate on the traditional skills and leave the acquisition of specific computer skills to be learned after graduation.

Bhaskar's study (1983) presented three levels for usage the computer in accounting syllabuses:
Level 1 small usage of computer (teach computer programming)
Level 2 medium usage of computers (statistical forecasting routines)
Level 3 large computer usage (financial modelling, financial reporting systems, a business game, a mathematical programming package a statistical forecasting package)
A variety of possibilities for course focus and emphasis were considered, ranging from complete emphasis on programming, flowcharting, and coding, to an emphasis which

focused primarily on case studies selected to develop a theory of application; however, no specific emphasis was recommended as the preferable one (Bhasker, 1983)

Er and Ng (1989) replaced the categories presented by Bhasker (1982,1983) with seven categories: computing (comp); computer simulation and modelling (CSM); decision support (DS); business application (BA); mathematical programming (MP); accounting information systems (AIS); and computer-aided learning (CAL).

Computing (COM):

The term computing is narrower than computer science in the sense that it covers a small subset of subjects in computer science. It used generally to refer to the studies of basic skills for programming the computer to perform information-processing tasks. Subjects included in computing are: computer programming, computer systems, data structures, data processing, operating systems, compilers, computer networks and data communications, computer graphics, database management systems, and fourth generation programming languages. Excluded is the theory of computing and the semantics of programming languages. Artificial intelligence, expert systems, parallel computing analysis and complexity of algorithms, VLSI design, functional and logic programming, super-computers, and other advanced topics.

Computer Simulation and Modelling (CSM):

Computer Simulation and Modelling (CSM) can refer to a wide variety of topics involving simulation and modelling with computers. But in the present context it refers to simulation and modelling of firms using quantitative, statistical and probabilistic techniques with computers.

Decision Support (DS):

Decision Support (DS) refers to the use of accounting information for management decision making. It covers cost-volume-profit analysis, sales forecasting, investment appraisal, cash-flow analysis, variance analysis, and decision under uncertainty. The general paradigm is to use the "What If" technique involving changing values of parameters subject to certain constraints. It is more convenient to use computers to do recalculations than not, but the emphasis is more on the understanding of the techniques.

Business Appreciation (BA)

Business Appreciation refers to the need to understand in an integrated manner complex business decision making and how it affects and is in turn affected by the market. For instance, how much money should be spent on advertising, production, plant, and machinery, personnel, research and development? And how much should be borrowed from banks? Because of the difficulty in controlling the environment, the studies are normally carried out through management and business games using simplified models of the economy. Obviously, a computer is needed in order to achieve fast response.

Mathematical Programming (MP)

Mathematical Programming generally refers to optimisation subject to constraints in the business and the production contexts. Topics included are:

Linear programming, operational research, econometric techniques, dynamic programming, non-linear optimisation. A computer is generally used because of tedious repetitive calculations.

Accounting information systems (AIS)

Accounting information systems refers to computer-based information systems for processing accounting data. Topics included are sales systems, accounting systems (sales ledger, purchasing and nominal ledger, payroll system, etc.), and budgeting and costing systems. Generally speaking, accounting information systems are straightforward implementations of manual systems, with built-in controls.

Computer-Aided Learning (CAL)

Computer-Aided learning (CAL) refers to the use of the computer as the medium of instruction for assisting the reader in a learning process, as opposed to static painted texts and pictures. Because of its computational flexibility, a computer can be programmed to generate extra remedial lessons and exercises to assist weaker students who make repeated mistakes in some particular areas. In theory, all written texts and lectures can be turned into CAL lessons, but the real challenge is to make use of the hypertext facilities to create animated and interactive lessons. A research problem in this area is how to program a computer to understand the mistakes made by students so those relevant remedial lessons can be automatically generated to suit the needs of individual students.

Collier; et al, 1990 modified Bhaskar's classification as follow:

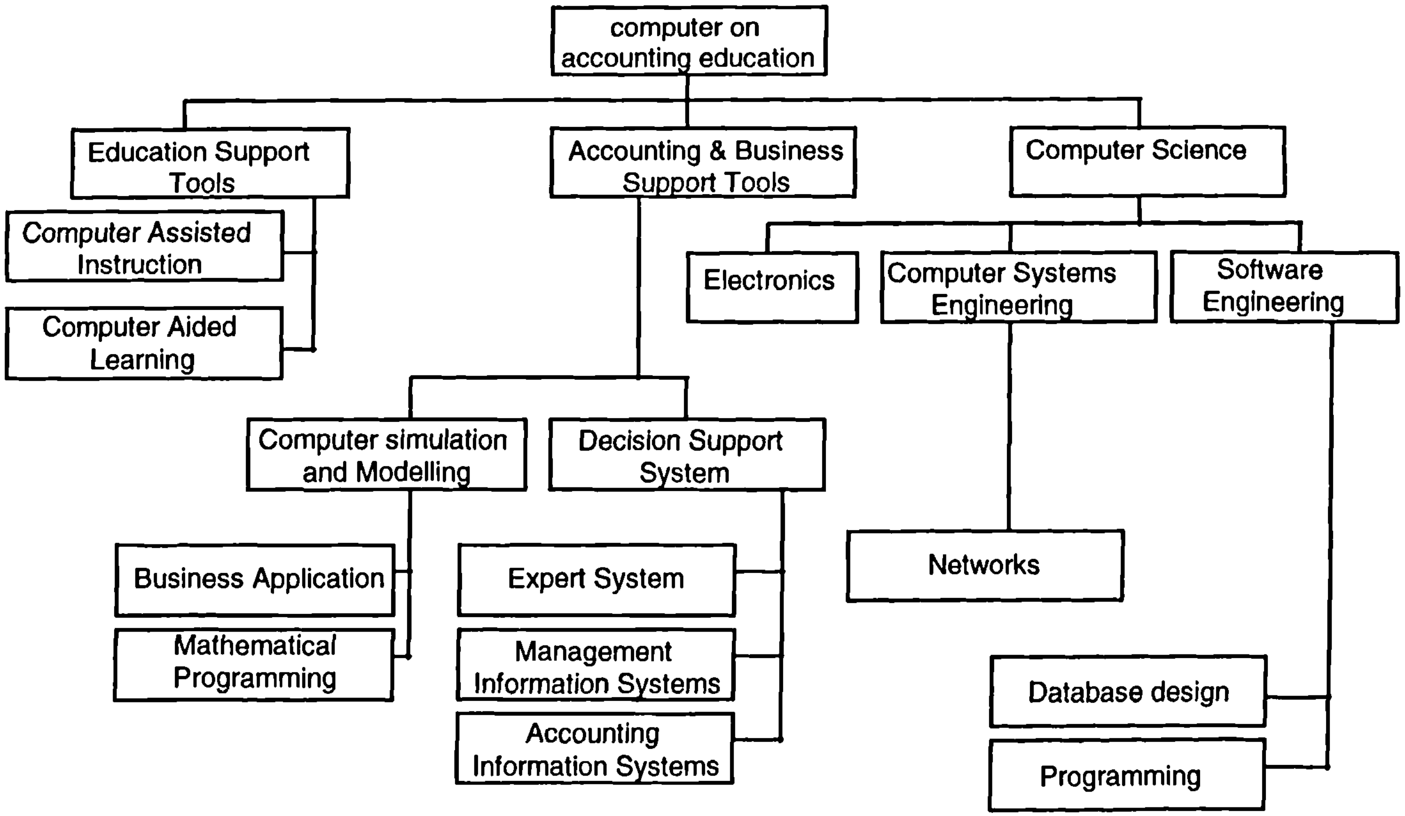
1- Education Support Tools (previously CAI),

2- Accounting and business support tools (previously CCT), and

3-Computing Science.

Further subdivisions of these categories are possible and examples are illustrated in figure 3-2:

Figure 3-2 Integrating Computers into Accounting Education



Impact of computers on accounting education

1- Educational support tools

  1-1 Computer assisted Instruction

  1-2 computer aided Learning

2- Accounting and business support tools

  2-1 computer simulation and modelling

    2-1-1 Business application

    2-1-2 mathematical programming

  2-2 Decision Support System

    2-2-1 Expert system

    2-2-2 Management information systems

    2-2-3 Accounting information systems

3- Computer science

  3-1 Electronics

  3-2 Computer systems engineering

    3-2-1 Networks

  3-3 Software engineering

    3-3-1 Database design

    3-3-2 Programming

Kent and Linnegear (1988) presented another category as follow:

1- Computer Science.

2- Computer assisted learning and computer assisted instruction.

3- Computer managed learning.

The term computer science covers all aspects of computing including hardware, software, elementary introductory courses in computer programming, systems programming and computer design. In this case the object of the educational process is the computer itself (Bhaskar, 1982).

Many computer assisted learning systems also carry out some management function while some computer managed learning systems present tutorial information which would usually be associated with computer assisted learning (Ruhbly, 1979).

Computers are being introduced and used in a wide range of accounting courses. Some literature deals with how computers should be used in different courses such as financial accounting (Vickers and Gallagher, 1993)), intermediate courses (Marriott and Mellett, 1994; Chandler and Marriott, 1994; Marriott, 1992), information systems (Shaoul, 1990; McCombie and Sangster, 1993; Alexander, 1996; Meer and Adams, 1996; Guinn, 1988, cost accounting (Shaoul, 1991) and auditing (Guinn, 1988)

3-5 THE USE OF COMPUTERS IN INTERMEDIATE COURSES

The American Accounting Association presented a study with regard to how computers can be used in financial accounting courses (AAA, 1985). The microcomputer should be introduced into the elementary, intermediate, and advanced accounting curriculum as a tool that helps students learn accounting concepts and problems in ways that would not be possible without the computer. In this role, the computer may naturally integrate into the financial accounting curriculum as a tool rather than as an end object in. The proper focus on the issue of integration is not the microcomputer, but rather the financial accounting course structure and content. Other courses within the accounting curriculum or within the curriculum from other academic departments may be used to present a computer science approach to micro computing. For example, accounting systems courses may include a large variety of microcomputer-based exercises or case studies. Different objectives exist for these courses and the integration of the microcomputer into these aspects of the curriculum must be based on specific objectives selected for those courses.

3-6 COMPUTER APPLICATIONS IN ACCOUNTING EDUCATION

Professionals and educators have supported and encouraged the utilisation of computer applications in accounting education. Several accounting microcomputer-based case studies (e.g., Dickinson et al, 1986; Holt, 1990; Mantabe and Asplund, 1992), and simulation packages (Arens et al., 1990; Carter and Watt, 1990; Hearing and Gronholm, 1992; Klooster and Allen, 1990) have been developed during the past few years. Computerised case studies are designed to test and reinforce students' comprehension of the accounting cycle. Simulation packages are designed to simulate components (inventory, payroll, receivable, payable, internal control, etc.) of the computerised accounting system, and to expose students to computerised accounting procedures (Roufail, 1995). In addition to the computerised case studies and simulation packages, accounting educators use spreadsheet applications.

3-7 Use of the accounting practice set general ledger accounting:

The use of a computerised Accounting Ledger Packages (ALPs) as part of an accounting degree and as professional education is now very common in the UK. The need to introduce ALPs onto both the degree and professional courses was recognised for two main reasons: (Vickers and Gallagher 1993).

Firstly, the need for students to gain experience of situations that they would meet in their later work life. Secondly, to ensure that students were able to put theory into practice and to give them an appreciation of the implications that computers have for the processing of accounting data.

The general ledger accounting package requires input of a variety of transactions and produces output of financial statements. Several presently available practice sets are constructed around this general ledger logic. Most practice sets require manual records of input so time spent at the keyboard is minimised (AAA, 1985). General ledger packages are widely used by many businesses. ALP's (Accounting Ledger Packages) have been in existence for quite a long time as a means of introducing undergraduate students to computerised accounting systems (Davies, 1997). A critical pedagogical issue, however is the objective of its use in the accountancy curriculum? Does the use of a computerised practice set or general ledger program help students understand the accounting cycle, or is the use of a microcomputer justified because it introduces students to a form of micro-computing they may meet after they complete their undergraduate program? Would a manual practice set result in the same, or greater, level of student knowledge of the accounting cycle? The costs of these computerised general ledger programs are quite significant and additional research is needed to determine if the costs in financial terms and student time are justified (AAA, 1985).

Packaged computerised practice sets or what is called computer assisted accounting simulation (CAAS) prepare the students for today's real world in which the computer has become a necessary management tool. The students will be more willing and able to make effective use of the hardware and software available to facilitate employment tasks.

Abraham et al (1987) reported on a controlled study conducted to determine the benefits of a Computer Assisted Accounting Simulation (CAAS) in an introductory accounting course. Benefits were categorised using three criteria of performance, effort, and attitude. The findings of this study indicated that the use of a CAAS results in a positive change in attitude towards accounting. Early introduction of a CAAS may help to reduce the role of attrition that presently occurs between compulsory introductory accounting courses and optional upper-level courses. Roufaiel (1995) presented a comprehensive practice set that demonstrates the integrative nature of the accounting cycle in the microcomputer environment. This set was called the Financial Accounting Computerised Tutor (FACT) which focused on the conceptual analysis of the accounting transactions from the inception of a company to preparation of the classified financial statements.

3-8 THE USE OF SPREADSHEETS IN TEACHING ACCOUNTING SUBJECTS

A spreadsheet package contains the electronic equivalent of a calculator, a pencil, and a large piece of paper, which is referred to as a worksheet. The worksheet is really a large matrix of columns and rows. Electronic spreadsheet programs are widely used in accounting practice and are being introduced rapidly into the classroom. Spreadsheet packages provide a user-friendly tool for modelling and are commonly used in practice; many practitioners in accounting rely daily on the PC and spreadsheet software to produce and to analyse management information (Chandler and Marriott, 1994). The accounting profession has been significantly affected by computerisation applications. The spreadsheet is one application that is in general use and offers significant advances in the workplace. Smith (1992) suggests three potential advantages of using a spreadsheet approach in accounting education:

1- Spreadsheet model development will be able to replace computer programming within the accounting education curriculum;

2- The student will learn and apply a wide range of skills within a practical accounting application area, which is actually used in practice;

3- The education establishments can take a lead in the teaching of spreadsheet development methodologies, which is required in the real world

Most employers now expect graduating accounting majors to have basic skills in preparing and using electronic spreadsheets. For example, Heagy and McMickle (1988) surveyed 122 CPAs and 172 accounting academics to define which computing knowledge and skills they considered to be important or unimportant in accounting education. Accounting practitioners ranked the ability to use electronic spreadsheets as second in importance out of 59 possible topics. Many accounting academics have been reluctant to incorporate spreadsheet training into the accounting curriculum. Spreadsheet applications are designed to familiarise students with the well-established electronic spreadsheet technology, and its use in financial accounting (Michelman, 1992; Smith, 1990), managerial accounting (Michelman, 1992; Smith, 1993), intermediate accounting (Meddaugh, 1986; Smith, 1992), and accounting information systems (Maher, 1993; Alexander, 1996). Roufaiel (1995) classified spreadsheet applications into two subcategories:

(A) The pre-programmed type that requires students to finish a spreadsheet model that has been partially started. The Pre-programmed spreadsheet type is suitable for accounting courses that do not require extensive knowledge of spreadsheet programming. This type of application is useful in reinforcing some accounting principles and in utilising the "what if" capabilities of the spreadsheet technology.

(B) The model building type which requires students to construct the spreadsheet model from start to finish. The model building spreadsheet type is more appropriate for higher level courses that require system design with an emphasis on computer programming. Electronic spreadsheets are relatively easy to learn and provide the utmost in flexibility to a wide range of financial accounting problems (AAA, 1985). Students may use previously prepared templates or may be required to begin with a blank spreadsheet. If blank, the electronic spreadsheet logic may require that students completely understand the analytical relationships of the accounting issues in order to specify the equations necessary to complete the spreadsheets. The biggest advantage of the electronic spreadsheet is its adaptability to additional what-if questions, which require consideration of alternatives. The computer performs the computations after the initial financial model or worksheet is derived. Students have the capability of seeing the outcomes of many different variations and have the opportunity to judge alternatives based on economic or other consequences.

Wu (1984) attempted to show that the use of electronic spreadsheet software (ESS) in teaching managerial (cost) accounting could accomplish two objectives. First, students' learning can take place more effectively since ESS requires students to think analytically. The construction of accounting procedures in ESS and simulation through the constructed procedures in ESS make it mandatory that students understand the logical relationships underlying accounting procedures. ESS makes simulation easy to understand as well as to apply. Second, accounting schools can produce more marketable graduates. If accounting schools are responsible for preparing students to enter the accounting profession, then they can no longer teach students using only traditional manual accounting procedures. The second objective is a logical consequence of the first objective.

A great part of managerial (cost) accounting is procedure-oriented and can be taught more effectively using electronic spreadsheet software, because this software lets students learn the mechanical procedures in a dramatic way within a shorter time period, thereby enabling them to think more analytically (Thomas, 1983)

A few words about ESS are necessary to enable understanding of the subsequent presentation. An ESS is a set of application programs which transforms a microcomputer screen into a large ledger sheet, By simulating the rows and columns of a ledger sheet, the ESS allows a user to work with a large number of interrelated values on an electronic ledger sheet and not store the ledger sheet in computer-accessible files.

The greatest advantage of using an ESS is that when a user changes a given value on a spreadsheet, the ESS automatically recalculates any affected values in seconds. This advantage enables accountants not only to shorten the tedious process of preparing accounting ledgers and reports, but also to ask as many "what-if" analytical questions as the number of assumptions they have in preparing those financial reports. In summary this feature of the ESS transforms the accountant's singularly tedious, repetitive, and error-prone drudgeries into analytical challenges. Simulation is a powerful analytical tool, which, under the traditional manual accounting procedures, is difficult to apply. ESS makes simulation easy to understand as well as to apply.

Togo (1992) presented a spreadsheet approach to stochastic financial modelling. Alexander (1996) used spreadsheets to teach systems designs. Chandler and Marriott (1994) used spreadsheet models in teaching management accounting. Marriott and Mellett (1994) introduced spreadsheets into an intermediate financial accounting course. Marriott (1992) studied the effectiveness of using spreadsheets to teach financial accounting. McKeown (1976) presented a discussion of the objectives of the project for computer assisted instruction (CAI) which was developed at the University of Illinois at USA which is called PLATO IV (Programmed Logic for Automatic Teaching Operations)

Groomer (1981) presented the results of a study which undertakes to evaluate whether the PLATO time sharing system and the introductory accounting modules residing on this system are an effective tutorial medium for introductory accounting.

3-9 THE USE OF CD-ROM IN THE ACCOUNTING CURRICULUM

The introduction of CD-ROM technology is having a dramatic effect on the accounting practice environment, as witnessed by the number of CD-ROMs that index tax, auditing, and accounting rules. Some CD-ROMs are for internal use by members of the firm that developed them, and others are available for purchase. In addition, most university libraries now subscribe to CD-ROM indexes for business periodicals and government documents (Paquette.and Schwarzbach, 1991).

Consider the following developments in accounting applications on CD-ROM:

- Arthur Andersen and Price Waterhouse are supplying auditors with CDs for tax, auditing, and accounting rules.
- The AICPA is using them to provide data to members
- Tax services provided by Matthew Bender and West Publishing are now available on CD-ROM (for a detailed review of Matthew Bender's search of the Master Tax Library, see Cassill, 1990) .
- A CD-ROM version of NAARS (National Automated Accounting Research System) which is part of Lexis and Nexis is being developed in conjunction with the AICPA.
- Lotus development offers CD/corporate and CD/Newsline.

In addition, many companies are now using CDs as a distribution medium for software. For example, GO System, which is a in-house tax preparation package, uses the CD-ROM delivery method (Paquette and Schwarzbach, 1991).

Brown and Philips (1990) provide a listing of specific databases currently on CD-ROMs that would be of interest to accountants.

There are studies that have tried the use of optical media CD-ROM databases for storage and distribution into the accounting curriculum as a way for keeping students abreast of new Information Technology. For example, (Paquette and Schwarzbach, 1991). Where the authors used CD-ROM in introductory and intermediate accounting for searching in the financial database about financial ratios for a given company. They used the CD-ROM in the auditing course such as for analytical review. The use of a financial database package in accounting curriculum can be extremely beneficial. One reason for integrating this material into the curriculum is to provide some insight into the potential of CD-ROM technology and how it is having impact on the field of accounting. A second reason is to provide the students with an opportunity to work with a database (Paquette and Schwarzbach, 1991). Shaoul (1991) presented a study in the use of database for teaching management accounting.

3-10 Expert system in accounting education:

Accounting academicians and practitioners have discussed expert systems (ES) in accounting for at least a decade, and expert systems were in fact the first application of artificial intelligence (AI) in accounting and business; preceding both neural nets and robotics. (White, 1995).

Expert systems have been used to assist with decision making in all accounting domains in practice, including tax (Brown 1988, 1991), auditing, (Brown and Murphy, 1990; Brown, 1991; Brown and Phillips, 1991), and management accounting (Brown and Phillips, 1990, 1995; Sangster, 1995). Accounting tasks that have been suggested as being suitable for expert systems development include external auditing (Etheridge and brooks, 1994), internal auditing (Sriram, 1992), Governmental accounting and auditing, and tax accrual and planning (Foltin, 1994; McDuffie et al., 1994). One of the biggest areas of expert systems development is in external auditing. Expert systems are developed and used by public firms to plan audits (Baldwin-Morgan, 1994), assess risk, evaluate loan loss reserves (Willingham and Ribar, 1988), determine disclosure compliance, recommend audit sample sizes, predict bank failures, account for foreign currency transactions, apply SEC regulations (Brown, 1991), and evaluate internal control (Brown and Murphy, 1990). Taxation is another domain with much expert systems development. In tax, expert systems are used for corporate, international and individual tax planning, tax-exempt status maintenance, compliance checking, uniform capitalisation, tax issues concerning preferred shares, and resident alien status questions (Brown, 1991)

On the financial front, accounting firms use expert systems to provide personal financial planning to individual clients (Phillips et al., 1990). The state bank of New South Wales, Australia, uses an expert system to assess loan applications (Zawa, 1994). Expert systems are also used in management and management accounting. Some companies use expert systems to provide personal financial planning assistance for their employees (Phillip et al., 1990).

There are general papers discussing integrating expert systems into accounting education for a different purpose: teaching accounting students about expert systems

concepts and practices (Dorr et al, 1988; Hatherly and Frasser, 1988; Sangster, 1991). Using expert systems to teach accounting as expert tutoring systems (Booker and Kick, 1987; Eining and Dorr, 1991; King and McAulay, 1989; Murphy, 1990). Using student development of ES as a learning tool (Peek, 1991; Sangster and Wilson, 1991). Testing the effects of ES use student performance (Boer and Livnat, 1990). With just a PC or MAC, a range of expert system shells can now be obtained with adequate power and flexibility for a wide variety of systems to be developed and operated. (Lymer, 1995)
As information providers, accountants must interact with expert systems used for both accounting and non-accounting tasks in the financial domain. (Brown et al., 1995).

Expert systems are computer programs that emulates the output of an expert (Sangster, 1995). Expert systems are computer systems that imitate the thinking processes of human experts in order to solve problems in narrow domains (AICPA, 1987). Expert systems store and interpret human expertise and which are used to give advice and reach decisions in the light of evidence given to them in much the same way as human expertise would be consulted (Jackson, 1992). The purpose of developing expert systems is to have expertise available even when the human expert is not. Expert systems are one of the technological vehicles underpinning the changes in the profession, and we need to ensure that our graduates are equipped to deal appropriately with this technology when they encounter it in the workplace. If we fail to introduce them to the technology, we shall be failing in our duty to prepare them for their future (Brown et al, 1995). Sangster (1991) suggested that it was time the academic community recognised that a need existed to include expert systems in accounting education.

The use of expert systems in accounting can be regarded as a logical step to extend the capabilities of decision support systems, especially in the areas of audit, taxation, financial planning, regulations and risk assessment (Er.and Ng, 1989). Of course, there are reasons to integrate expert systems in accounting education, such as: Lymer (1995) to teach evaluation of internal control mechanisms (Dorr et al., 1988); to analyse classification of leases into capital or operating (Böer and Livnat, 1990); to aid teaching of standard costing to professional students (King and McAulay, 1991); to aid learning about Accounting Standard applications (Sangster and Wilson, 1991).

The evidence supporting the importance of integrating this branch into accounting curriculum according to Sangster (1995) is as follows: -

Evidence from Industry; Hayes-Roth and Jacobstein (1994) found expert systems to have the highest rate of diffusion among several advanced automation technologies they studied, and that the dominant domain in which expert systems developments were occurring was finance. In the UK, approximately 25% of expert systems activity reported by Department of Trade and Industry in 1992 were accounting-related (Touche Ross, 1992). The latest annual Information Technology Review from Price Waterhouse (1995) reported a 10% level of expert systems use among companies in their annual UK survey of emerging technologies, and 22% of the IT directors surveyed were seriously considering use of expert systems in their companies. The major banks and credit card companies are all significant users of expert systems.

There is ***evidence from the profession***; where, all the major accounting firms are users and developers of expert systems. The Institute of Chartered Accountants in England and Wales recently published Expert systems, A Perspective for Accountants (ICAEW, 1994) in which they state:

"Expert systems offer high-value benefits. The scope for their application is wide-spread, and covers many facets of professional expertise". (P.43).

The International Federation of Accountants (IFAC), in their 1992 Publication, *"The Impact of Information Technology on Accountancy Profession"*, refer to expert systems as having great potential advances for accountant interpreting legislation and regulations. And in their Discussion Paper, *2000 and Beyond*, IFAC state that:

"In any consideration of the education and training of future professional accountants, consideration must be given to the implications for their profession of the accelerating developments in the area of information technology. Such developments prescribe a new approach to professional accounting education and training. This will require that the latest tools and techniques of high technology be integrated into the professional pre-qualification education, training and lifetime learning of the future accountants". (P.5).

There is also evidence from ***accounting education***; CPAs trained today will practise in a much wider information area than in the past, and curriculum requirements must reflect this. Audit technology will adopt many methods being developed in the study of human information processing and artificial intelligence (Elliot, 1986). An introductory AIS course should include, among other things, coverage of expert systems for accounting (Black and Costandi, 1988). Students should be provided with hands-on experience of a number of applications, including decision support and expert systems software (Bagranoff, 1993). One objective of accounting education should be educating future accounting professionals who *"understand the current and future roles of information technology in organisation"* (AECC, 1990b, P 308)

Expert systems are likely to become as integral to most accountancy degree as spreadsheets and databases are now (Sangster, 1991). There are three broad approaches which can be adopted when including expert systems in accounting education: (Sangster, 1991)

1- Provide accountancy students with a general module on how to use expert systems- the equivalent of providing a module on spreadsheets;

2- Provide accountancy students with a module that uses expert systems in order to teach or reinforce some aspect of accountancy - the equivalent of using spreadsheets in the teaching of consolidations;

3- Provide accountancy students with a specialised module related to accountancy and incorporating expert systems theory, case study analysis, and hands-on exposure to the software.

Components of expert systems:

Most expert systems have four common components, a knowledge base, an inference engine, a user interface, and an explanation facility. The knowledge base is the component that contains the expertise or knowledge elicited from the expert(s). The inference engine is a computer program that uses the knowledge base to solve a problem. Essentially, the inference engine finds the knowledge bases that are appropriate for solving the problem and uses them to find a solution (AICPA, 1987). The user interface refers to the way the expert systems and the human user communicate. The user gives facts about the issue in question to the inference engine using the user interface. The inference engine communicates the problem solution to the user. An explanation facility explains to the user why certain information is requested or how a solution has been reached. An explanation facility will provide the user with more confidence in the system. It can also help the user gain expertise about the domain from the expert system (AICPA, 1987).

Kinds of expert systems:

There are three kinds of expert systems:

1- Rule-based expert systems: where the majority of accounting expert systems are rule based. The knowledge of the human expert(s) is recorded in the knowledge base as facts and rules. (Morgan, 1995). These rules are often in the form of *IF...THEN* statements (AICPA, 1987).

2- Frame-based expert systems; where some expert systems represent knowledge using frames rather than rules. Frames associate an object or concept with a set of characteristics (e.g. values, facts, rules, etc.) (Morgan, 1995). Each characteristic is stored in a slot. A frame is the group of slots associated with a specific object. A frame is somewhat analogous to a record, in database or programming terms (Harmon and Sawyer, 1990).

3- Case-based reasoning; where case-based reasoning uses past experiences in the way that humans use experiential reasoning to solve complex problems (Morgan, 1995). This type of expert system is most appropriate when little evidence is available or information is incomplete. The case base is made of a set of cases. Each case contains information about its situation, its solution, and the results of that solution and key attributes. Case-base reasoning is particularly suited for application to accounting principles derived from prevalent industry practices, auditing, compliance accounting and management accounting. Commercial case-based systems have been developed for financial credit evaluation, bankruptcy prediction, credit evaluation, real estate property appraisal (Gonzalez and Laureano-Ortiz, 1992), bidding for manufactured products, and fraud detection (Brown, 1994)

3-11 Artificial Intelligence and accounting education

The American Institute of Certified Public Accountants (AICPA) provides practical definition of artificial intelligence as follows:

"A set of techniques whose processes give computers the human-like abilities to see, hear, speak, reason with imprecise or incomplete information, and learn" (1987, p.1)

The artificial intelligence abilities of reasoning and learning have the most interesting potential for accounting applications. Currently, the forms of artificial intelligence most likely to have an impact on accountants are expert systems and neural networks. (Morgan, 1995)

Artificial intelligence is becoming a more common technology, with commercial applications in the accounting domain. Where, the development and use of artificial intelligence technologies continues to expand in accounting practice, industry and government? (Morgan, 1995). Artificial intelligence is also used by governmental entities. A California county government uses an expert system to determine eligibility of applications for welfare benefits. A similar system was developed for the state of Pennsylvania (Schwartz and Treece, 1992).

Many accounting tasks require expertise to form opinions about complex information, both numeric and symbolic (Borthick, 1987).

Therefore, accounting educators should move towards integrating artificial intelligence topics into the accounting curriculum so that students can begin learning about artificial intelligence and are exposed to its features and potential before reaching and encountering it in the workplace. How should it be integrated in accounting education? Morgan (1995) presented four steps that can be followed to integrate artificial intelligence into the curriculum.

Initially, accounting educators must recognise the need for artificial intelligence integration, that is, the need for future accountants to become familiar with artificial intelligence. Secondly, educators must become aware of artificial intelligence. One of the biggest barriers to change is the lack of accounting educators' knowledge about artificial intelligence. Thirdly, knowledgeable professors and departments can then intelligently implement appropriate changes to the accounting curriculum. And lastly the knowledge that enlightened professors and the changes in the curriculum will affect student knowledge and awareness of artificial intelligence.

How to integrate Artificial intelligence and expert systems into accounting education:

One reason some instructors have been slow to integrate artificial intelligence and expert systems topics into their courses may be that they feel unsure where to begin (Baldwin-Morgan, 1995). The two most common involve having students ***USE*** an expert system and having students ***BUILD*** an expert system (Baldwin-Morgan, 1995). ***USE*** of expert system by students will give them a basic understanding of the technology and of the expert system's task. ***BUILDING*** a simple expert system carries the added bonus of providing a deeper understanding of both the technology, the task requirements, and problem-solving skills. Students who build an expert system also gain some understanding of the process of system development (Bardwin-Morgan, 1995). Expert systems have been introduced in different accounting courses. Böer and Livant (1990) demonstrated the use of an expert system project to teach intermediate accounting students how to classify capital or operating leases. Böer and Livant (1990) concluded that expert systems tools could be an effective teaching aid. Sangster and Wilson (1991) described an expert system (using *VP-Expert*) for accounting for business combinations. Booker and Kick (1987) developed an expert system for use in intermediate accounting using Expert Ease. Their article describes the development process in detail. There are other expert system developments in financial accounting. Hatherly and Fraser (1988) discussed the development of an expert system for classifying inter-company investments. Böer and Livant (1990) suggest other financial accounting topics that may be appropriate for the use of expert systems use, such as earnings per share, accounting for pensions, foreign currency translation, business combinations and accounting for deferred compensation. There are attempts to use expert systems in management and cost accounting. King and McAulay (1991) developed an expert systems to support the learning process in management accounting. The knowledge area encompassed in the system was standard costing. French and Flesher (1987) suggest that tax educators must prepare for the impact of expert system on tax education. Bouwman and Knox-Quinn (1995) had Masters students in taxation build simple expert systems. As well, McCarthy and Outsly (1989) presented an analysis of the applicability of artificial intelligence techniques to problem-solving in taxation domains. The students improved not only their knowledge about the tax subject, but also their problem solving skills. With regard to integrating expert systems in accounting information systems Black and Costandi (1988) suggested that expert systems in accounting should be a topic covered in the accounting information systems class. White (1995) mentions seven methods for integrating artificial intelligence into an accounting information systems course. This course is the most popular place to integrate expert systems to teach students about internal control and to introduce them to expert systems technology (Baldwin-Morgan, 1995). Eining and Dorr (1991) constructed an expert system for internal control evaluation. Auditing is one area that has seen much expert systems development in public accounting, but no corresponding coverage in auditing courses (Baldwin-Morgan, 1995).

4. Problems related to integrating computers in accounting education

4.1-Introduction

The successful integration of IT raised a wide range of actions concerning various issues. The use of computers in accounting education, however, is not without problems. For example: funding, staff training, student assistance, availability of hardware and software, and quality teaching materials. There are several resources required to run any course involving the use of computers. First, an interactive computer laboratory is required, next that there is adequate support such as academic staff, systems analysts, computer operators, computer programmers, secretarial services, hardware, software facilities, library services and information services and staff. Kent and Linnegar (1988) in their survey of Australian Universities found several reasons for the low usage of computers in accounting education. They offered that a shortage of financial resources, lack of staff time, lack of staff training, shortage of accounting software suitable for use in a teaching environment, lack of hardware and lack of staff initiatives were the reasons. Guinn (1988) reported the reasons for non-use of computers in auditing courses. Insufficient numbers of microcomputers, insufficient time, lack of audit software and problem materials, and the need for faculty development.

There are also environmental preparations for integrating the microcomputer into the accounting curriculum. Three environmental concerns need to be addressed if computers are to be successfully integrated into the accounting curricula (AAA, 1985):

(1) Faculty preparation; (2) student preparation; and (3) organisational support.

Faculty Preparation, Historically most accounting faculty members had little or no experience with computers either in their graduate studies or in their work experience. Even for those who have prior computer exposure, it is not clear that the type of computer experience found in graduate programs in accounting or in the practice of accounting is adequate for those who wish to fully integrate the microcomputer tool into the accounting classroom. Prior exposure to the use of computers in accounting practice may be more helpful than research experience but knowledge is required for effective use of practice tools in the classroom lacking. Productive use of application tools such as spreadsheets or general ledger packages in accounting courses is far different from using these tools with clients or within companies. Therefore, two layers of preparation are needed to prepare the faculty for a productive and worthwhile use of computer technology in an accounting courses. The base layer consists of familiarity with computers themselves, and the second layer consists of understanding the marriage between sound pedagogy and computer technology. While some faculty may possess such knowledge, most will need to increase their grasp of pedagogy and computers. Both of these problems can be addressed either through self-study, in-house seminars, or by attending external seminars. All three approaches have been used successfully in the past, to increase usually, basic knowledge about computers. In addition to assistance in skill acquisition, the faculty must be provided with appropriate hardware/software support if microcomputers are to be effectively integrated into the accounting curriculum. The faculty member who is using microcomputers in the classroom must have a microcomputer in the office, Adequate software must be made available to faculty. If professors are expected to develop classroom tools centred around spreadsheets, then sufficient copies of the spreadsheet software and documentation must be available. Spending time attempting to locate the one departmental copy of software and its documentation is discouraging and unproductive. While sharing software is more feasible than sharing hardware, multiple copies of software and its documentation for regularly used packages will be required in all but the smallest departments.

With regard to **student preparation,** in addition to faculty preparation, students should possess basic computer/systems knowledge when they enrol in their first accounting course using microcomputer technology. As a prerequisite for enrolment on an accounting course using microcomputer technology, the student should be familiar with computer terminology and technology.

The third one of the three preparations is **organisational support**. Most campuses have central computing centres that are responsible for the maintenance and development of the mainframe environment. At University level, the mainframe is still often perceived as the primary computing configuration. The development system includes the choice of programming language, hardware, and software systems. Once a system has completed its development stage and is operational, the effectiveness of the courseware should be measured. This is necessary to ensure that the academic objectives are being achieved as well as to test whether it is possible to improve or change certain aspects of the system.

There may also be some system problems. The introduction of microcomputers into the accounting curriculum is similar to any other systems project. Each project can be expected to follow a life cycle: (AAA, 1985)

(1) Determining the needs and requirements,

(2) A test or pilot project of the proposed new system,

(3) Development and implementation of the system,

(4) The final obsolescence of the system

The introduction of microcomputers into the teaching of accounting is driven by the same factors that have made these microcomputers commonplace in small businesses: low cost and ease of use. A variety of problems can occur in the development of any computer system. Many of the problems are the same whether the computing power is leased or purchased; these problems may be divided into hardware problems and software problems. Hardware Problems where hardware consists of equipment and facilities necessary for teaching accounting through the use of the microcomputer. The microcomputer hardware includes the central processing unit (CPU), the disk drives (which hold the floppy diskettes and CD-ROMs), a monitor, and a printer. In defining hardware includes not only the microcomputer, but also the other facilities and equipment which are necessary for using a microcomputer in accounting instruction. Hardware problems can arise at any point in the selection and operation of microcomputers. The most effective way of dealing with hardware problems is to anticipate them as part of the acquisition process. There are a variety of sources, which describe the acquisition process.

Some of the requirements to consider are cost, software suitability, service, technical assistance in installation and operation, and documentation.

Planning and problem solving issues concerns that must be addressed before micros can be successfully used as an educational tool and can be classified into four major topics. These are (Romney, 1983) Availability of hardware and software, Faculty training, Student assistance, and developing teaching materials. Hardware and software availability is probably the single biggest deterrent to use of the micro. A sufficient number of micros must be made available to faculty and students. The number varies depending on the educational institution's needs.

Nash and England (1986) dealt with problems related to integrating computers into accounting.

Computerisation of accounting instruction may involve the use of centralised mini or mainframe computers, with or without interactive terminals, or may involve the use of microcomputers. A single computer with either a large video display or several smaller display devices can accommodate classroom demonstrations. In contrast, student assignments typically require access to multiple workstations in a computer laboratory. The workstations may take the form of interactive terminals supported by a large centralised computer or may consist of microcomputers. Some schools still expect student assignments to be completed using batch facilities; but besides being less efficient, such systems limit the range of applicable software that can be run. Moreover, batch-processing experience is less relevant to the needs of real-word accounting. The choice between a large, centralised system with interactive terminals and a decentralised one based on microcomputers is frequently debated. Some types of assignments require the use of a large computer, but the advantages of using microcomputers are rapidly being recognised. Microcomputers offer a relatively inexpensive means of providing multiple workstations for laboratory use. In addition to being relatively inexpensive, they offer reliability and flexibility. Students gain a better understanding of the function of component devices when they work with a whole computer system than they would if they merely sat in front of an interactive terminal or submitted jobs through the I/O window of a batch-processing facility. The availability of local area network (LAN) hardware and software offers the potential for clustering microcomputers so they can communicate with other facilities such as a large mainframe computer.

4-2 CHOOSING THE SOFTWARE

Computerised accounting practice sets are becoming widely available for principles of accounting and intermediate accounting. They eliminate much of the tedium of completing manual practice sets, as well as providing useful computer exposure. More specialised practice sets, for use in such courses as not-for-profit accounting and international accounting, are not yet readily available, but are badly needed.

These packages typically require a large volume of data to make them interesting, and instructors may need to build an initial database to which students can add a smaller number of sample transactions.

Other types of software used in accounting practice, such as tax packages and audit software, are of use in accounting courses to which they relate. Generalised audit software packages are frequently made available to schools by major public accounting firms. The older package must be implemented on a large mainframe computer, but an increasing numbers of audit software packages are now available, which can be run on microcomputers. Several tax planning and tax preparation packages also are available for microcomputers and are suitable for instructional purposes.

4-3 USING BUSINESS PACKAGES

Commercially available business software for microcomputers can play a valuable role in accounting education. Acquisition of such software is particularly easy because of the attractive terms vendors offer to schools for laboratory use. Data management packages, graphics packages, statistical packages are used in advanced cost/managerial accounting courses.

Electronic spreadsheets offer perhaps the most flexible tool for accounting curricula and can be used a variety of courses. In cost and managerial accounting, spreadsheets may be used to perform process-costing calculations, or to do capital budgeting exercises. Spreadsheets may also be used to perform analyses of standard cost variances. In auditing courses, they may be used to simulate audit working papers. In advanced accounting, spreadsheets may be used to prepare consolidated statements. A major advantage of performing calculations using a spreadsheet is that multiple cases can be examined, giving the student a feel for the sensitivity of the results to changes of input data.

4-4 DIFFICULTIES OF IMPLEMENTING

Implementation of a comprehensive computerisation of the accounting curriculum is not an easy matter. It involves the identification and acquisition of computer hardware facilities, the acquisition or development of software, staffing of computer labs, course development and training of faculty and personal support. Some centralised university computer facilities still provide only poor interactive access. If such facilities are to be used for accounting instruction, appropriate access must be

provided to large numbers of students. Sometimes the number of accounting students having to use interactive facilities seriously degrades response times.
The number of accounting students and the extent of their computer needs may be large enough to justify a dedicated computer lab separate from other university or college facilities. The trade-off between the economics of scale and flexibility to adjust to instructional requirements should govern the choice between more extensive general-purpose facilities and facilities dedicated solely to accounting use.
Computerisation of the accounting curriculum means more than simply establishing a computer laboratory. Many schools have opened a lab only to find that it stays empty and courses are still taught in the old way. Computerisation requires a long-term commitment by the faculty to adapt to new methods of teaching. Often faculty members feel threatened by computer technology, which may be commonplace among students who have grown up in the computer age. Courses must be developed to include computer assignments and demonstration. Computerised problems must be developed and tested.

In response to a question in Kent and Linnegear study (1988) asking why computer assisted learning had not been used more, respondents offered explanations: shortage of financial resources, lack of staff time and lack of staff training. Other shortages in accounting software suitable for use in a teaching environment, lack of hardware and lack of staff initiatives create problems. Lack of hardware and staff initiatives is expected to be inter-related with financial resources, staff time and training shortages. Shortage of relevant software may partially account for use of computer assisted learning predominantly in introductory courses. One survey of accounting textbook publishers in USA found that certain types of software such as computerised programmed learning packages. Games and cases were in short supply. In fact, the survey found that very little was available for courses other than introductory accounting (Lightner and Hartman, 1985). A significant trend evident in the survey responses was the usage of internally designed software. Internally designed software may answer the shortage of suitable software, but actual design requires financial resources, staff time and staff expertise. Researchers estimate that the design and testing of one hour of computer instructional material requires at least two hundred personnel hours (Angus-Leppan, 1984).

According to Salleh & Williams (1997), Cerullo and Klein (1988) conducted a survey to rank problems identified in earlier studies relating to the integration of microcomputers into accounting education. They found that the main reason for limiting the use of computers was the limited number of micros available followed by the difficulty in scheduling access. The lack of availability of support staff and software selection was ranked third and fourth respectively.

5- SUMMARY

Accounting educators are aware of the need to integrate computer skills/knowledge into the accounting curriculum to prepare accounting graduates for the work environment they will be entering. This change dates back to 1967 when Daniel's study concluded that four general areas of computer technology in the curriculum need to be developed in an effort to use computers in handling management problems. In 1970, the American Accounting Association provided six groups of computer aids to be integrated in accounting education. In 1983 Wu's survey identified nine main topic areas for AIS courses. In 1983/84, a significant study into IT requirements for accountants was performed by a joint task force from the Australian Society of Accountants (ASA) and the Institute of Chartered Accountants (ICA) identified three main issues concerning the IT knowledge requirements of accounting graduates. The results provided input to course planning by tertiary sector institutions at the time. The results were used by professional societies to provide a basis on which to accredit the IT component of accounting courses at tertiary institutions.

In 1985, Waller and Gallun's study attempted to determine the desired range and depth of knowledge or skills in terms of broad programs or topics and the desired depth of coverage in terms of more sophisticated computer concepts. In 1986, Armitage and Boritz's study listed the broad skills desirable for accounting students, including knowledge of and ability to use state-of-the-art system analysis and design techniques, "hands-on" exposure to major program products, e.g., word processing, spreadsheets, statistical packages, database management systems, report writing, modelling packages, and accounting packages. In 1987, Bean and Medewitz's study asked accounting graduates of 15 Universities to rate computer skills relative to their own educational preparation and the importance of these skills to a professional accountant. In general, the respondents perceived that their preparation on the computer was low. They felt most prepared in programming skills, minimally prepared on software skills, and least prepared in network and computer communication skills. In terms of importance to a professional accountant, however, software skills were perceived as being most important and programming skills as the least important.

In 1988, Edmonds' study surveyed accounting practitioners in public accounting and private industry to obtain their perceptions of the micro-computing needs of accounting students. Spreadsheet programs were perceived to be the most important software applications for accounting students, although practitioners believe that less than 20% of new-recruits possessed adequate preparation for work on spreadsheet programs. Computer languages and word-processing programs were not viewed as being important topics for accounting majors, while respondents were indifferent concerning the importance of covering database programs in a microcomputer course. In 1989, Er and Ng's study presented six topics seen to be necessary for an understanding of computing and computers and their utilisation in accountancy. These topics were computer programming, microcomputer applications, computer systems and systems programming, computer-based accounting information systems, computer auditing and expert decision support systems.

In 1990, The Accounting Education Change Commission (AECC), in its first position statement, encouraged the creative use of technology and the view that students should learn by doing. Microcomputers can be a very useful tool in accounting education. Not only are the students and faculty members using current technology, but also the concepts taught in accounting classes can often be easily reinforced using micros. In 1992, a joint project team from the ASCPA and ICA presented a report to the International Federation of Accountants (IFAC). The report presented views on the likely impact of advances in Information Technology over the next decade on the education and work of accountants. As a direct result of this submission, the IFAC Education Committee issued a discussion paper in November 1993 considering the minimum skill levels in Information Technology required by professional accountants. This document rates each topic on two dimensions: the importance of the topic and the required knowledge level. Each dimension uses a two-level rating scale for each of these issues. In 1994, Heagy and Gallun's study recommended

microcomputer knowledge for accounting graduates which conducted a survey to describe the desired knowledge of broad and specific microcomputer topics for entry-level accountants from the perspective of accountants both in public practice and industry alike. The study outlined the broad topics such as spreadsheets, database management systems, telecommunications, accounting systems, systems development, and other topics like word-processing and programming languages.
At the end of 1996, The Board of Accreditation of Accountancy Educational Courses (BAAEC) published its new accreditation guidelines as a new IT requirements of relevance to the various subjects at Foundation level.

In this chapter the researcher continued to present aspects for integrating IT/IS into accounting education. First, what IT/IS skills and knowledge should accountants possess? IT/IS skills are much broader now and students require an understanding of how accounting information systems fit in with an organisation's overall information systems infrastructure. There have been many attempts in western countries like the USA, UK, and Australia, either by accounting bodies or individual attempts, to determine computer literacy, competency, or Information Technology skills and knowledge which should be integrated into accounting programmes. Most of these studies are out of date where the technology is changing faster and brings new roles with new skills and knowledge which the accountant should possess. And others provide broad skills. But there are studies that provide a different IT/IS skills with regard to the different roles for the accountant like as a user of Information Technology, manager of information systems, designer of accounting information, and evaluator or auditor of computerised accounting systems

Secondly, how should be IT skills be integrated in accounting education? While there is general agreement regarding the need for computer literacy among accounting graduates, there is little information as to how such literacy should be developed. These studies recommended that accountants obtain competence and skills for IT through accounting education at University level. A lot of very interesting experiments and research have been carried out about computers in accounting education. The last two decades have witnessed a wealth of attempts aimed at integrating computers into accounting education in different courses. IT/IS skills and knowledge should be integrated into accounting programmes either as an individual

IT course or in accounting courses such as financial accounting, managerial/cost accounting and as well as in auditing courses. IT/IS skills should be included in in-house training in business organisations.

Thirdly, the chapter provides literature related to the problems that face the integrating process in the accounting curriculum. The successful integration of IT/IS into accounting programmes is not without problems, for example: funding, staff training, student assistance, availability of hardware and software, choosing the software and quality teaching materials. There are several categories of resources required to run any course involving the use of computers: first, an IT suite is required; second, adequate support such as academic staff, systems analysts, computer operators, computer programmers, secretarial services, hardware, software facilities, library and information services are required. There is also a need for environmental preparation for integrating IT into the accounting curriculum such as faculty preparation, student preparation, and organisational support.

The next chapter will deal with the research techniques which are used to accomplish the objectives of the study as appears in chapter one. Two specific techniques were adopted for the empirical stage, on line focus group and questionnaire method.

The purpose of the focus group is to implement the first step in gathering perceptions and opinions about IT/IS from three groups, accounting educators, accounting practitioners, and learning technology people. The reasons for using the Internet in this study were easy access for users, not expensive to use, fast collection of data for analysis purpose, collecting views from practitioners representing different countries in short time and broadly and globally views which eliminates bias.

The questionnaire methodology was used because a questionnaire was determined to be the most efficient and economical means of contacting accounting educators in different countries with some accounting educators who have expertise in IT/IS and accounting.

CHAPTER FOUR

METHODOLOGY OF RESEARCH

Chapter Structure

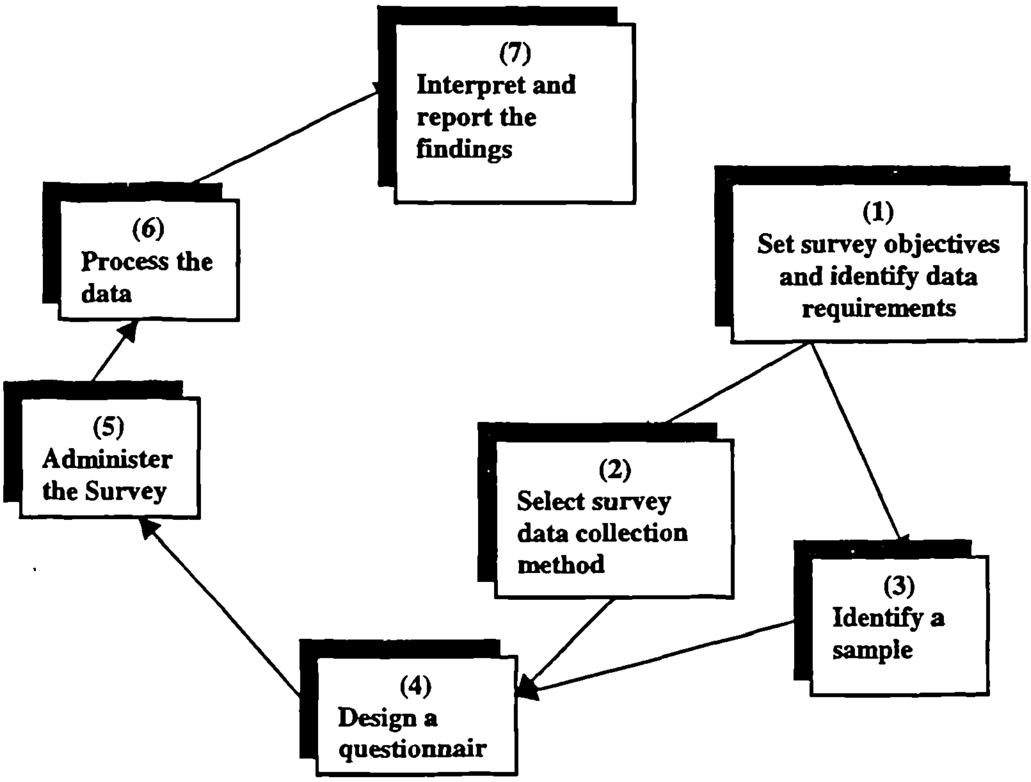
1- INTRODUCTION

As the research seeks to determine opinions, perceptions and attitudes therefore, the survey is an ideal research methodology which can produce valid and reliable results, which are relatively easy and inexpensive to obtain.

The research techniques implemented mostly depend on the nature of the research, and the environment in which the study has been conducted. The questionnaire is economical in terms of time and costs, and its administration is relatively simple. Thus, this suggests that it well suits studies with time limitations and is aimed at collecting data about attitudes, as in this case. Furthermore, the questionnaire has further advantages such as elimination of interviewer bias, which results from limited skills, or personal characteristics. The questionnaire allows respondents enough time to consider the questions carefully and provides more confidentiality for responses, which helps to get reactions on more sensitive personal topics.

The survey process is usefully thought of as a series of steps which, if taken in the correct order, will enable the researcher to gather and interpret relevant data and enable the objectives of the research to be met. These key steps are illustrated in Figure 4.1 (McCormack & Hill, 1997).

Figure 4.1 Key stages in conducting a survey

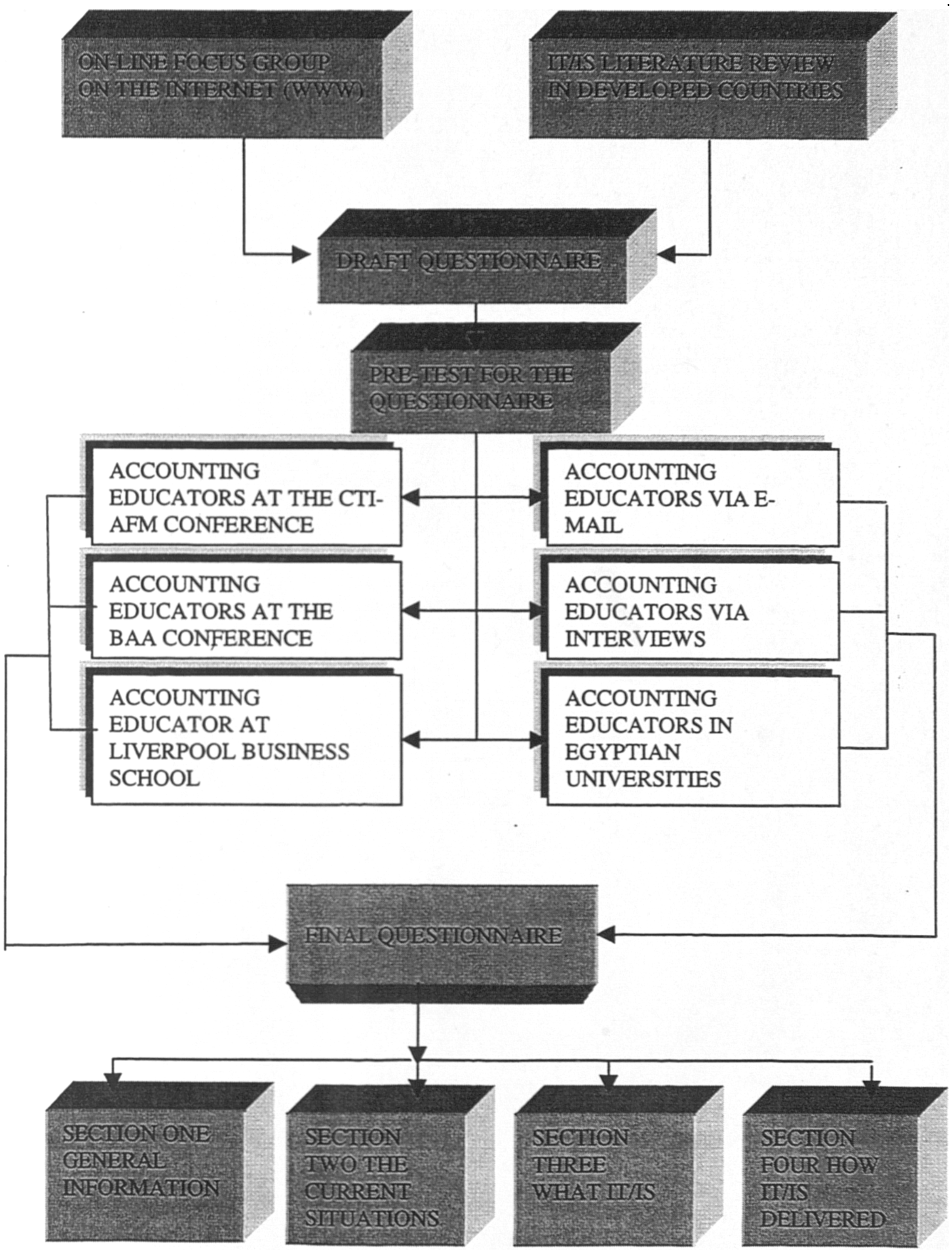


Therefore, the purpose of this chapter is to describe the methods used to accomplish the objectives of the study as appears in figure 3.2

A focus group on the Internet and a four-section questionnaire were used: following six pre-tests of the questionnaire. The first pre-test was done by approaching four accounting educators interested in IT/IS at the CTI-AFM conference. The second pre-test was by giving the questionnaire to five accounting educators who are interested into accounting education research at the BAA conference. The third pre-test way via E-mail where, the researcher sent the questionnaire as an attached file to two members of staff at a USA University and who have expertise in computers in accounting education. The questionnaire was sent twice to one member of staff in an accounting department at one University in the UK who is interested area is accounting and Information Technology. The fourth pre-test was conducted by interviewing three members of staff at three accounting departments at different Universities (Copy of letter for interview appendix eight) The fifth pre-test was conducted with three members of staff in Liverpool Business School. The last pre-test was conducted via four staff at accounting department in Egyptian Universities

Three subject groups were selected representing accounting educators in three different countries. The subjects were chosen who have interests in the area of accounting and computers or related subjects such as Information Technology, Information Systems, IT teaching in accounting education, IT and Computerised Accounting Information Systems, Information Technology and IT in Education. The research interests are computers in accounting education, computer audit, computerised accounting systems, IT in the accounting profession.

Figure 4.2 THE METHODOLOGY OF THE RESEARCH



2- SUBJECTS (THE SAMPLING UNIT)

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 the questionnaire. This choice involves a number of decisions. The researcher must first decide upon the type of people who are relevant to the survey (the population of interest), and identify them in some way (create a sampling frame). Then decisions have to be made as to whether to ask questions of all the relevant people, (conduct a census) or just some of them (select a sample).

The sampling unit means the people from whom relevant data is sought and accordingly to whom the questionnaire should be directed. In other words, the population of interest comprises 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, taking the above with more consideration consequently, the choice of sampling unit should be directed to that person within the accounting department who actually has expertise in IT/IS in teaching or a research interested area. This study approached three different countries as subjects, namely the USA, UK and Egypt

2-1 USA Subjects

This researcher dealt with the research questions by gaining insight into accounting educators who have IT/IS expertise in the accounting department in the Business Schools in the Florida State region (USA). The aim was to collect an academic's perception and views with regard to what IT skill/knowledge the accountants should possess and how it should be delivered. Opinions about the current state and the future for IT/IS in accounting programmes were obtained.

The researcher did a search of the Web sites for the accounting faculty who are interested and whose teaching area is accounting information systems or computers and systems courses in accounting programmes in the accounting department of US Universities. Following up with several accounting faculties using email and by telephone. The researcher gained acceptance to interview them in Florida State (copy of e-mail message appendix nine). Therefore, the researcher decided to travel to Florida to six Universities to hand the questionnaire to thirty-five members and the number of the questionnaires collected was 21. This makes a response rate of 60%.

The researcher used a Self- Administrated Questionnaire in USA where the questionnaires were distributed to each person when I met him/her and they were asked to complete the questionnaire and I returned to collect the completed ones later.

2-2 UK Subjects

In order to gather sufficient numbers of responses from a wide population in terms of subject area, a postal survey was used to gather initial data. A questionnaire was then sent to some accounting educators listed in the BAA Research Register. The subjects for this study were accounting staff listed in BAA who are interested in a research or teaching area in Information Technology and Information Systems in accounting education.

The questionnaire was sent out to 110 accounting educators as listed in the 1998 edition of the BAA Research Register who were interested in and teaching area in IT or IS. A total of 58 responses were received, yielding a response rate of 53%.

A variety of procedures were used to improve the response rate among those taking part such as follow-up (copy form follow-up letter appendix ten)

Only a total of 53 from 58 were usable questionnaires for the analysis. With such a high response rate I feel I can, with some confidence, present some benchmark figures on the current state of IT/IS in accounting education. It helps me to present a framework of IT/IS skills and knowledge in accounting programmes via the current views and opinions of the academic staff on this subject.

2-3 Egyptian Subjects

The Egyptian subjects for this study were accounting staff in the Faculty of Commerce at Egyptian Universities as appear in table 4-1.

In the Egyptian University System, the assistant and assistant lecturer do not get involved in designing accounting courses but their jobs consist of teaching through some cases study or some tutorial work.

Therefore, the study approached the three categories only as follow:

1- Professors 2- Assistant professors 3- Lecturers

As appears in the table 4-2:

From 194 who teach accounting subjects in Accounting departments at Faculty of Commerce in Egyptian Universities there are 52 who teach and are interested in accounting and computers and accounting information systems courses in 1997/98 academic year. The researcher approached the entire fifty-two members and handed the questionnaires to them personally. The questionnaire with a covering letter from my Director of Study (copy from this letter appendix eleven) was given by hand to all 52 accounting educators in 11 Egyptian Universities. A total of 32 usable responses were achieved. The response rate was 32 of 52 (61%)

Table 4-1 Accounting staff in Faculty of Commerce at Egyptian Universities.

	ASH	ALEX	ASSIU	CAIRO	HELWAN	MANS	MENOF	S VAL	SUE	TANT	ZAGA	
Professors	14	6	2	17	9	10	3	2	5	5	12	63
Assistant professors	11	4	0	12	4	3	1	1	5	1	10	37
Lectures	8	5	8	25	6	7	2	8	16	9	21	94
Assistant Lectures	43	16	10	21	5	6	8	9	3	12	11	75
Assistants	27	31	1	24	13	11	1	4	13	9	6	81
	103	62	21	99	37	37	15	24	42	36	60	350

The source: The Ministry of Education, The higher Board for the Universities

Table 4-2 Accounting staff in Faculty of Commerce at Egyptian Universities Approached.

	ASH	ALEX	ASSIU	CAIRO	HELWAN	MANS	MENOF	S VAL	SUE	TANT	ZAGA	
Professor	14	6	2	17	9	10	3	2	5	5	12	63
Assistant Professor	11	4	0	12	4	3	1	1	5	1	10	37
Lecture	8	5	8	25	6	7	2	8	16	9	21	94
	33	15	10	54	19	20	6	11	26	15	43	194

The source: The Ministry of Education, The Higher Board for the Universities

ASH = Ain Shams University ALEX = Alexandria University ASSIU = Assiout University CAIRO = Cairo University
HELWAN = Helwan University MANS = Mansoura University MENOF = Menoufeya University S VAL = South Valley University
SUE = Suez Canal University TANT = Tanta University ZAGA = Zagazig University
NB This statistics in 97/98 academic year

3- RESEARCH QUESTIONS

There is an increasing demand in business environments for accountants who possess IT/IS skills and knowledge. The business world a waiting graduating accounting students is one that demands some level of IT/IS skill and knowledge. Therefore, integrating IT/IS skills, which refer to introducing IT into the curriculum in accounting education with the aim of helping students acquire the appropriate knowledge and skills relevant to understanding the role of IT in accounting work. The research will also identify the IT competencies that reflect the changing practice environment in the real business world.

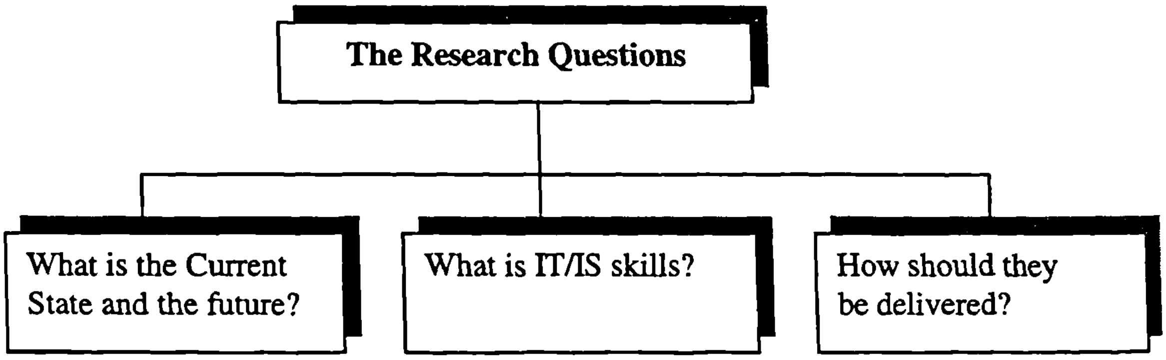
Therefore, fundamental research questions may emerge for the three groups in different countries, two are in developed countries (USA and UK) and the third is one of the developing countries (Egypt). Therefore, research questions for academic accounting educators in Egyptian Universities and UK Universities and Universities at only one state in USA (Florida) as it was not practical to make a structured interview with all accounting academics in all states. In the view of the researcher, the accounting educators represent the supply side for accountants or the manufacturers, for the product, that is, the well prepared accounting graduate. Therefore the study will call the academics' viewpoint "the manufactory or supply Perspective " The questions will be as follows:

- What are their opinions about the current state and future for IT/IS in accounting undergraduate programmes?
- What Information Technology skills and knowledge should graduating accounting students be expected to have?

- How should IT skills and knowledge be delivered in the accounting curriculum?

Figure 4-3 shows the research questions

Figure 4-3 the Research Questions

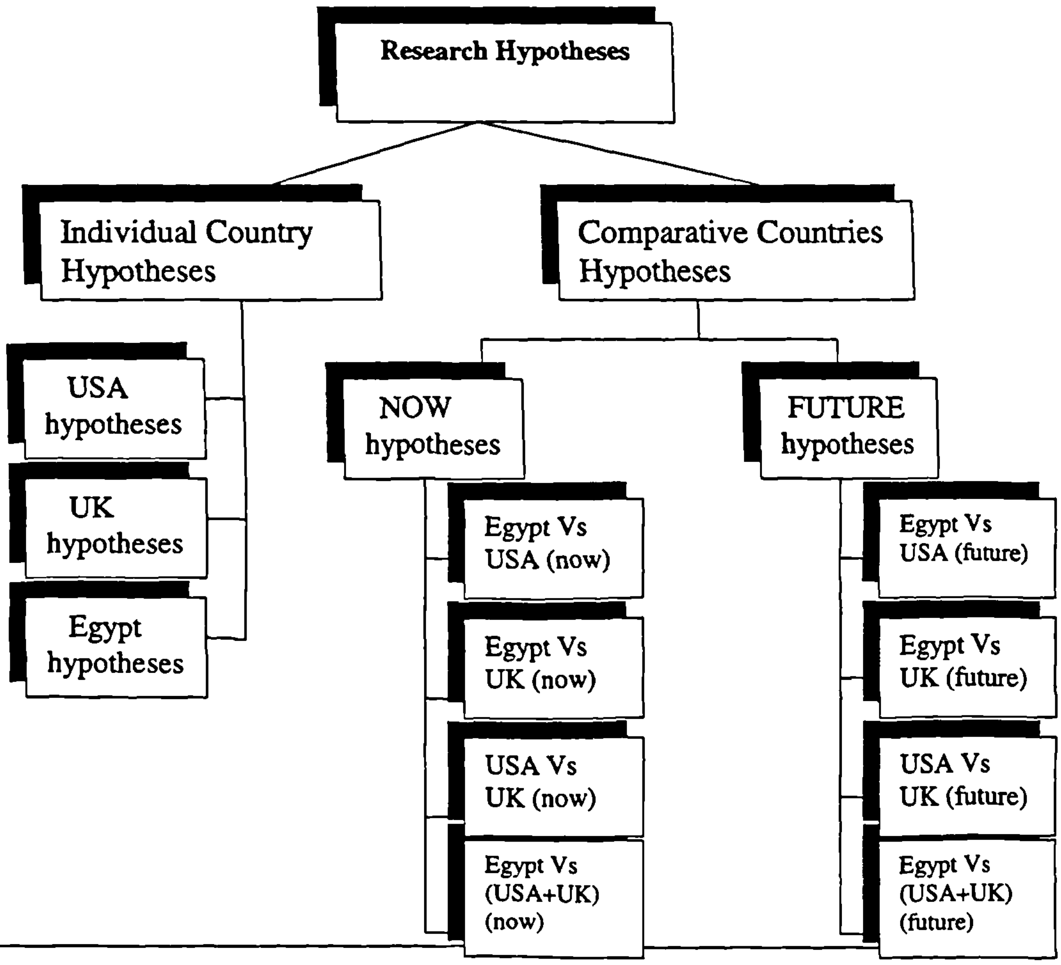


Therefore, the current research will emphasise three questions as it appears in Figure 4-3. These above three questions will be answered from three groups: USA group, UK group, and Egypt group via on-line focus groups and questionnaires:

4- THE RESEARCH HYPOTHESES:

An additional aim of the research was to test two types of hypotheses as it appears in Figure 4-4.

Figure 4-4 The Research Hypotheses



These hypotheses are as follows:

First type: Individual Country Hypotheses

Second type: Comparative Countries Hypotheses

4-1 FIRST:INDIVIDUAL COUNTRY HYPOTHESES

4-1-1- USA HYPOTHESES

- *Hypothesis 1a:* There is no significant difference in the level of **GENERAL** IT/IS skills/Knowledge which is in **USA** accounting programmes **NOW** and the level which should be in the **FUTURE** ($P < 0.05$).
- *Hypothesis 1b* There is no significant difference in the level of IT/IS skills/Knowledge as **USER** which is in **USA** accounting programmes **NOW** and the level which should be in the **FUTURE** ($P < 0.05$).
- *Hypothesis 1c:* There is no significant difference in the level of IT/IS skills/Knowledge as **MANAGER** which is in **USA** accounting programmes **NOW** and the level which should be in the **FUTURE** ($P < 0.05$).
- *Hypothesis 1d:* There is no significant difference in the level of IT/IS skills/Knowledge as **DESIGNER** which is in **USA** accounting programmes **NOW** and the level which should be in the **FUTURE** ($P < 0.05$).
- *Hypothesis 1e* There is no significant difference in the level of IT/IS skills/Knowledge as **EVALUATOR** which is in **USA** accounting programmes **NOW** and the level which should be in the **FUTURE** ($P < 0.05$).

4-1 2- UK HYPOTHESES

- *Hypothesis 2a:* There is no significant difference in the level of **GENERAL** IT/IS skills/Knowledge which is in **UK** accounting programmes **NOW** and the level which should be in the **FUTURE** (P < 0.05).
- *Hypothesis 2b* There is no significant difference in the level of IT/IS skills/Knowledge as **USER** which is in **UK** accounting programmes **NOW** and the level which should be in the FUTURE (P < 0.05).
- *Hypothesis 2c:* There is no significant difference in the level of IT/IS skills/Knowledge as **MANAGER** which is in **UK** accounting programmes **NOW** and the level which should be in the **FUTURE** (P < 0.05).
- *Hypothesis 2d:* There is no significant difference in the level of IT/IS skills/Knowledge as **DESIGNER** which is in **UK** accounting programmes **NOW** and the level which should be in the **FUTURE** (P < 0.05).
- *Hypothesis 2e* There is no significant difference in the level of IT/IS skills/Knowledge as **EVALUATOR**, which is in **UK** accounting programmes **NOW** and the level which should be in the **FUTURE** (P < 0.05).

4-1-3- EGYPT HYPOTHESES

- *Hypothesis 3a:* There is no significant difference in the level of **GENERAL** IT/IS skills/Knowledge which is in **EGYPT** accounting programmes **NOW** and the level which should be in the **FUTURE** (P < 0.05).
- *Hypothesis 3b* There is no significant difference in the level of IT/IS skills/Knowledge as **USER** which is in **EGYPT** accounting programmes **NOW** and the level which should be in the **FUTURE** (P < 0.05).

- *Hypothesis 3c:* There is no significant difference in the level of IT/IS skills/Knowledge as **MANAGER** which is in **EGYPT** accounting programmes **NOW** and the level which should be in the **FUTURE** ($P < 0.05$).
- *Hypothesis 3d:* There is no significant difference in the level of IT/IS skills/Knowledge as **DESIGNER** which is in **EGYPT** accounting programmes **NOW** and the level which should be in the **FUTURE** ($P < 0.05$).
- *Hypothesis 3e* There is no significant difference in the level of IT/IS skills/Knowledge as **EVALUATOR**, which is in **EGYPT** accounting programmes **NOW** and the level which should be in the **FUTURE** ($P < 0.05$).

4-2 SECOND TYPE: COMPARATIVE COUNTRIES HYPOTHESES NOW AND IN THE FUTURE

4-2-1 EGYPT Vs USA (NOW)

Hypothesis 4a: There is no significant difference in the level of **GENERAL** IT/IS skills/Knowledge in **Egyptian** accounting programmes compared to **USA** accounting programmes **NOW** ($P < 0.05$)

Hypothesis 4b: There is no significant difference in the level of IT/IS skills/Knowledge as **USER** in **Egyptian** accounting programmes compared to **USA** accounting programmes **NOW** ($P < 0.05$)

Hypothesis 4c: There is no significant difference in the level of IT/IS skills/Knowledge as **MANAGER** in **Egyptian** accounting programmes compared to **USA** accounting programmes **NOW** ($P < 0.05$)

Hypothesis 4d: There is no significant difference in the level of IT/IS skills/Knowledge as **DESIGNER** in **Egyptian** accounting programmes compared to **USA** accounting programmes **NOW** (P < 0.05)

Hypothesis 4e: There is no significant difference in the level of IT/IS skills/Knowledge as **EVALUATOR** in **Egyptian** accounting programmes compared to **USA** accounting programmes **NOW** (P < 0.05)

4-2-2 EGYPT Vs UK (NOW)

Hypothesis 5a: There is no significant difference in the level of **GENERAL** IT/IS skills/Knowledge in **Egyptian** accounting programmes compared to **UK** accounting programmes **NOW** (P < 0.05)

Hypothesis 5b: There is no significant difference in the level of IT/IS skills/Knowledge as **USER** in **Egyptian** accounting programmes compared to **UK** accounting programmes **NOW** (P < 0.05)

Hypothesis 5c: There is no significant difference in the level of IT/IS skills/Knowledge as **MANAGER** in **Egyptian** accounting programmes compared to **UK** accounting programmes **NOW** (P < 0.05)

Hypothesis 5d: There is no significant difference in the level of IT/IS skills/Knowledge as **DESIGNER** in **Egyptian** accounting programmes compared to **UK** accounting programmes **NOW** (P < 0.05)

Hypothesis 5e: There is no significant difference in the level of IT/IS skills/Knowledge as **EVALUATOR** in **Egyptian** accounting programmes compared to **UK** accounting programmes **NOW** (P < 0.05)

4-2-3 USA Vs UK (NOW)

Hypothesis 6a: There is no significant difference in the level of GENERAL IT/IS skills/Knowledge in **USA** accounting programmes compared to **UK** accounting programmes **NOW** (P < 0.05)

Hypothesis 6b: There is no significant difference in the level of IT/IS skills/Knowledge as **USER** in **USA** accounting programmes compared to **UK** accounting programmes **NOW** (P < 0.05)

Hypothesis 6c: There is no significant difference in the level of IT/IS skills/Knowledge as **MANAGER** in **USA** accounting programmes compared to **UK** accounting programmes **NOW** (P < 0.05)

Hypothesis 6d: There is no significant difference in the level of IT/IS skills/Knowledge as **DESIGNER** in **USA** accounting programmes compared to **UK** accounting programmes **NOW** (P < 0.05)

Hypothesis 6e: There is no significant difference in the level of IT/IS skills/Knowledge as **EVALUATOR** in **USA** accounting programmes compared to **UK** accounting programmes **NOW** (P < 0.05)

4-2-4 EGYPT (DEVELOPING COUNTRY) Vs (USA +UK) (DEVELOPED COUNTRIES) (NOW)

Hypothesis 7a: There is no significant difference in the level of **GENERAL** IT/IS skills/Knowledge in **DEVELOPING COUNTRY** accounting programmes compared to **DEVELOPED COUNTRY** accounting programmes **NOW** (P < 0.05)

Hypothesis 7b: There is no significant difference in the level of IT/IS skills/Knowledge as **USER** in **DEVELOPING COUNTRY** accounting programmes compared to **DEVELOPED COUNTRY** accounting programmes **NOW** (P < 0.05)

Hypothesis 7c: There is no significant difference in the level of IT/IS skills/Knowledge as **MANAGER** in **DEVELOPING COUNTRY** accounting programmes compared to **DEVELOPED COUNTRY** accounting programmes NOW (P < 0.05)

Hypothesis 7d: There is no significant difference in the level of IT/IS skills/Knowledge as **DESIGNER** in **DEVELOPING COUNTRY** accounting programmes compared to **DEVELOPED COUNTRY** accounting programmes NOW (P < 0.05)

Hypothesis 7e: There is no significant difference in the level of IT/IS skills/Knowledge as **EVALUATOR** in **DEVELOPING COUNTRY** accounting programmes compared to **DEVELOPED COUNTRY** accounting programmes NOW (P < 0.05)

4-2-5 EGYPT Vs USA (FUTURE)

Hypothesis 8a: There is no significant difference in the level of GENERAL IT/IS skills/Knowledge in **Egyptian** accounting programmes compared to **USA** accounting programmes in the **FUTURE** (P < 0.05)

Hypothesis 8b: There is no significant difference in the level of IT/IS skills/Knowledge as **USER** in **Egyptian** accounting programmes compared to **USA** accounting programmes in the **FUTURE** (P < 0.05)

Hypothesis 8c: There is no significant difference in the level of IT/IS skills/Knowledge as **MANAGER** in **Egyptian** accounting programmes compared to **USA** accounting programmes in the **FUTURE** (P < 0.05)

Hypothesis 8d: There is no significant difference in the level of IT/IS skills/Knowledge as **DESIGNER** in **Egyptian** accounting programmes compared to **USA** accounting programmes in the **FUTURE** ($P < 0.05$)

Hypothesis 8e: There is no significant difference in the level of IT/IS skills/Knowledge as **EVALUATOR** in **Egyptian** accounting programmes compared to **USA** accounting programmes in the **FUTURE** ($P < 0.05$)

4-2-6 EGYPT Vs UK (FUTURE)

Hypothesis 9a: There is no significant difference in the level of *GENERAL IT/IS* skills/Knowledge in **Egyptian** accounting programmes compared to **UK** accounting programmes in the **FUTURE** ($P < 0.05$)

Hypothesis 9b: There is no significant difference in the level of IT/IS skills/Knowledge as **USER** in **Egyptian** accounting programmes compared to **UK** accounting programmes in the **FUTURE** ($P < 0.05$)

Hypothesis 9c: There is no significant difference in the level of IT/IS skills/Knowledge as **MANAGER** in **Egyptian** accounting programmes compared to **UK** accounting programmes in the **FUTURE** ($P < 0.05$)

Hypothesis 9d: There is no significant difference in the level of IT/IS skills/Knowledge as **DESIGNER** in **Egyptian** accounting programmes compared to **UK** accounting programmes in the **FUTURE** ($P < 0.05$)

Hypothesis 9e: There is no significant difference in the level of IT/IS skills/Knowledge as **EVALUATOR** in **Egyptian** accounting programmes compared to **UK** accounting programmes in the **FUTURE** ($P < 0.05$)

4-2-7 USA Vs UK (FUTURE)

Hypothesis 10a: There is no significant difference in the level of GENERAL IT/IS skills/Knowledge in **USA** accounting programmes compared to **UK** accounting programmes in the **FUTURE** (P < 0.05)

Hypothesis 10b: There is no significant difference in the level of IT/IS skills/Knowledge as **USER** in **USA** accounting programmes compared to **UK** accounting programmes in the **FUTURE** (P < 0.05)

Hypothesis 10c: There is no significant difference in the level of IT/IS skills/Knowledge as **MANAGER** in **USA** accounting programmes compared to **UK** accounting programmes in the **FUTURE** (P < 0.05)

Hypothesis 10d: There is no significant difference in the level of IT/IS skills/Knowledge as **DESIGNER** in **USA** accounting programmes compared to **UK** accounting programmes in the **FUTURE** (P < 0.05)

Hypothesis 10e: There is no significant difference in the level of IT/IS skills/Knowledge as **EVALUATOR** in **USA** accounting programmes compared to **UK** accounting programmes in the **FUTURE** (P < 0.05)

4-2-8 EGYPT (DEVELOPING COUNTRY) VS (USA +UK) (DEVELOPED COUNTRIES) (FUTURE)

Hypothesis 11a: There is no significant difference in the level of GENERAL IT/IS skills/Knowledge in **DEVELOPING COUNTRY** accounting programmes compared to **DEVELOPED COUNTRY** accounting programmes in the **FUTURE** (P < 0.05)

Hypothesis 11b: There is no significant difference in the level of IT/IS skills/Knowledge as **USER** in **DEVELOPING COUNTRY** accounting programmes compared to **DEVELOPED COUNTRY** accounting programmes in the **FUTURE** ($P < 0.05$)

Hypothesis 11c: There is no significant difference in the level of IT/IS skills/Knowledge as **MANAGER** in **DEVELOPING COUNTRY** accounting programmes compared to **DEVELOPED COUNTRY** accounting programmes in the **FUTURE** ($P < 0.05$)

Hypothesis 11d: There is no significant difference in the level of IT/IS skills/Knowledge as **DESIGNER** in **DEVELOPING COUNTRY** accounting programmes compared to **DEVELOPED COUNTRY** accounting programmes in the **FUTURE** ($P < 0.05$)

Hypothesis 11e: There is no significant difference in the level of IT/IS skills/Knowledge as **EVALUATOR** in **DEVELOPING COUNTRY** accounting programmes compared to **DEVELOPED COUNTRY** accounting programmes in the **FUTURE** ($P < 0.05$)

5- 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.

The research questions and research hypotheses, which is maintained above, should be answered via sharing the academic world and the world of practice. The research view believes that a mix of academic and non-academic education and training in IT skills and knowledge is required. The research will use two methods in order to collect the data: A Focus Group and A Questionnaire:

***5-1 Focus Group*;**

Originally, focus groups were stated to be held in order to identify IT/IS skills/knowledge in the early stages of the research. The purpose of these Focus Groups was the first step to gathering data from the three groups, accounting educators, accounting practitioners and learning technology group. The focus group was aimed at collecting the information about three states: first, what is the current state in accounting education and accounting practice in general, for Information Technology skill and knowledge. Secondly, what skill should accounting students in accounting programmes possess. Thirdly, what is the future of IT skills, which will affect accounting practice and consequently affect accounting education.

The focus groups conducted via the Internet where, the researcher created a web site in WWW World Wide Web, which included the questions targeting the three focus groups. The URL addresses were:

http://www.livjm.ac.uk/~busaahme/ (for introduction)

http://www.livjm.ac.uk/~busaahme/education.html (Accounting educators group)

http://www.livjm.ac.uk/~busaahme/practition.html (Accounting Practitioners Group)

http://www.livjm.ac.uk/~busaahme/learning.html (Learning Technology Group)

5-1-1 Focus Group Procedures:

The following procedures were adopted:

1- Placing the questions on the web site. The researcher created a web site on the Internet including the questions (Copy from the focus group questions in appendix one). A preliminary step was needed from the researcher which was for him to take a course about how to create a web page.

2- Sending Email messages to educators in accounting departments in USA, UK, Australia, and New Zealand, and to any business organisations that had a relevant web site and the accounting firms including the big six companies in auditing. It also included the people who teach computers in education in general. (Copy from Email message in Appendix six)

3- Receiving the responses via my email account at Liverpool Business School, Liverpool John Moores University.

5-2 Questionnaire Method

The second method was used to gather opinions from the sample of accounting educators was the questionnaire. Mail questionnaires are extremely useful to get information from geographically dispersed populations. Gorden (1980) states that mail questionnaires do not need the coincidence in time and place of interviewer and interviewee, reaching population segments that were out of access in other ways. Therefore, feedback from two processes, the literature reviews and the focus group will be used in the design of the final questionnaires. The IT/IS survey was a ten-page questionnaire (Appendix Seven) that contained 52 subtopics listed under five main categories of IT/IS knowledge and skills or a clear statement of IT competencies and skills. IT/IS skills that accountants should possess as a benchmark. The source of these is two ways first: based on the responses to the Focus group which the researcher conducted earlier and collect the comments and opinions which were obtained from the responses (accounting educators and accounting practitioners group). Second, the survey of the literature review which has already been done in the developed countries, US and UK and Australia and New Zealand, which dealt with IT skills and knowledge in accounting education and accounting practice. From these studies the researcher will build from the benchmark which is examined in the developing counties, Egypt for example.

The study will emphasise the use of IT knowledge and skills from the perspective of its usefulness, application, and impact where a study's approach will focus on harnessing the power and use of IT, rather than focusing on technology as an end in itself. In other words, the study will try to present a framework for IT skills and knowledge, which was launched in accounting education to learn how to use IT in accounting work, rather than learn IT itself.

5-2-1-THE QUESTIONNAIRE METHODOLOGY:

A questionnaire was determined to be the most efficient and economical means of contacting accounting educators in different countries. In the USA group the researcher preferred to do a structured questionnaire. The questionnaire was long so the researcher did visit some Universities in Florida State and made appointments with some accounting educators who have expertise in IT/IS and accounting.

In the UK group a mail questionnaire was used to collect the opinions and views about IT/IS in accounting education at University level. Following the E-mail sent to each subject to make sure he received the questionnaire and to deal with any query from the respondent.

In the Egyptian group, the researcher used a Self-Administrated Questionnaire where the researcher approached the subjects personally and handed the questionnaire after certain time the questionnaires were gathered personally as well

The questionnaire was divided into four sections, each covering a different topic.

In designing the questionnaire, every effort was made to ensure that it was effective and complete. To assist in this endeavour, comments and suggestions were solicited from people in accounting education with an interest in the area of IT/IS either in USA and UK, and as a result the questionnaire was revised and improved.

This section includes two main subsections:

5-2-1-1 Questionnaire design;

5-2-1-2 Development of the questionnaire.

5-2-1-1 QUESTIONNAIRE DESIGN

The first stage in carrying out a survey is the questionnaire construction, whom to ask? what to ask?, how should the questions be worded? One of the most crucial elements of these is asking the right questions and constructing them in the right order and format. A covering letter was included confirming the name of the researcher, outlining the purpose of the survey, explaining the selection of the respondent to motivate co-operation and reduce suspicion. It is often desirable to provide an explanation appealing to altruistic tendencies, giving recognition, and communicating positive expectations of co-operation and reasons why they should co-operate, and a guarantee of confidentiality as well as a prediction on how long it will take.

The key word in the construction of the questionnaire is relevance, to the goals of the study and the relevance of the questions to the individual respondents. The relevance of the questionnaire to the goals of the study will be discussed here. The second point will be addressed in detail when the development of the questionnaire, which includes six aspects that render it relevant to the individual respondent, is dealt with.

RELEVANCE OF QUESTIONS TO THE STUDY:

One of the most serious problems of constructing the questionnaire is the formulation of questions. To be sure that all the questions are relevant to the stated goals of the study, the following tactic was employed;

1- Each item in the questionnaire should have a role in the study; i.e. the purpose of each question was clarified to ensure that it accomplished that purpose.

2- Before including an item in the questionnaire, the way it was to be analysed, the statistical technique to be used and the manner in which it was to be published or presented were decided.

Two aspects must now be explained: the source of the ideas for the questionnaire and the rationale for each question.

THE SOURCE OF THE IDEAS FOR THE QUESTIONNAIRE:

The main sources of ideas for questions involved two processes which, were used in designing the final questionnaire, which included the sets of IT/IS knowledge and skills which accountants should possess. Firstly, based on the responses to the focus group, which had been done on-line on the Internet. Secondly, feedback from the literature review in developed countries covering different disciplines (An Interdisciplinary approach) including information systems (IS), Information

Resource Management (IRM), and Electronic Data Processing (EDP) which deals with IT skills and knowledge in accounting.

THE RATIONALE FOR EACH QUESTION:

The complete research instrument was a four-section questionnaire. The purpose of this survey is:

1- to collect opinions about the current state and future for IT/IS in accounting undergraduate programmes,

2- to identify perceptions and views about what IT/IS knowledge/skills that accounting education programmes should contain and

3- to determine how IT/IS skills/knowledge should be delivered.

Therefore, the questionnaire is divided into four sections. Three of them were main sections dealing with the three goals above and only one section to collect general information about the respondents.

Section one gathered data concerning the demographic information of the respondents. Section two collected opinions about the current state and future of IT/IS in accounting undergraduate programmes. Section three required respondents to assess his/her perceptions and views about what IT/IS knowledge/skills that accounting education programmes should contain. Section four investigated how these IT/IS skills/knowledge should be delivered in accounting programmes.

The rationale for each section and each question in the questionnaire, which appears in appendix seven), are as follows:

SECTION ONE: was designed to find answers to the following questions:

- What is your Academic position?
- In which type of University are you employed?

- What accounting degrees does your Accounting Department offer?
- How would you rate your overall level of IT/IS experience?
- How long have you been teaching Accounting?
- What is the highest academic qualification you have obtained?
- In which country did you obtain your highest academic qualification?

SECTION TWO:

In this section the subjects have been asked to indicate their opinions and views regarding the current and the future of IT/IS in accounting programmes and the obstacles facing integrating IT/IS into accounting education. Therefore, this section is divided to two subsections. Firstly, asking the respondents to indicate the extent to which they agree or disagree with 19 statements (some statements were positive and some negative in order to avoid "response-set") in his/her accounting department in the University using Likert-type scale for his/her ratings Strongly Agree = 1, Agree = 2, Neutral = 3, Disagree = 4, and Strongly Disagree = 5. Secondly, by dealing with the key issues, which would be helpful in increasing the integration of IT/IS in accounting education? Examples are training; updated software; updated hardware; funding and others as explained in the questionnaire. The subjects had also been asked about obstacles facing them for the integration of computers in their teaching area(s). There are obstacles such as a lack of suitable software; a lack of suitable hardware; too expensive (Financial Shortage); lack of interest in integration; lack support systems staff in IT/IS; a lack of training; a need for more information on how to integrate IT/IS and staff must become computer literate before their students. In this section, the respondents have been asked to indicate in general, where they will be asked in detail in sections three and four, about the kind of IT/IS training he/she would like to see in the accounting curriculum and they were given four options as follow:

- Students trained to become a **USER** of Information Technology
- Students trained to become a **MANAGER** for information system
- Students trained to become a **DESIGNER** of information system
- Students trained to become an **EVALUATOR** (auditors) information systems

What is the best way for the delivery of IT/IS training in accounting programme was an additional question.

Individual IT/IS skills/knowledge courses or the integration of IT/IS skills/knowledge into the accounting courses or a combination of two above or workplace.

<u>**SECTION THREE:**</u>

This section dealt with, one of the main research questions, what IT/IS skills/knowledge should be integrated into the accounting programmes? The subjects have been asked to indicate his/her **assessment** about IT/IS both at **PRESENT in their accounting department, in the CURRENT SITUATION NOW**, and what should be integrated into accounting education in **THREE YEARS** time. The respondents were asked to use a four point scale **No Knowledge = 0 Low Knowledge = 1 Moderate Knowledge = 2 High Knowledge = 3.** The respondents have been asked to indicate his/her **assessment** about IT/IS both at **PRESENT in** the first column and **THREE YEARS** in the future in the second column for parts A, B, C, D, E and have been asked to make a circle around the numbers in each column.

The questionnaire gave the respondent five kinds of IT/IS skills/knowledge. Where section three is divided into five parts (A, B, C, D, and E) as follows:

Part A- General Information Technology Knowledge: This part includes seven items

Part B- IT/IS skills/knowledge for the accountant as a USER of Information Technology: This part includes five items

Part C- IT/IS skills/knowledge for the accountant as a MANAGER of information systems This part includes fourteen items

:**Part D- IT/IS skills/knowledge for accountant as a DESIGNER of information systems:** This part includes twelve items

Part E- IT/IS skills/knowledge for accountant as an EVALUATOR of information systems: This part consists of fourteen items

SECTION Four:

This section dealt with one of the main research questions which was how IT/IS skills/knowledge should be delivered into accounting programmes. The questionnaire asked the respondents to indicate in the relevant column how the following IT/IS skills/knowledge should be delivered into accounting programmes by inserting a percentage in each column (rows should equal 100%). Where the respondents have been given three ways to deliver IT/IS skills i.e. individual IT/IS course; accounting course and workplace either in placement or after graduation

The questionnaire gave the respondent the same five kinds of IT/IS skills/knowledge as in section three but without any details. Where section four is similarly divided to five parts (A, B, C, D, and E) as is section three.

5-2-1-2 THE DEVELOPMENT OF THE QUESTIONNAIRE

This part is concerned with how the questionnaire was constructed for data collection. Nine aspects were emphasised:

1) The wording of the questions;
2) The order of the Questions;
3) The type of Questions;
4) The type of scales;
5) The pilot study;
6) Pre-test the Questionnaire
7) Reliability and Validity of Questions
8) Non-response biased
9) Coding the Questionnaire

1-THE WORDING OF QUESTIONS

Of course, the survey questions should be directly related to the theory and concepts that the research is investigating. Great care must be exercised in writing questions in order to get the information that the research is seeking (Weisberg and Bowen, 1977).

Several factors had to be taken into consideration in the composition of the Questionnaire, including:

1) Spelling out precisely what was really required from each question or set of questions (sometimes a series of questions were needed to meet one objective).
2) Avoiding bias; i.e. the questions should not be biased in any way. Biased questions are questions that make one response more likely than another, regardless of the respondent's opinion is (Kalton, 1983).
3) Avoidance of ambiguous wording. Every effort was made to use simple and familiar terms, and not "loaded" words.

4) Making the questions as short and direct as possible, because longer questions take up more of the respondent's time and make him/her less willing to co-operate, and indirect questions increase the probability of the question being misunderstood.

5) Avoiding ambiguous and unreliable answers. For example, when the subjects were asked, which would be helpful in increasing integration of IT/IS into accounting education, only the most important reasons given.

2- THE ORDER OF QUESTIONS

A well-sequenced questionnaire enables rapport to be built between respondent and researcher, thus encouraging questions to be completed. Therefore, after the questions were devised, a few rules had to be taken into account before completion of the final draft: these included:

1) Questions on similar topics should be grouped into blocks relating to the same subject together; therefore the questionnaire was split into four sections.

2) Broad questions should be accompanied by follow-up questions that were determined by the individual's initial response.

3) The way the questions were asked should put the respondent at ease and show that the researcher was interested in the subject's views rather than testing his/her knowledge.

4) The questionnaire was sequential to a certain extent; i.e. one question flowed from another where possible.

5) The whole questionnaire should consist of a series of question sequences, with questions placed in a logical order.

3- THE TYPE OF QUESTIONS (QUESTIONS STYLES)

After perfecting the wording and ordering of the questions, the researcher is still left with important problems such as: How the answers should be structured?

Two alternatives are usually available with respect to the type of questions: open-ended and closed questions, each of which has its own advantages and difficulties. While the first are easy to ask and may give more information by allowing free expression of ideas and views, they need more time and effort to answer, require more paperwork and make the questionnaire appear longer, are more difficult to analyse and may lead to a collection of worthless and irrelevant information.

Closed questions require exploration before their construction, to take into consideration all possible answers. Without such exploration they may be difficult to formulate. However, these questions are easy to answer, code and analyse. They require no paperwork and a greater number of questions can be asked within a given length of time. They encourage respondents by giving the impression of timesaving. The answers are standard, can be compared from person to person and are relatively complete.

With the exception of straightforward questions of the Yes/No variety, the main type used in the construction of the questionnaire were closed questions. Closed questions are designed to limit respondents to a pre-determined selection of alternative answers, thus avoiding many of the difficulties associated with open-ended questions. The researcher used different styles in closed questions. He used multiple choice questions where the respondents were required to choose one or more answers from a list of two or more alternatives, this style of question required the researcher to have identified and pre-determined the most likely responses before issuing the questionnaire. Therefore, the researcher pays more attention to the pilot study and the pre-test of the questionnaire. The researcher used some of the closed questions such as dichotomous questions where only two fixed alternatives were on offer, from which one must be chosen, such as questions about gender. Others were multiple choice questions offer a range of alternative answers, from which the respondent has to choose one only like age and academic position, the overall level of IT/IS expertise and teaching accounting period. There were multiple-response questions which allow respondents to choose as many answers such as when the respondents were asked to tick as many alternatives from the list including the problems faced when integrating IT/IS into accounting programmes. There was another kind of closed questions used i.e. Scaled questions like the **Unipolar scale,** which measures the intensity of an attitude or opinion using a single descriptor eg. when the researcher asked the respondents to evaluate how satisfied they were about the content and delivery of IT/IS skills in accounting programmes given a scale from extremely satisfied to extremely dissatisfied. Other scaled questions were used i.e. **Likert Scales** which required respondents to indicate the extent to which they agreed or disagreed with given statements like when the respondents were asked about the current state and future for IT/IS in accounting.

However, in order not to forego the advantages of obtaining further explanation, there are two ways:

1) The researcher preferred to handle the questionnaire personally in the American sample and in the Egyptian one. In the UK sample the researcher used mail questionnaire followed by sending E-mail via the computers if the respondents needed any further prompting or they could give the researcher any comments.
2) A space for additional views was provided at the end of the questionnaire if the respondents wanted to give any comments.

4- The type of scales

In constructing a questionnaire, one wants to use scales at the interval level or at least ordinal level whenever possible. All of the more powerful techniques of statistical analysis demand such scales, rather than simple "nominal" measures.

One of the most frequently used ordinal-type scales is a single item (question) on a Likert-type scale. A Likert-type item consists of a single statement, followed usually by a five -point choice with each option described in words.

In constructing Likert-Type and similar scales, some of the items should be positive and some negative (in order to avoid "response-set").

On the issue of scaling, two points are subject to argument: the type of scale and the number of points used in that scale. The rating scale was used to rate answers in the questionnaire.

The reasons behind the use of rating scales were:

1) Rating scales can be easily processed and quantified, so this type of scale was found easier to analyse by the researcher. There is sufficient evidence to indicate that scales that have been properly developed and used and can yield sound and useful information (Howell, 1997).

2) Because direct measurements of variables in the social sciences are difficult, rating scales are extremely common (Kalton, 1983).

3) Rating scales were rated more highly by the respondents than other types of scales.

4) A good use of the rating scale is to assess high-inference variables (Kerlinger, 1986).

With regard to the number of points a scale should contain, the divisions should not be too fine or too coarse. In the case of the too-finely-scaled division, respondents may be unable to place themselves and at the other extreme, the scale may be thought to have inadequate differentiation. Oppenhein mentioned that:

"The number of steps in a rating scale tends to vary from three or five to perhaps ten." (Oppenheim, 1966, P25).

In accordance with the above views, the scale used in the questionnaire is rating type, running on a five-point scale in section two, to avoid the respondent becoming overly stressed with minimum differentiation. However, in section three rating type running on a four-point scale in order to push the respondent to rank the level of IT/IS skills and knowledge which the accountants possess at present and three years in the future.

5- THE PILOT STUDY

The purpose of a pilot study is to test the effectiveness of a questionnaire on a limited number of people from the population of interest before the costs of a full-scale survey are incurred. Pilot studies - regardless of the type of research involved or the intended population- help:

1) To discover and ameliorate mechanical problems with regard to interviews (such as interview sessions) or questionnaires (such as too-lengthy wording, etc)
2) To improve the approach of any kind of data collection in order to raise the response rate.

6- PRE-TEST THE QUESTIONNAIRE:

The need for pre-testing items in test of the questionnaires is already well known but should be stressed. Pre-testing is an important step in which the questionnaire is tested on a few respondents in an attempt to discover any problems in the questionnaire, such as ambiguous or extraneous questions. Pre-testing is the final stage in questionnaire construction.

7- THE 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. Cronbach's alpha for the opinion of the current state was 0.8490 and for general IT/IS was 0.8470, for User IT skills was 0.8110, for Manager IT skills Alpha = 0.9214, for Designer role was 0.9134, for Evaluator skills was 0.9479.

Before administering the survey, the survey instrument was rigorously validated through pilot testing and interviews as described earlier in this chapter. 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.

8- 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 nonresponse bias, late responses were compared to early responses. This procedure assumes that late respondents are similar to nonrespondents (Oppenheim, 1966). The researcher checked non-response bias by doing chi-square ($x2$) test on the responses of early and late responses for each 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.

9- CODING THE QUESTIONNAIRE AND TRANSFERRING DATA.

When the questionnaire has been piloted and modified as required, it is then necessary to enter codes. This method was used in order to enter the data after the questionnaire was completed and returned. The responses that were entered on the completed return questionnaires are known as the raw data. They must be entered into the computer to prepare them for analysis and descriptive testing using any statistics packages. The researcher used two kind of these packages first Statistics Package for Social Science (SPSS) and Stategraphics plus Package. There are several ways in which data can be transferred into the computer. The researcher used the keyboard to enter the data because it was the simplest method of data entry and it had the advantage of not requiring a special layout for the questionnaire like the Optical Mark Reader (OMR) which needs special forms.

6- SUMMARY

The purpose of this chapter is to describe the methods used to accomplish the objectives of the study as appears in the introductory chapter.

A focus group on the Internet and a four-section questionnaire were used: following six pre-tests of this questionnaire. Firstly, a CTI-AFM conference, The second pre-test was a BAA (British Accounting Association) conference. The third pre-test was via E-mail, The fourth pre-test was conducted by making three personal interviews. The fifth pre-test was conducted with three members of staff in Liverpool Business school. The last pre-test was conducted via four faculty at accounting department in Egyptian Universities

Three groups of subjects, representing accounting educators in three different countries. The subjects were chosen who have interested area or teaching area of accounting and computers or related to Information Technology such as Information Systems, IT teaching in accounting education, IT and Computerised Accounting Information Systems, Information Technology, IT in Education. Research Interests are Computers in Accounting Education, Computer Audit, Computerised Accounting Systems, IT in the accounting profession.

This chapter as well presented subjects (the sampling unit for the study. This study approached three different subjects, USA, UK and Egypt. With regard to the research questions the current research placed the emphasis on two questions:

Firstly, What are the IT knowledge and skills should be the professional accountants possess?

Secondly, How IT knowledge and skills can be delivered in accounting education?

The above two questions will be answered from three groups: The American group, the British group, and Egyptian group. With regard to the research hypotheses, the research aim as well to test two types of hypotheses as follows: the first type: Individual Country Hypotheses, the second type: Comparative Countries

Hypotheses

This chapter dealt with the questionnaire methodology where a questionnaire was determined to be the most efficient and economical means of contacting accounting educators in different countries with some accounting educators who have expertise in IT/IS and accounting. The chapter also presented sections about the design of the questionnaire, the development of the questionnaire, the relevance of questions to the study, the source of the ideas for the questionnaire where the main sources of the ideas for questions two processes were used in designing the final questionnaire, which, included sets of IT/IS knowledge and skills which accountants should possess. Firstly, based on the responses to the focus group, which had been done on-line on the Internet. Secondly, feedback from the literature review in developed countries of different disciplines (An Interdisciplinary) including information systems (IS), Information Resource Management (IRM), and Electronic Data Processing (EDP) which deal with IT skills and knowledge in accounting.

CHAPTER FIVE:

DATA REPORTING

<u>**Chapter Structure**</u>

1-INTRODUCTION

This chapter reports on the findings of the focus groups and describes and summarises the data description from the questionnaire survey of accounting educators in accounting departments at the Universities in the three groups representative of the three countries, USA, UK, and Egypt. The aim of this chapter is to provide a summary of the data collected via the survey from USA sample, the UK sample, and the Egyptian sample. Statistical analysis, which tests the hypotheses for the data and comparative analysis between the three samples, will be explained in the next chapter.

Data description is a typical first step in any data analysis project. In addition to being an important, self-standing activity when a descriptive focus characterises the analysis objectives, descriptive analysis provides a very useful initial examination of the data even when the ultimate concern of the investigator is inferential in nature. Specifically, the purpose of descriptive analysis is to (Diamantopoulos and Schlegelmilch, 1997, P.73):

1- Provide preliminary insights as to the nature of the responses obtained, as reflected in the distribution of the values for each variable of interest.
2- Help detect errors in the coding process.
3- Provide a means for presenting the data in a digestible manner, through the use of the tables and graphs.
4- Provide summary measures of "typical" or "average" responses as well as the extent of variable in responses for a given variable.
5- Provide an early opportunity for checking whether the distributional assumptions of subsequent statistical tests are likely to be satisfied.

The purpose of this survey was to collect opinions about the current state and future for IT/IS in accounting programmes, as well as perceptions and views about what IT/IS knowledge/skills that accounting education programmes should contain and how these should be delivered.

This chapter will be devoted to four issues. Firstly, reporting on-line focus groups which were done on the WWW. Secondly, to examine reporting about the USA data. Thirdly, to present reporting UK data. Fourthly, to discuss the data, which was collected from accounting academics in Egyptian Universities.

2- ON-LINE FOCUS GROUP

The purpose of these focus groups is to gather data from accounting educators and accounting practitioners as a first step. These focus groups were aimed at collecting the information about three states: initially, the current state in the accounting education and accounting practice, for Information Technology skills and knowledge. Then, what the accountants and the students in accounting programme should possess? Finally, the future of IT skills which will affect accounting practices and consequential effect in accounting education.

The focus groups were conducted via the Internet where the researcher created a web site on the World Wide Web (WWW), which included the questions targeted at the two focus groups. The URL address were:

http://www.livjm.ac.uk/~busaahme/ (for introduction)

http://www.livjm.ac.uk/~busaahme/education.html (Accounting educators group)

http://www.livjm.ac.uk/~busaahme/practition.html (Accounting Practitioners Group)

2.1. FOCUS GROUP PROCEDURES

1- Placing the questions on the web site. The researcher created a web site on the Internet including the questions (see in appendix one). An important step was needed from the researcher which was to take a course about how to create a web page.

2- Sending e-mail messages to the educators who teach or are interested in accounting and computer systems in accounting departments in USA, UK, Australia, New Zealand, and Egypt. In addition to some business organisations which had web sites and e-mail addresses, electronic accounting and information systems discussion groups and accounting firms including the big six companies in auditing were contacted as well. (see Appendix 2)

2.2. FOCUS GROUP REPORT

The researcher received two hundred and fifty two e-mail messages as replies from the focus group in the Internet. One hundred and thirty were received from accounting educators representing different countries such as USA, UK, Germany, Australia, New Zealand, Egypt, and Malaysia. One hundred and twenty two were received from accounting practitioners from different countries as well. Some of the comments, which were received in response to the focus groups, will be explored to the extent that IT/IS skills are needed by those graduates from accounting programmes. The comments consistently stressed the importance of IT/IS skills for those planning a career in accounting. The researcher scanned the responses and pulled out common themes. The following was typical:

Expertise Area: Accounting Education Group

1. What do you think is the current status of IT skills in accounting education?

The responses for this question are utilised in section two of the questionnaire as it appears in chapter four (see appendix seven).

-Accounting education does not equip students with IT/IS skills for their role beyond graduation in their employment.

• IT/IS skills in accounting training at undergraduate level are not adequately covered

- Most IT/IS syllabuses in accounting degrees concentrate on programming languages rather than looking at the broad issues of IT/IS

- University does not provide sufficient grounding in the use of IT/IS in a commercial environment

- University lecturers do not possess the necessary IT skills and knowledge to teach IT successfully in accounting

- The IT in 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

- Most respondents are extremely dissatisfied or dissatisfied about the *CONTENT* of *IT/IS* skills/knowledge that exist within their current accounting curriculum

• Most responses were dissatisfied about the *DELIVERY* of IT/IS skills and knowledge in accounting education *NOW* in their Universities

2. What developments would you suggest?

- The accounting profession, industry and commerce should first able to specify what IT/IS they require to be taught at university.

- Having more IT/IS available in undergraduate accounting makes students more effective in their employment and improves their work

- 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.

- Accounting students should gain " Hands- on " experience of computers, not just BASIC or FORTRAN and C++ programming.

3. What would be helpful in increasing the integration of IT/IS training into accounting education?

-Staff Training
-Updated Software
-Updated Hardware
-Funding
-Increased computer literacy of staff
-Increased recognition of need for integrating
-Relevant and up to date text books
-Availability of Systems Support
-Lack of suitable software
-Lack of suitable hardware
-Too expensive (Financial Shortage)
-Lack of interest in integration
-Lack support systems staff in IT/IS
-Lack of training
-Need more information on how to integrate IT/IS
-Staff must become computer literate before students

4. Are there, in your opinion, General IT skills for the students in accounting education? Or is there a specific IT skills depending on the accounting work e.g. as users of Information Technology, as managers of information systems, as designers of business systems and as evaluators of information systems?

The students should take some training related to general IT/IS skills regardless of their roles in organisations. Students should train to become users of Information Technology.
Students should also train to become managers of information systems, and to become designers for information systems, Students should additionally train to become evaluators (auditors) of information systems.

5.In your opinion what should educators have IT focus for student learning and to what extent should computers be involved?

- Accounting students should have experience in the use of general applications, such as spreadsheets, word-processing, data base management and accounting packages.

- The use of Computer-Assisted Audit Techniques (CAATs) such as approaches auditing through the computer, auditing with the computer, to professional standards taking into account feasibility considerations and categories of CAATs

- Understanding of characteristics of EDP systems, their major components, and methods of operation.

- Ability to design and apply computer-assisted audit techniques for a variety of audit purposes.

6.What in your opinion with regard to Information Technology is its' potential future direction over the next three years, i.e. directly affecting accounting education?

- Electronic Commerce (Telecommunication in Business On-line Resource) like Electronic Data Interchange (EDI), Electronic Payment Schemes, electronic markets and catalogues, Point Of Sale (POS), Electronic Funds Transfer System (EFTS).

- 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. Therefore, accounting education in the five years at the future should include some training such as:

- <u>Information Systems (IS) Design and Implementation</u>
(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).

- Knowledge of financial accounting, managerial accounting, auditing and ability to use state-of-the-art systems analysis and design techniques.

- Ability to design and apply computer-assisted auditing techniques for a variety of audit purposes.

<u>7- Please add any further comments you may have concerning IT and accounting education or write any questions that you feel should be included in a questionnaire to academics.</u>

- What is the best way for the delivery of IT/IS training in accounting programme?
Like individual IT/IS skills/knowledge courses, integrating IT/IS skills/knowledge into the accounting courses, or combination of the two above, or some basic skills at University level and more experience in the workplace.

- Who should teach these IT/IS skills /knowledge into accounting programs?
IS professional or accounting professional or both!!

Expertise Area: Accounting Practitioners Group

1. In your opinion, what does the accounting profession need from its entry-level accountants, regarding IT skills?

Professional accountants may need to acquire general IT/IS knowledge related to business information systems such as:

- Information systems technology, for example, components of information systems technology (H/W, S/W), information systems processing methods in organisations, structure of information systems in organisations. etc.

- Files/databases, file organisations. Database Management Systems (DBMS); database concepts, controls and security. etc.

- Communication technology, data communication and networks, communication technology, design, communication controls, business telecommunications (LAN, WAN, INTERNET)

- Role of information within business and Information Management, For example, transaction processing system (TPS), management information systems (MIS), decision support systems (DSS), executive information systems (EIS), -Expert system (ES), neural network (NN)

- Hands-on exposure to major program products (day-to-day application), for example word processors, spread sheets, statistical packages, database management system

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 such as:

- The ability to use Accounting Systems packages, 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

- The ability to use database services and the Internet for financial reporting and disclosure

- Ability to search On-line Public Access Databases such as use on-line retrieval services for tax case research from CD-ROM or WWW.

- Ability to understand the structure of typical computerised accounting systems and subsystems, Including the flow of transactions, data file organisations, and programmed accounting procedures, financial modelling, general ledger systems packages, revenue/expenditure/Payroll cycles

- 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. Therefore, accountants must have the following training:

- Data Resource Structures, for example, data resources and information, applications of data administration, management of system maintenance and change.

- Management of Accounting Information Systems
For example, management of end-user computing, information resources management principles, information concepts and requirements. etc..

- Global Information Management, 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.

- Ability to use financial database and spreadsheet for planning and control purposes.

- Ability for selection and acquisition of hardware/software (including contract negotiation).

- Ability to participate as part of system development team, appreciation of information and methods, behavioural consequences of project management.

- Understanding of the methods of operating and managing business systems once implemented.

- Understanding of the system development life cycle, its phases, and management principles for the system development process.

- Administrative issues like, reporting relationships of the IT/IS department, approaches to staffing, personnel development and performance evaluation.

The role of accountants as auditors encompasses the functions of internal audit; external audit and other evaluative roles filled by accountants, whether or not formally identified as audit roles. Therefore, the new graduates should gain some skills/knowledge related to:

- Internal control in computer-based systems, 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.).

- Understanding of characteristics of EDP systems, their major components, and methods of operation.

- Ability to specify, identify, and document financial and operational controls in computer-based systems.

- Auditing of Accounting Information Systems, 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.

<u>2 . Are there general IT skills for accountants dependent on their roles in accounting practice? Or are there specific IT skills depending on the accounting work e.g. as user of Information Technology, as manager of information systems, as a designer of business systems or as an evaluator of information systems?</u>

The student should take some training related to general IT/IS skills regardless of their roles in organisations Students should train to become a USER for Information Technology.
Students should train to become a MANAGER for information systems. Students should train to become a DESIGNER for information systems. Students should train to become a EVALUATOR (auditors) information systems

3 .Do you think that a gap exists between what the students currently learn in accounting education and what accountants do in the real world, with regard to IT skills?

- A gap does exists 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

- 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

- New accounting graduates are not adequately prepared in IT/IS skills at college/university to work in the real world

- IT/IS education at University level is mostly theoretical

4 .If you think a gap does exists, how do you think that we may bridge this gap?

- The business community and those involved in accounting education must first decide what their objectives are with regard to IT training.

- Communication between the business community and Universities needs to be improved so that IT training can more closely match needs.

- IT/IS training for skills and knowledge must begin at university level

5 .What, in your opinion, will be the major factors affecting accounting work in the next five years, and what role, if any, will IT contribute to these?

- The roles of decision support systems, approaches to decision support systems, decision support systems development will be important.

- The ability to design and use decision support aids and financial modelling tools such as linear programming, statistical tools, simulation packages, and network models for enhancing managerial decision making.

- The knowledge of and ability to use state-of-the-art system analysis and design techniques. e.g. Object-Oriented Programming (OOP), Object-Based Programming.

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

- Legal, ethical, auditing and information system control standards, for example, legal and ethical requirements, auditing standards relevant to IT/IS, computer control guidelines and standards, computer Security issues such as viruses and computer fraud

6 .Please add any further comments you may have concerning IT and accounting practice or suggest any questions that you feel should be included in a questionnaire

- The use of computers in accounting practice enhances the efficiency and effectiveness of the accountant's work

- To what extent the link between the University and business in the real world regarding what IT/IS skills the accountants need and how they should be delivered in the University, the workplace or combination of both?

3-SURVEY REPORTING:

3-1 PRESENTING USA DATA

Tables 5-1 to 5-9 present the demographic data

Table 5-1 Response Rate of the USA Group

Questionnaire Forwarded	Questionnaire Returned	Response Rate
35	21	60%

As you can see from table 5-1 the response rate was quite significantly above 50%

3-1-1 GENERAL INFORMATION

Table 5-2 Please indicates your gender?

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	18	85.7	85.7	85.7
Female	3	14.3	14.3	100.0
Total	21	100.0	100.0	

This table shows the number of times each value of GENDER occurred, as well as percentages and cumulative statistics. For example, in 18 rows of the data file GENDER equalled male. This represents 85.7143% of the 21 values in the file. The rightmost two columns give cumulative counts and percentages from the top of the table down.

Table 5-3 What is your Academic position?

	Frequency	Percent	Valid Percent	Cumulative Percent
Associate Professor	6	28.6	28.6	28.6
Professor	11	52.4	52.4	81.0
Assistant Professor	4	19.0	19.0	100.0
Total	21	100.0	100.0	

Table 5-3 shows the number of times each value of **Academic position** occurred, as well as percentages and cumulative statistics. For example, in 6 rows of the data file **Academic position** equalled Associate Professor. This represents 28.5714% of the 21 values in the file. The rightmost two columns give cumulative counts and percentages from the top of the table down.

Table 5-4 What accounting degrees does your Accounting Department offer?

Degree offers	Frequency	Percent
Bachelor in Accounting	21	100.0
Postgraduate Diploma	21	100.0
Master in Accounting	21	100.0
PhD in Accounting	21	100.0

Table 5-4 shows the number of times each value of each degree offers occurred, as well as percentages and cumulative statistics. For example, in 21 rows of the data file Bachelor in Accounting. This represents 100.0% of the 21 values in the file.

Table 5-5 How would you rate your overall level of IT/IS experience?

	Frequency	Percent	Valid Percent	Cumulative Percent
Highly experienced	7	33.3	33.3	33.3
Fairly experienced	12	57.1	57.1	90.5
Novice	2	9.5	9.5	100.0
Total	21	100.0	100.0	

This table shows the number of times each value of **IT/IS experience** occurred, as well as percentages and cumulative statistics. For example, in 7 rows of the data file **IT/IS experience** equalled 1. This represents 33.3333% of the 21 values in the file. The rightmost two columns give cumulative counts and percentages from the top of the table down.

Table 5-6 How long have you been teaching Accounting?

	Frequency	Percent	Valid Percent	Cumulative Percent
1-5 Years	3	14.3	14.3	14.3
6-10 Years	4	19.0	19.0	33.3
11-14 years	4	19.0	19.0	52.4
15-20 years	10	47.6	47.6	100.0
Total	21	100.0	100.0	

This table shows the number of times each value of **teaching Accounting** period occurred, as well as percentages and cumulative statistics. For example, in 3 rows of the data file **teaching Accounting** equalled 1-5 Years. This represents 14.2857% of the 21 values in the file. The rightmost two columns give cumulative counts and percentages from the top of the table down.

Table 5-7 Do you hold any accounting professional qualification?

	Frequency	Percent	Valid Percent	Cumulative Percent
NO	7	33.3	33.3	33.3
YES	14	66.7	66.7	100.0
Total	21	100.0	100.0	

This table shows the number of times each value of **professional qualification** occurred, as well as percentages and cumulative statistics. For example, there is 14 respondents have **professional qualification**. This represents 66.7% of the 21 values in the file. The rightmost two columns give cumulative counts and percentages from the top of the table down. There are 50% from those have **professional qualification,** have Certified Public Accountant (CPA)

Table 5-8 What is the highest academic qualification you have obtained?

	Frequency	Percent	Valid Percent	Cumulative Percent
Doctoral Degree in Accounting	21	100.0	100.0	100.0

This table shows that all the respondents hold PhD degree in Accounting. This represents 100%

Table 5-9 In which country did you obtain your highest academic qualification?

	Frequency	Percent	Valid Percent	Cumulative Percent
USA	20	95.2	95.2	95.2
UK	1	4.8	4.8	100.0
Total	21	100.0	100.0	

This table shows that more than 95% from the respondents got their **highest academic qualification from USA. Only one respondent** has his/her PhD from UK

3-1-2 OPINION ABOUT THE CURRENT STATE AND FUTURE FOR IT/IS ACCOUNTING PROGRAMMES

Table 5-10 shows the respondents views about current state and future for IT/IS in accounting programmes

Table 5-10 USA opinion about IT/IS skills into accounting programmes

	Strongly agree %	Agree %	Neutral %	Disagree %	Strongly disagree %	Total %
- Accounting education equips students with T/IS skills for their role beyond graduation in heir employment		9.5% 2	14.3% 3	71.4% 15	4.8% 1	100.0% 21
- 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	38.1% 8	57.1% 12	4.8% 1			100.0% 21
3-IT/IS skills in accounting training at undergraduate level are not adequately covered	23.8% 5	57.1% 12	14.3% 3	4.8% 1		100.0% 21
4-Most IT/IS syllabuses in accounting degrees concentrate on programming languages rather than looking at the broad issues of IT/IS		19.0% 4	14.3% 3	57.1% 12	9.5% 2	100.0% 21
5- University does not provide sufficient grounding in the use of IT/IS in a commercial environment	9.5% 2	61.9% 13	19.0% 4	4.8% 1	4.8% 1	100.0% 21
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	28.6% 6	42.9% 9	14.3% 3	9.5% 2	4.8% 1	100.0% 21
7- University lecturers do not possess the necessary IT skills and knowledge to teach IT successfully in accounting	9.5% 2	66.7% 14	14.3% 3	9.5% 2		100.0% 21
8- The accounting profession, industry and commerce are unable to specify what IT/IS they require to be taught at university	14.3% 3	47.6% 10	28.6% 6	4.8% 1	4.8% 1	100.0% 21
9- The business community and those involved in accounting education must first decide what their objectives are with regard to IT training	61.9% 13	33.3% 7	4.8% 1			100.0% 21
10- Communication between the business community and universities needs to be improved so that IT training can more closely match needs	57.1% 12	42.9% 9				100.0% 21
11 Having more IT/IS available in undergraduate accounting makes students more effective in their employment and improve their work	52.4% 11	42.9% 9	4.8% 1			100.0% 21
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	57.1% 12	33.3% 7	9.5% 2			100.0% 21

Continued table 5-10

13-Accounting students should gain " Hands- on experience of computers, not just BASIC or FORTRAN and C++ programming	61.9% 13	33.3% 7	4.8% 1			100.0% 21
14-Accounting students should have experience in the use of applications , such as spreadsheets , word-processing, data base management and accounting packages	66.7% 14	33.3% 7				100.0% 21
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	9.5% 2	61.9% 13	19.0% 4	9.5% 2		100.0% 21
16-IT/IS education at University level is mostly theoretical		23.8% 5	9.5% 2	61.9% 13	4.8% 1	100.0% 21
17-The use of computers in accounting practice enhances the efficiency and effectiveness of the accountant's work	85.7% 18	14.3% 3				100.0% 21

Table 5-11 USA 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		14.3% 3	14.3% 3	66.7% 14	4.8% 1	100.0% 21
Satisfied degree with the DELIVERY of IT/IS skills/knowledge into accounting curriculum		14.3% 3	23.8% 5	52.4% 11	9.5% 2	100.0% 21

It clear from table 5-11 that the accounting educators in the USA sample dissatisfied about the content and the delivery of IT/IS skills. Of those responding, more than 60% (66.7%) were dissatisfied about the content and more than 50% (52.4%) dissatisfied about the delivery.

The respondents were asked about what was helpful in increasing integration of IT/IS into accounting education. Of those responding, more than 90% (90.5%) chose updating software, 81% chose staff training and 76.2% increased computer literacy of staff. Other factors also were reported as shown in table 5-12

Table 5-12 helpful for Integrating IT/IS into USA accounting programmes

	No %	Yes %
Updated Software	9.5% (2)	90.5% (19)
Staff Training	19.0% (4)	81.0% (17)
Updated Hardware	23.8% (5)	76.2% (16)
Increased computer literacy of staff	23.8% (5)	76.2% (16)
Relevant text books	23.8% (5)	76.2% (16)
Increased recognition of need for integrating	28.6% (6)	71.4% (15)
Availability of Systems Support	42.9% (9)	57.1% (12)
Funding	52.4% (11)	47.6% (10)

The respondents were asked about the difficulty which they face integrating IT/IS into their courses. Of those responding, more than 80% cited lack of training and the need for more information on how to integrate IT/IS. In addition, more than 70% reported that Staff must become computer literate before students. Table 5-13 reports the obstacles which face the integration of computers into teaching area(s).

Table 5-13 Obstacles facing Integrating IT/IS into USA accounting Programmes

	No %	Yes %
Lack of suitable software	52.4% (11)	47.6% (10)
Lack of suitable hardware	76.2% (16)	23.8% (5)
Too expensive (Financial Shortage)	81.0% (17)	19.0% (4)
Lack of interest in integration	42.9% (9)	57.1% (12)
Lack support systems staff in IT/IS	38.1% (8)	61.9% (13)
Lack of training	19.0% (4)	81.0% (17)
Need more information on how to integrate IT/IS	19.0% (4)	81.0% (17)
Staff must become computer literate before students	28.6% (6)	71.4% (15)
The Number of Students very large in the Lecture	100.0% (21)	(0)

le 5-15 PART B- IT/IS SKILLS/KNOWLEDGE FOR THE ACCOUNTANT AS A USER OF INFORMATION TECHNOLOGY

	Current Situation				Three Years future			
	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %
1		9.5	47.6	42.9			14.3	85.7
2		9.5	52.4	38.1		4.8	9.5	85.7
3	9.5	33.3	52.4	4.8			9.5	90.5
4		19	42.9	38.1			4.8	95.2
5		28.6	38.1	33.3		4.8	14.3	81

With regard to the level of IT/IS skills related to the User role in information technology systems context, the respondents reported that now most of these skills were between moderate and high but should be at the high level in the future. Table 5-15 present the results for these skills.

TABLE 5-16 -PART C- IT/IS SKILLS/KNOWLEDGE FOR ACCOUNTANT AS A MANAGER OF INFORMATION SYSTEMS

	Current Situation				Three Years future			
	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %
M1	38.1	52.4	9.5			42.9	57.1	
M2	14.3	38.1	47.6			4.8	47.6	47.6
M3	28.6	71.4				14.3	71.4	14.3
M4	9.5	76.2	14.3			4.8	71.4	23.8
M5		61.9	38.1			4.8	57.1	38.1
M6	47.6	42.9	9.5		4.8	9.5	76.2	9.5
M7	28.6	57.1	14.3		4.8	23.8	52.4	19
M8	19	71.4	9.5		4.8	4.8	81	9.5
M9	14.3	71.4	14.3			9.5	71.4	19
M10	19	76.2	48		4.8		90.5	4.8
M11	23.8	71.4	4.8			14.3	81	4.8
M12	23.8	47.6	28.6			4.8	66.7	28.6
M13	28.6	52.4	19			9.5	61.9	28.6
M14	28.6	52.4	19				57.1	42.9

It is clear from table 5-16 that the level of IT/IS skills for manager role is low and should be moderate in the future.

le 5-15 PART B- IT/IS SKILLS/KNOWLEDGE FOR THE ACCOUNTANT AS A USER OF INFORMATION TECHNOLOGY

	Current Situation				Three Years future			
	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %
1		9.5	47.6	42.9			14.3	85.7
2		9.5	52.4	38.1		4.8	9.5	85.7
3	9.5	33.3	52.4	4.8			9.5	90.5
4		19	42.9	38.1			4.8	95.2
5		28.6	38.1	33.3		4.8	14.3	81

With regard to the level of IT/IS skills related to the User role in information technology systems context, the respondents reported that now most of these skills were between moderate and high but should be at the high level in the future. Table 5-15 present the results for these skills.

TABLE 5-16 -PART C- IT/IS SKILLS/KNOWLEDGE FOR ACCOUNTANT AS A MANAGER OF INFORMATION SYSTEMS

	Current Situation				Three Years future			
	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %
M1	38.1	52.4	9.5			42.9	57.1	
M2	14.3	38.1	47.6			4.8	47.6	47.6
M3	28.6	71.4				14.3	71.4	14.3
M4	9.5	76.2	14.3			4.8	71.4	23.8
M5		61.9	38.1			4.8	57.1	38.1
M6	47.6	42.9	9.5		4.8	9.5	76.2	9.5
M7	28.6	57.1	14.3		4.8	23.8	52.4	19
M8	19	71.4	9.5		4.8	4.8	81	9.5
M9	14.3	71.4	14.3			9.5	71.4	19
M10	19	76.2	48		4.8		90.5	4.8
M11	23.8	71.4	4.8			14.3	81	4.8
M12	23.8	47.6	28.6			4.8	66.7	28.6
M13	28.6	52.4	19			9.5	61.9	28.6
M14	28.6	52.4	19				57.1	42.9

It is clear from table 5-16 that the level of IT/IS skills for manager role is low and should be moderate in the future.

TABLE 5-17 PART D- IT/IS SKILLS/KNOWLEDGE FOR ACCOUNTANT AS A DESIGNER OF INFORMATION SYSTEMS

	Current Situation				Three Years future			
	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %
D1	33.3	47.6	19			19	61.9	19
D2	71.4	28.6			42.9	57.1		
D3	4.8	61.9	33.3				23.8	76.2
D4	23.8	42.9	33.3			4.8	19	76.2
D5	9.5	66.7	23.8				33.3	66.7
D6	19	52.4	28.6			4.8	23.8	71.4
D7	9.5	61.9	28.6			4.8	52.4	42.9
D8	28.6	52.4	19			23.8	57.1	19
D9	47.6	47.6	4.8			52.4	47.6	
D10	33.3	57.1	9.5			14.3	57.1	28.6
D11	33.3	66.7				28.6	61.9	9.5
D12	52.4	47.6				42.9	57.1	

Table 5-17 presented the results about the level of IT/IS skills related to the Designer role in information systems environment within the business organisations. The level of these skills in accounting programmes now is low but should be moderate and high in the future. Examples are the 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). The level of the skills was moderate for 61.9% but in the future should be moderate (52.4%) and high knowledge (42.9%). System design techniques (D11) for example, data flow diagrams, entity-relationship model, decision tables and trees, prototyping, computer aided software engineering methodology (CASE) show the level is now low (66.7%) but in the future should be moderate (61.9%).

TABLE 5-18 PART E- IT/IS SKILLS/KNOWLEDGE FOR ACCOUNTANT AS AN EVALUATOR OF INFORMATION SYSTEMS

	Current Situation				Three Years future			
	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %
E1	4.8	66.7	28.6				47.6	52.4
E2	14.3	57.1	28.6				9.5	90.5
E3	28.6	38.1	33.3				42.9	57.1
E4	28.6	28.6	28.6	14.2			42.9	57.1
E5	28.6	38.1	33.3				42.9	57.1
E6		52.4	38.1	9.5			38.1	61.9
E7		47.6	52.4				38.1	61.9
E8	33.3	47.6	19				52.4	47.6
E9	38.1	47.6	14.3				52.4	47.6
E10	33.3	47.6	19				28.6	71.4
E11	9.5	81	9.5				52.4	47.6
E12	42.9	28.6	23.8	4.8			47.6	52.4
E13	33.3	47.6	19				47.6	52.4
E14	9.5	52.4	38.1				4.8	95.2

With regard to IT/Is skills for the accountant as a evaluator table 5-18 shows the results for USA sample.

OVERALL "MOST COMMON " RATINGS:

The results related to the overall most common rating for IT/IS skills as general, user, manager, designer, and evaluator are presented in table 5-19

Table 5-19 USA OVERALL "MOST COMMON " RATINGS:

COMPETENCY GENERAL IT/IS	NOW	THREE YEARS FORWARD
G1	1	3
G2	2	3
G3	1	3
G4	1	3
G5	1	3
G6	1	3
G7	1	3
USER IT/IS		
U1	2	3
U2	2	3

Table 5-19 contd.

U3	1	3
U4	2	3
U5	2	3
MANAGER IT/IS		
M1	1	2
M2	2	2
M3	1	2
M4	1	2
M5	1	2
M6	0	2
M7	1	2
M8	1	2
M9	1	2
M10	1	2
M11	1	2
M12	1	2
M13	1	2
M14	1	2
DESIGNER IT/IS		
D1	1	2
D2	0	1
D3	1	3
D4	1	3
D5	1	3
D6	1	3
D7	1	2
D8	1	2
D9	0	1
D10	1	2
D11	1	2
D12	0	2
EVALUATOR IT/IS		
E1	1	3
E2	1	3
E3	1	3
E4	0	3
E5	1	3
E6	1	3
E7	2	3
E8	1	2
E9	1	2
E10	1	3
E11	1	2
E12	0	3
E13	1	3
E14	1	3

It is apparent from table 5-19 that general IT/IS competency (G's) moved from low to high level from now to future. In addition, User skills (U's) moved from moderate to high but the skills and knowledge of manager (M's) and designer (D's) moved from low to only moderate. But the evaluator skills (E's) moved from low to high level.

-IT/IS SKILLS SHOULD BE INCREASED FROM NO KNOWLEDGE NOW TO LOW KNOWLEDGE IN THREE YEARS FORWARD IN THE FUTURE

Table 5-20 USA IT/IS rating form NO to LOW Knowledge

COMPETENCY	NOW	THREE YEARS FORWARD
D2	**0**	**1**
D9	**0**	**1**

Table 5-20 shows IT/IS skills that increased from no knowledge now to low knowledge in three years forward in the future. This is concerned with the ability to write simple file-processing and report-writing routines in several common programming languages e.g. COBOL, C, C++ (D2) and Algorithm Concepts and Information Management (D9) such as algorithm planning and processing information systems, algorithm validation concepts, algorithm technology and database management)

-IT/IS SKILLS SHOULD BE INCREASED FROM NO KNOWLEDGE NOW TO MODERATE KNOWLEDGE IN THREE YEARS FORWARD IN THE FUTURE

Table 5-21 USA IT/IS rating form NO to MODERATE Knowledge

COMPETENCY	NOW	THREE YEARS FORWARD
M6	**0**	**2**
D12	**0**	**2**

Table 5-21 presents IT/IS skills which should be increased from no knowledge now to moderate knowledge in three years in the future. This is concerned with the ability to make a selection and acquire hardware/software (including contract negotiation) (M6) and System acquisition/development life cycle phases tasks and practices. It also covers 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.

-IT/IS SKILLS SHOULD BE INCREASED FROM NO KNOWLEDGE NOW TO HIGH KNOWLEDGE IN THREE YEARS FORWARD IN THE FUTURE
(a most common rating of 0 to 3)

Table 5-22 IT/IS rating form NO to HIGH Knowledge

COMPETENCY	NOW	THREE YEARS FORWARD
E4	0	3
E12	0	3

Table 5-22 appears IT/IS skills should be increased from no knowledge now to high knowledge in three years forward in the future. It deals with the ability to specify, identifies, and documents financial and operational controls in computer-based systems (E4) and communicating results of evaluations (E12) for example types of reports, levels of assurance.

-IT/IS SKILLS SHOULD BE INCREASED FROM LOW KNOWLEDGE NOW TO MODERATE KNOWLEDGE IN THREE YEARS FORWARD IN THE FUTURE
(a most common rating of 1 to 2)

Table 5-23 IT/IS rating form LOW Knowledge to MODERATE

COMPETENCY	NOW	THREE YEARS FORWARD
M1	1	2
M3	1	2
M4	1	2
M5	1	2
M7	1	2
M8	1	2
M9	1	2
M10	1	2
M11	1	2
M12	1	2
M13	1	2
M14	1	2
D1	1	2
D7	1	2
D8	1	2
D10	1	2
D11	1	2
E8	1	2
E9	1	2
E11	1	2

From table 5-23 you can see IT/IS skills that should be increased from low knowledge now to moderate knowledge in three years forward in the future. This concerns all IT/IS skills as manager located in this category except the Management of Accounting Information Systems (M2) and Information Systems (IS) Design and Implementation (D1), Ability to participate as part of a system development team with an appreciation of information system development theories (D7). It also deals with knowledge of and ability to use state-of-the-art system analysis and design techniques (D8) and knowledge in the role of information in organisation design and behaviour (D10) and System design techniques (D11). Finally, it covers evaluation of Decision Support Systems (E8), Legal, ethical, auditing and information system control standards (E9) and Evaluation objectives (E10).

-IT/IS SKILLS SHOULD BE INCREASED FROM LOW KNOWLEDGE NOW TO HIGH KNOWLEDGE IN THREE YEARS FORWARD IN THE FUTURE
(a most common rating of 1 to 3)
Table 5-24 IT/IS rating form LOW Knowledge to HIGH

COMPETENCY	NOW	THREE YEARS FORWARD
G1	1	3
G3	1	3
G4	1	3
G5	1	3
G6	1	3
G7	1	3
U3	1	3
D3	1	3
D4	1	3
D5	1	3
D6	1	3
E1	1	3
E2	1	3
E3	1	3
E5	1	3
E6	1	3
E10	1	3
E13	1	3
E14	1	3

Table 5-24 presented IT/IS skills should be increased from low knowledge now to high knowledge in three years forward in the future which are the following:

Information Systems Technology (G1), Files/Databases (G3), Communication Technology (G4), Role of information within business and Information Management (G5), Electronic Commerce (Telecommunication in Business On-line Resource) (G6), Administrative Issues (G7), Ability to use database service and Internet for financial reporting and disclosure (U3), Knowledge of financial accounting, managerial accounting, auditing and ability to use state-of-the-art system analysis and design techniques (D3), Ability to design and apply computer-assisted auditing techniques for a variety of audit purposes (D4), Ability to design and use decision support aids and financial modelling tools (D5), Ability to design financial databases for planning and control purposes (D6).

-IT/IS SKILLS SHOULD BE INCREASED FROM MODERATE KNOWLEDGE NOW TO HIGH KNOWLEDGE IN THREE YEARS FORWARD IN THE FUTURE (a most common rating of 2 to 3)

TABLE 5-25 IT/IS rating form MODERATE to HIGH Knowledge

COMPETENCY	NOW	THREE YEARS FORWARD
G2	2	3
U1	2	3
U2	2	3
U4	2	3
U5	2	3
E7	2	3

It is clear from table 5-25 that IT/IS skills should be increased from moderate knowledge now to high knowledge in three years forward in the future are Computer-Based Accounting Systems (G2), Hands-on exposure to major program products (day-to-day application) (U1), Ability to use Accounting Systems packages (U2), Ability to search On-line Public Access Databases (U4) and Ability to understand the structure of typical computerised accounting systems and subsystems (U5). Also, Accounting systems internal control (E7).

-IT/IS SKILLS SHOULD BE THE SAME LEVEL FROM MODERATE KNOWLEDGE NOW TO MODERATE KNOWLEDGE IN THREE YEARS FORWARD IN THE FUTURE (a most common rating of 2 to 2)

Table 5-26 IT/IS rating form MODERATE TO MODERATE Knowledge

COMPETENCY	NOW	THREE YEARS FORWARD
M2	2	2

Table 5-26 shows that IT/IS skills should be the same level from moderate knowledge now to moderate knowledge in three years forward in the future is Decision Support Systems (M12).

3-1-4 HOW SHOULD IT/IS SKILLS/KNOWLEDGE DELIVERED

In this section the respondent was asked how the following IT/IS skills/knowledge should be delivered into accounting programmes by inserting a percentage in each column (rows should sum to 100%). The respondent was given three options in three columns. Firstly, Individual IT/IS courses, secondly, Accounting courses, lastly, Workplace. Table 5-27 shows the results as a percentage and Appendix 24 shows the results in graphics.

TABLE 5-27 USA RESULTS ABOUT HOW SHOULD IT/IS SKILLS/KNOWLEDGE DELIVERED

	Individual IT/IS course %	Accounting course %	Work %
A- GENERAL INFORMATION TECHNOLOGY KNOWLEDGE			
1-Information Systems Technology	55.50	22.50	22.00
2-Computer-Based Accounting Systems	22.50	90.00	17.50
3-Files/Databases	59.00	35.50	5.50
4-Communication Technology	46.50	17.50	35.00
5-Role of information within business and Information Management	35.50	22.50	42.00
6-Electronic Commerce (Telecommunication in Business On-line Resource)	42.00	26.00	32.00
7-Administrative Issues	25.50	28.00	46.50
B- IT/IS SKILLS/KNOWLEDGE AS USER			
1-Hands-on exposure to major program products (day-to-day application)	59.00	18.00	23.00
2-Ability to use Accounting Systems packages	5.00	90.00	5.00
3-Ability to use database service and Internet for financial reporting and disclosure	24.00	54.50	21.50
4-Ability to search On-line Public Access Databases	61.00	19.50	19.50
5-Ability to understand the structure of typical computerised accounting systems and subsystems	25.00	53.50	21.50
C- IT/IS SKILLS/KNOWLEDGE AS MANAGER			
1-Data Resource Structures and Administration	40.00	18.00	42.00
2-Management of Accounting Information Systems	12.50	78.50	9.00
3-Global Information Management	64.50	9.00	26.50
4-Executive Information Systems Management	39.00	22.00	39.00
5-Ability to use financial database for planning and control purposes	59.50	17.00	22.00
6-Ability for selection and acquisition of hardware/software	64.00	14.50	21.50
7-Ability for reinforcement of investment analysis using software	30.00	32.50	38.00
8-Ability to participate as part of system development team worth an appreciation of information and methods, behavioural consequences of project management	23.00	31.00	46.00

Continue Table 5-27

9-Understanding of the methods of operating and managing business systems once implemented	20.50	12.50	67.00
10-Understanding of the system development life cycle, its phases, and management principles for the system development process	44.00	21.00	35.00
11-Appreciation of the social, economic, and legal implications of computer technology, including effects of automation on work, institutions, and freedoms	40.00	18.50	41.50
12-Decision Support Systems	46.00	15.00	39.00
13-Strategic considerations in IT/IS development	65.50	12.00	22.50
14-Administrative issues	27.00	27.00	46.00
D- IT/IS SKILLS/KNOWLEDGE AS DESIGNER			
1-Information Systems (IS) Design and Implementation	38.00	16.00	46.00
2-Ability to write simple file-processing and report-writing routines in several common programming languages e.g. COBOL, C, C++	48.50	2.50	49.00
3-Knowledge of financial accounting, managerial accounting, auditing and ability to use state-of-the-art system analysis and design techniques	22.50	70.50	7.00
4-Ability to design and apply computer-assisted auditing techniques for a variety of audit purposes.	20.50	70.00	9.50
5-Ability to design and use decision support aids and financial modelling tools	40.00	54.50	5.50
6-Ability to design financial databases for planning and control purposes	32.00	34.50	34.00
7-Ability to participate as part of a system development team with an appreciation of information system development theories	59.50	18.00	22.50
8-Knowledge of and ability to use state-of-the-art system analysis and design techniques	55.00	18.50	26.50
9-Algorithm Concepts and Information Management	74.50	5.00	20.50
10-Knowledge in the role of information in organisation design and behaviour	57.50	18.50	24.00
11-System design techniques	59.50	16.50	24.00
12-System acquisition/development life cycle phases, tasks and practices and maintaining control over system development processes	55.50	20.00	24.50
E- IT/IS SKILLS/KNOWLEDGE AS EVALUATOR			
1-Internal control in computer-based systems	22.50	60.50	17.50
2-Understanding of characteristics of EDP systems, their major components , and methods of operation	33.00	39.50	28.00
3-Ability to design and apply computer-assisted audit techniques for a variety of audit purposes	25.00	65.00	11.50
4-Ability to specify, identifies, and documents financial and operational controls in computer-based systems.	24.50	55.00	20.50
5-Ability to evaluate effectiveness and efficiency of management and operations in computer-based system	28.00	32.50	39.50
6-Auditing of Accounting Information Systems	18.50	67.50	13.50
7-Accounting systems internal control	18.00	69.00	13.00
8-Evaluation of Decision Support Systems	30.00	51.00	19.00
9-Legal, ethical, auditing and information system control standards	28.00	49.50	22.50
10-Evaluation objectives	30.00	34.50	35.00
11-Evaluation methods and techniques	32.00	36.50	32.00
12-Communicating results of evaluations	32.00	36.00	32.50
13-Specific types of evaluations	30.50	36.50	33.50
14-Computer-assisted audit techniques (CAATs)	22.50	64.00	13.50

3-2 REPORTING OF UK DATA.

Tables 5-28 to 5-37 present the demographic data

Table 5-28 Response Rate of the UK Group

Questionnaire Forwarded	Questionnaire Returned	Questionnaire Used	Response Rate
110	58	53	52%

The response rate in UK sample was more than 5o% (52%)

3-2-2 GENERAL

Table 5-29 Please indicate gender

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	38	71.7	71.7	71.7
Female	15	28.3	28.3	100.0
Total	53	100.0	100.0	

Table 5-30 Academic position for the respondent:

	Frequency	Percent	Valid Percent	Cumulative Percent
Lecturer	19	35.8	35.8	35.8
Senior Lecturer	23	43.4	43.4	79.2
Professor	9	17.0	17.0	96.2
Reader	2	3.8	3.8	100.0
Total	53	100.0	100.0	

Table 5-31 Accounting degrees that Accounting Department offers:

Degree offers	Frequency		Percent	
	NO	YES	NO	YES
Bachelor in Accounting		53		100
Postgraduate Diploma	41	12	77.4	22.6
Master in Accounting	15	38	28.3	71.7
PhD in Accounting	15	38	28.3	71.7

Table 5-32 Overall level of IT/IS experience for the respondent:

	Frequency	Percent	Valid Percent	Cumulative Percent
Highly experienced	22	41.5	41.5	41.5
Fairly experienced	27	50.9	50.9	92.5
Novice	4	7.5	7.5	100.0
Total	53	100.0	100.0	

The overall level of IT/IS experience for the respondents was more than 40% (41.5%) High, and nearly 50% fairly as it table 5-32 shows.

5-33 The numbers of years teaching Accounting experience:

	Frequency	Percent	Valid Percent	Cumulative Percent
Less than 1 year	1	1.9	1.9	1.9
1-5 Years	21	39.6	39.6	41.5
6-10 Years	13	24.5	24.5	66.0
11-14 years	9	17.0	17.0	83.0
15-20 years	7	13.2	13.2	96.2
More than 20 years	2	3.8	3.8	100.0
Total	53	100.0	100.0	

Table 5-33 shows that teaching accounting experience for the respondents was nearly 40% from 1-5 years and nearly 25% from 6-10 years.

Table 5-34 Do you hold any accounting professional qualification?

	Frequency	Percent	Valid Percent	Cumulative Percent
NO	13	24.5	24.5	24.5
YES	40	75.5	75.5	100.0
Total	53	100.0	100.0	

More than 75% hold accounting professional qualification and only 24% do not.

Table 5-35 which of the following professional qualification you have obtained?

	Frequency	Percent	Valid Percent	Cumulative Percent
(ICAEW) The Institute of Chartered Accountants in England and Wales	13	24.5	24.5	24.5
(CIMA) The Chartered Institute of Management Accountants	6	11.3	11.3	35.8
(ACCA) The Association of Chartered Certified Accountants	10	18.9	18.9	54.7
(CIPFA) The Chartered Institute of Public Finance and Accountancy	1	1.9	1.9	56.6

Table 5-35 contd.

(ICAS) The Institute of Chartered Accountants of Scotland	7	13.2	13.2	69.8
(ICAI) The Institute of Chartered Accountants of Ireland	2	3.8	3.8	73.6
Other	1	1.9	1.9	75.5
Do Not Have	13	24.5	24.5	100.0
Total	53	100.0	100.0	

Highest academic qualification

When the respondents in UK sample were asked about the highest qualification they have obtained most of the respondents answer were others like: Master degree in non-accounting like Master in IT, Master in Operational research, Master in Engineering (Chemical Engineering), Master in Data Processing, master degree in management science, MBA, Master in Higher Education, Master degree in Computing, master degree in economics. Bachelor in Non-Accounting, like BA Eco. PhD in Management science. The results appear in table 5-36

Table 5-36 Highest academic qualification

	Frequency	Percent	Valid Percent	Cumulative Percent
Bachelor in Accounting	2	3.8	3.8	3.8
Bachelor in non-Accounting	7	13.2	13.2	17.0
Postgraduate Diploma in Accounting	1	1.9	1.9	18.9
Master's Degree in Accounting	17	32.1	32.1	50.9
Doctoral Degree in Accounting	6	11.3	11.3	62.3
Master's Degree in Non-Accounting	18	34.0	34.0	96.2
Ph.D. in Non-Accounting	2	3.8	3.8	100.0
Total	53	100.0	100.0	

Table 5-37 From which country is your highest academic Qualification?

	Frequency	Percent	Valid Percent	Cumulative Percent
USA	3	5.7	5.7	5.7
UK	50	94.3	94.3	100.0
Total	53	100.0	100.0	

The majority (94.3%) of the respondents have their highest academic qualification from UK and the rest from USA.

3-2-3- OPINION ABOUT THE CURRENT STATE AND FUTURE FOR IT/IS ACCOUNTING PROGRAMMES

The question about the current state and the future for IT/IS skills in accounting programmes in UK universities was asked. Therefore, seventeen statements as an explanation were stated in the table 5-38.

Table 5-38 UK OPINION ABOUT THE CURRENT STATE AND FUTURE FOR IT/IS ACCOUNTING PROGRAMMES

	Strongly agree %	Agree %	Neutral %	Disagree %	Strongly disagree %	Total %
1- Accounting education equips students with IT/IS skills for their role beyond graduation in their employment		22.6 12	20.8 11	45.3 24	11.3 6	100.0% 53
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	56.6 30	39.6 21	1.9 1	1.9 1		100.0% 53
3-IT/IS skills in accounting training at undergraduate level are not adequately covered	22.6 12	62.3 33	7.5 4	5.7 3	1.9 1	100.0% 53
4-Most IT/IS syllabuses in accounting degrees concentrate on programming languages rather than looking at the broad issues of IT/IS		15.1 8	22.6 12	56.6 30	5.7 3	100.0% 53
5- University does not provide sufficient grounding in the use of IT/IS in a commercial environment	22.6 12	54.7 29	11.3 6	7.5 4	3.8 2	100.0% 53
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	22.6 12	54.7 29	9.4 5	11.3 6	1.9 1	100.0% 53
7- University lecturers do not possess the necessary IT skills and knowledge to teach IT successfully in accounting	47.2 25	35.8 19	9.4 5	5.7 3	1.9 1	100.0% 53
8- The accounting profession, industry and commerce are unable to specify what IT/IS they require to be taught at university	15.1 8	54.1 29	22.6 12	5.7 3	1.9 1	100.0% 53
9- The business community and those involved in accounting education must first decide what their objectives are with regard to IT training	37.7 20	58.5 31	3.8 2			100.0% 53
10- Communication between the business community and universities needs to be improved so that IT training can more closely match needs	37.7 20	62.3 33				100.0% 53

Table 5-38 contd.

11 Having more IT/IS available in undergraduate accounting makes students more effective in their employment and improve their work	**39.6** **21**	**58.5** **31**	**1.9** **1**			**100.0%** **53**
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	**34** **18**	**60.4** **32**	**3.8** **2**	**1.9** **1**		**100.0%** **53**
13- Accounting students should gain " Hands- on " experience of computers, not just BASIC or FORTRAN and C++ programming	**50.9** **27**	**47.2** **25**	**1.9** **1**			**100.0%** **53**
14- Accounting students should have experience in the use of applications , such as spreadsheets , word-processing, data base management and accounting packages	**54.7** **29**	**44.3** **24**				**100.0%** **53**
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	**3.8** **2**	**56.6** **30**	**22.8** **11**	**18.9** **10**		**100.0%** **53**
16- IT/IS education at University level is mostly theoretical	**7.5** **4**	**26.4** **14**	**24.5** **13**	**39.6** **21**	**1.9** **1**	**100.0%** **53**
17- The use of computers in accounting practice enhances the efficiency and effectiveness of the accountant's work	**67.9** **36**	**32.1** **17**				**100.0%** **53**

It clear from table 5-39 that the accounting educators in the UK sample are dissatisfied about the content and the delivery of IT/IS skills. Of those responding, more than 55% (58.5%) are dissatisfied about the content and more than 65% (66%) dissatisfied about the delivery.

Table 5-39 UK 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	**1.9** **1**	**20.8** **11**	**11.3** **6**	**58.5** **31**	**7.5** **4**	**100.0%** **53**
Satisfied degree with the DELIVERY of IT/IS skills/knowledge into accounting curriculum		**18.9** **10**	**7.5** **4**	**66** **35**	**7.5** **4**	**100.0%** **53**

The respondents were asked about what was helpful in increasing integration of IT/IS into accounting education. Of those responding, more than 85% (86.4%) chose updated software. 92% chose staff training. Increased computer literacy of staff was more than 90%. Other factors also were reported as show in table 5-40

Table 5-40 Helpful for Integrating IT/IS into UK accounting programmes

	NO %	YES %
Staff Training	7.5	92.5
Updated Software	13.2	86.8
Updated Hardware	28.3	71.7
Funding	34	66
Increased computer literacy of staff	9.4	90.6
Increased recognition of need for integrating	13.2	86.8
Relevant text books	32.1	67.9
Availability of Systems Support	24.5	75.5

·The Obstacles which face the integration of computers into teaching area(s)?

Table 5-41 Obstacles facing Integrating IT/IS into UK accounting Programmes

	NO (%)	YES (%)
Lack of suitable software	41.5	58.5
Lack of suitable hardware	47.2	52.8
Too expensive (Financial Shortage)	47.2	52.8
Lack of interest in integration	35.8	64.2
Lack support systems staff in IT/IS	28.3	71.7
Lack of training	18.9	81.1
Need more information on how to integrate IT/IS	28.3	71.7
Staff must become computer literate before students	17	83

The best way for the delivery of IT/IS training in accounting programme:

Table 5-42

Individual IT/IS skills/knowledge courses	20%
Integrating IT/IS skills/knowledge into the accounting courses	30%
Combination of two above	80%
Workplace	70%

3-2-4 WHAT IT/IS SKILLS/KNOWLEDGE SHOULD BE INTEGRATED INTO ACCOUNTING PROGRAMMES?

In this section the respondent was ask to use a 4 point scale (**No Knowledge, Low Knowledge, Moderate Knowledge and High Knowledge**) to indicate his **assessment** about IT/IS both at **PRESENT in his accounting department, CURRENT SITUATION NOW** and what should be integrated into accounting education in **THREE YEARS** into the future for parts A, B, C, D, E. The results appears in tables 5-42 to 5-46

TABLE 5-43 PART A- GENERAL INFORMATION TECHNOLOGY KNOWLEDGE

	Current Situation				Three Years future			
	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %
[illegible]	13.2	43.4	41.5	1.9		1.9	30.2	67.9
[illegible]	15.1	45.3	24.5	15.1		1.9	45.3	52.8
[illegible]	5.7	66	26.4	1.6		7.5	17	75.5
[illegible]	5.7	62.3	30.2	1.9			20.8	79.2
[illegible]	26.4	49.1	24.5			3.8	32.1	64.2
[illegible]	24.5	60.4	15.1			13.2	11.3	75.5
[illegible]	22.6	56.6	20.8			15.1	34	50.9

It is clear from table 5-43 that the level of General IT/IS knowledge now is mostly low and moderate but it should be in the future mostly high. For example, for Information Systems Technology (G1) now, the level in accounting programmes is between low and moderate (43.4%) (41.5%) but in the future it should be high.

TABLE 5-44 PART B- IT/IS SKILLS/KNOWLEDGE FOR THE ACCOUNTANT AS A USER OF INFORMATION TECHNOLOGY

	Current Situation				Three Years future			
	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %
[illegible]	3.8	30.2	37.7	28.3			7.5	92.5
2		41.5	41.5	17		1.9	26.4	71.7
3	26.4	54.7	18.9			11.3	34	54.7
4		52.8	39.6	7.5		1.9	22.6	75.5
5	5.7	47.2	30.2	17		11.3	17	71.7

With regard to IT/IS skills for accountants as a user it is mostly low now but it should be high in the future. The results are in table 5-44.

TABLE 5-45 PART C- IT/IS SKILLS/KNOWLEDGE FOR ACCOUNTANT AS A MANAGER OF INFORMATION SYSTEMS

	Current Situation				Three Years future			
	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %
M1	35.8	49.1	15.1		7.5	7.5	62.3	22.6
M2	20.8	45.3	34		5.7	5.7	49.1	39.6
M3	28.3	64.2	7.5			9.4	60.4	30.2
M4	20.8	64.2	15.1			5.7	50.9	43.4
M5	18.9	37.7	38.6	3.8		1.9	45.3	52.8

Table 5-46 contd.

6	39.6	43.4	17		9.4	15.1	39.6	35.8
7	20.8	64.2	11.3	3.8		7.5	67.9	24.5
8	30.2	47.2	22.6		9.4	11.3	54.7	24.5
9	20.8	56.6	22.6		5.7	7.5	64.2	22.6
10	37.7	49.1	13.2		7.5	13.2	62.3	17
11	43.4	49.1	7.5			11.3	67.9	20.8
12	18.9	62.3	18.9			1.9	66	32.1
13	35.8	45.3	18.9			13.2	62.3	24.5
14	34	52.8	13.2			9.4	54.7	35.8

Table 5-45 shows the results about the level of IT/IS skills knowledge for the accountant as manager for information systems in the organisation.

TABLE 5-46 PART D- IT/IS SKILLS/KNOWLEDGE FOR ACCOUNTANT AS A DESIGNER OF INFORMATION SYSTEMS

	Current Situation				Three Years future			
	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %	No Knowledge %	Low Knowledge %	Moderate Knowledg e %	High Knowledge %
D1	30.2	52.8	17		3.8	15.1	64.2	17
D2	79.2	20.8			35.8	58.5	5.7	
D3	28.3	49.1	22.6		1.9	22.6	39.6	35.8
D4	39.6	49.1	11.3			11.3	47.2	41.5
D5	28.3	56.6	15.1		5.7	20.8	43.4	30.2
D6	26.4	54.7	18.9			24.5	41.5	34
D7	22.6	56.6	20.8		1.9	30.2	41.5	26.4
D8	22.6	64.2	13.2			32.1	52.8	15.1
D9	50.9	49.1			3.8	41.5	52.8	1.9
D10	32.1	66	1.9		1.9	43.4	47.2	7.5
D11	37.7	58.5	3.8			43.4	54.7	1.9
D12	28.3	66	5.7			34	60.4	5.7

As you can see from table 5-46 the level of IT skills required in accounting programmes in the UK universities for designer for information systems skills is low knowledge but in three years forward should be moderate

TABLE 5-47 PART E- IT/IS SKILLS/KNOWLEDGE FOR ACCOUNTANT AS AN EVALUATOR OF INFORMATION SYSTEMS

	Current Situation				Three Years future			
	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %
[illegible]	15.1	56.6	28.3			13.2	37.7	48.1
[illegible]	35.8	35.8	24.5	3.8	11.3	1.9	28.3	58.5
[illegible]	24.5	50.9	24.5		3.8	9.4	50.9	35.8
[illegible]	26.4	43.4	24.5	5.7	7.5	3.8	45.3	43.4
5	22.6	50.9	26.4			11.3	47.2	41.5
6	18.9	52.8	24.5	3.8	3.8	9.4	45.3	41.5
7	13.2	56.6	30.2			11.3	45.3	43.4
8	13.2	73.6	13.2		3.8		58.5	37.7
9	26.4	64.2	9.4			5.7	64.2	30.2
10	22.6	56.6	20.8		3.8	1.9	43.4	50.9
11	34	58.4	7.5		1.9	3.8	56.6	37.7
12	30.2	49.1	18.9	1.9	1.9	11.3	45.3	41.5
13	22.6	66	11.3			1.9	58.5	39.6
14	26.4	52.8	20.8		1.9	1.9	35.8	60.4

Table 5-47 shows the results relating to the level of IT/IS skills in accounting education in UK sample.

OVERALL "MOST COMMON " RATINGS:

The results relating to the overall most common rating for IT/IS skills as general, user, manager, designer, and evaluator are presented in table 5-48

TABLE 5-48 UK OVERALL "MOST COMMON " RATINGS:

COMPETENCY	NOW	THREE YEARS FORWARD
GENERAL IT/IS		
G1	1	3
G2	1	3
G3	1	3
G4	1	3
G5	1	3
G6	1	3
G7	1	3
USER IT/IS		
U1	2	3
U2	1	3
U3	1	3

Continue Table 5-48

U4	1	3
U5	1	3
MANAGER IT/IS		
M1	1	2
M2	1	2
M3	1	2
M4	1	2
M5	2	3
M6	1	2
M7	1	2
M8	1	2
M9	1	2
M10	1	2
M11	1	2
M12	1	2
M13	1	2
M14	1	2
DESIGNER IT/IS		
D1	1	2
D2	0	1
D3	1	2
D4	1	2
D5	1	2
D6	1	2
D7	1	2
D8	1	2
D9	0	2
D10	1	2
D11	1	2
D12	1	2
EVALUATOR IT/IS		
E1	1	3
E2	0	3
E3	1	2
E4	1	2
E5	1	2
E6	1	2
E7	1	2
E8	1	2
E9	1	2
E10	1	3
E11	1	2
E12	1	2
E13	1	2
E14	1	3

It is apparent from table 5-48 that general IT/IS competency (G's) moved from low to high level from now to future. In addition, User skills (U's) moved from moderate to high but the skills and knowledge of manager (M's) and designer (D's) moved from low to only moderate. But the evaluator skills (E's) moved from low to high level.

-IT/IS SKILLS SHOULD BE INCREASED FROM NO KNOWLEDGE NOW TO LOW KNOWLEDGE IN THREE YEARS FORWARD IN THE FUTURE (a most common rating of 0 to 1)

TABLE 5-49 UK IT/IS rating form NO to LOW Knowledge

COMPETENCY	NOW	THREE YEARS FORWARD
D2	0	1

Table 5-49 shows that the IT/IS skills which should be increased from no knowledge now to low knowledge in three years forward in the future in the accounting education in the UK sample is the ability to write simple file-processing and report-writing routines in several common programming languages e.g. COBOL, C, C++.

-IT/IS SKILLS SHOULD BE INCREASED FROM NO KNOWLEDGE NOW TO MODERATE KNOWLEDGE IN THREE YEARS FORWARD IN THE FUTURE (a most common rating of 0 to 2)

TABLE 5-50 UK IT/IS rating form NO to MODERATE Knowledge

COMPETENCY	NOW	THREE YEARS FORWARD
D9	0	2

The IT/IS skills which should be increased from no knowledge now to moderate knowledge in three years forward in the future (see table 5-50) is Algorithm Concepts and Information Management such as algorithm planning and processing information systems, algorithm validation concepts, algorithm technology and database management.

-IT/IS SKILLS SHOULD BE INCREASED FROM NO KNOWLEDGE NOW TO HIGH KNOWLEDGE IN THREE YEARS FORWARD IN THE FUTURE (a most common rating of 0 to 3)

TABLE 5-51 UK IT/IS rating form NO to HIGH Knowledge

COMPETENCY	NOW	THREE YEARS FORWARD
E2	0	3

The IT/IS skills which should be increased from no knowledge now to high knowledge in three years forward in the future (see table 5-51) involves the understanding of characteristics of EDP systems, their major components, and methods of operation.

-IT/IS SKILLS SHOULD BE INCREASED FROM LOW KNOWLEDGE NOW TO MODERATE KNOWLEDGE IN THREE YEARS FORWARD IN THE FUTURE (a most common rating of 1 to 2)

TABLE 5-52 UK IT/IS rating form LOW Knowledge to Moderate

COMPETENCY	NOW	THREE YEARS FORWARD
M1	1	2
M2	1	2
M3	1	2
M4	1	2
M6	1	2
M7	1	2
M8	1	2
M9	1	2
M10	1	2
M11	1	2
M12	1	2
M13	1	2
M14	1	2
D1	1	2
D3	1	2
D4	1	2
D5	1	2
D6	1	2
D7	1	2
D8	1	2

TABLE 5-52 contd.

D10	1	2
D11	1	2
D12	1	2
E3	1	2
E4	1	2
E5	1	2
E6	1	2
E7	1	2
E8	1	2
E9	1	2
E11	1	2
E12	1	2
E13	1	2

Table 5-52 shows that IT/IS skills should be increased from low knowledge now to moderate knowledge in three years forward in the future are including most of manager skills as follows:

-Data Resource Structures and Administration (M1)

-Management of Accounting Information Systems (M2)

-Global Information Management (M3)

-Executive Information Systems Management (M4)

-Ability for selection and acquisition of hardware/software (M6)

-Ability for reinforcement of investment analysis using software (M7)

-Ability to participate as part of system development team worth an appreciation of information and methods, behavioural consequences of project management (M8)

-Understanding of the methods of operating and managing business systems once implemented (M9)

-Understanding of the system development life cycle, its phases, and management principles for the system development process (M10)

-Appreciation of the social, economic, and legal implications of computer technology, including effects of automation on work, institutions, and freedoms (M11)

-Decision Support Systems (M12)

-Strategic considerations in IT/IS development (M13)

-Administrative issues (M14).

Also some IT/IS skills for designer role are included such as:

-Information Systems (IS) Design and Implementation (D1)

-Knowledge of financial accounting, managerial accounting, auditing and ability to use state-of-the-art system analysis and design techniques (D3)

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

-Ability to design and use decision support aids and financial modelling tools (D5)

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

-Ability to participate as part of a system development team with an appreciation of information system development theories (D7)

-Knowledge of and ability to use state-of-the-art system analysis and design techniques (D8)

-Knowledge in the role of information in organisation design and behaviour (D10)

-System design techniques (D11)

-System acquisition/development life cycle phases, tasks and practices and maintaining control over system development processes D12).

In addition, some IT/IS skills for the accountant as evaluator for information systems are included as follows:

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

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

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

-Auditing of Accounting Information Systems (E6)

-Accounting systems internal control (E7)

-Evaluation of Decision Support Systems (E8)

-Legal, ethical, auditing and information system control standards (E9)

-Evaluation methods and techniques (E11)

-Communicating results of evaluations (E12)

-Specific types of evaluations (E13).

-IT/IS SKILLS SHOULD BE INCREASED FROM LOW KNOWLEDGE NOW TO HIGH KNOWLEDGE IN THREE YEARS FORWARD IN THE FUTURE (a most common rating of 1 to 3)

TABLE 5-53 UK IT/IS rating form LOW Knowledge to HIGH

COMPETENCY	NOW	THREE YEARS FORWARD
G1	**1**	**3**
G2	**1**	**3**
G3	**1**	**3**
G4	**1**	**3**
G5	**1**	**3**
G6	**1**	**3**
G7	**1**	**3**
U2	**1**	**3**
U3	**1**	**3**
U4	**1**	**3**
U5	**1**	**3**
E1	**1**	**3**
E10	**1**	**3**
E14	**1**	**3**

Table 5-53 shows the IT/IS skills that should be increased from low knowledge now to high knowledge in three years forward in the future are:

A-GENERAL IT/IS skills:

-Information Systems Technology (G1)

-Computer-Based Accounting Systems (G2)

-Files/Databases (G3)

-Communication Technology (G4)

-Role of information within business and Information Management (G5)

-Electronic Commerce (Telecommunication in Business On-line Resource) (G6)

-Administrative Issues (G7)

B- IT/IS SKILLS/KNOWLEDGE AS USER

-Ability to use Accounting Systems packages (U2)

-Ability to use database service and Internet for financial reporting and disclosure (U3)

-Ability to search On-line Public Access Databases (U4)

-Ability to understand the structure of typical computerised accounting systems and subsystems (U5).

C- IT/IS SKILLS/KNOWLEDGE AS EVALUATOR.

-Internal control in computer-based systems (E1)

-Evaluation objectives (E10)

-Computer-assisted audit techniques (CAATs) (E14)

-IT/IS SKILLS SHOULD BE INCREASED FROM MODERATE KNOWLEDGE NOW TO HIGH KNOWLEDGE IN THREE YEARS FORWARD IN THE FUTURE (a most common rating of 2 to 3)

TABLE 5-54 UK IT/IS rating form MODERATE to HIGH Knowledge

COMPETENCY	NOW	THREE YEARS FORWARD
U1	**2**	**3**
M5	**2**	**3**

Table 5-54 shows that IT/IS skills should be increased from moderate knowledge now to high knowledge in three years forward in the future are Hands-on exposure to major program products (day-to-day application) for example word processors, spread sheets, statistical packages, database management system, etc. and Ability to use financial database and spreadsheet for planning and control purposes.

3-2-5 HOW SHOULD IT/IS SKILLS/KNOWLEDGE DELIVERED?

In this section the respondent was asked how the following IT/IS skills/knowledge should be delivered into accounting programmes by inserting a percentage in each column (rows should sum to 100%). The respondent was given three options in three columns. Firstly, Individual IT/IS courses, secondly, Accounting courses, lastly, Workplace. Table 5-54 shows the results represented as means and appendix 25 shows the results in graphics.

TABLE 5-55 UK RESULTS ABOUT HOW SHOULD IT/IS SKILLS/KNOWLEDGE DELIVERED

	Individual IT/IS course %	Accounting course %	Work %
A- GENERAL INFORMATION TECHNOLOGY KNOWLEDGE			
1-Information Systems Technology	53.50	23.75	22.75
2-Computer-Based Accounting Systems	23.75	87.50	18.75
3-Files/Databases	56.00	38.25	5.75
4-Communication Technology	43.75	19.00	36.25
5-Role of information within business and Information Management	36.25	23.50	40.25
6-Electronic Commerce (Telecommunication in Business On-line Resource)	43.25	26.00	30.75

TABLE 5-55 contd.

7-Administrative Issues	25.50	28.25	46.25
B-IT/IS SKILLS/KNOWLEDGE AS USER			
1-Hands-on exposure to major program products (day-to-day application)	54.50	20.25	25.25
2-Ability to use Accounting Systems packages	5.00	88.75	6.25
3-Ability to use database service and Internet for financial reporting and disclosure	22.75	53.50	23.75
4-Ability to search On-line Public Access Databases	56.00	21.50	22.50
5-Ability to understand the structure of typical computerised accounting systems and subsystems	24.25	53.25	22.50
C-IT/IS SKILLS/KNOWLEDGE AS MANAGER			
1-Data Resource Structures and Administration	39.49	18.46	42.05
2-Management of Accounting Information Systems	14.00	76.00	10.00
3-Global Information Management	63.00	9.75	27.25
4-Executive Information Systems Management	38.75	21.50	39.75
5-Ability to use financial database for planning and control purposes	58.50	17.75	23.00
6-Ability for selection and acquisition of hardware/software	63.75	15.25	21.00
7-Ability for reinforcement of investment analysis using software	29.50	33.50	37.25
8-Ability to participate as part of system development team worth an appreciation of information and methods, behavioural consequences of project management	23.33	30.77	45.90
9-Understanding of the methods of operating and managing business systems once implemented	21.54	13.59	64.87
10-Understanding of the system development life cycle, its phases, and management principles for the system development process	45.38	20.26	34.36
11-Appreciation of the social, economic, and legal implications of computer technology, including effects of automation on work, institutions, and freedoms	41.03	18.21	40.77
12-Decision Support S tems	44.62	15.90	39.49
13-Strategic considerations in IT/IS development	64.10	12.05	23.85
14-Administrative issues	27.18	26.67	46.15
D- IT/IS SKILLS/KNOWLEDGE AS DESIGNER			
1-Information Systems (IS) Design and Implementation	37.44	15.90	46.67
2-Ability to write simple file-processing and report-writing routines in several common programming languages e g. COBOL, C, C++	49.74	2.56	47.69
3-Knowledge of financial accounting, managerial accounting, auditing and ability to use state-of-the-art system analysis and design techniques	21.79	71.28	6.92
4-Ability to design and apply computer-assisted auditing techniques for a variety of audit purposes.	19.23	69.74	11.03
5-Ability to design and use decision support aids and financial modelling tools	40.77	53.08	6.15
6-Ability to design financial databases for planning and control purposes	30.77	34.62	35.13
7-Ability to participate as part of a system development team with an appreciation of information system development theories	56.15	18.72	25.13
8-Knowledge of and ability to use state-of-the-art system analysis and design techniques	55.38	17.95	26.67
9-Algorithm Concepts and Information Management	75.64	5.13	19.23
10-Knowledge in the role of information in organisation design and behaviour	57.18	16.92	25.90
11-System design techniques	60.00	16.15	23.85

TABLE 5-55 contd.

12-System acquisition/development life cycle phases, tasks and practices and maintaining control over system development processes	56.92	18.46	24.62
E-IT/IS SKILLS/KNOWLEDGE AS EVALUATOR			
1-Internal control in computer-based systems	21.03	60.77	18.46
2-Understanding of characteristics of EDP systems, their major components, and methods of operation	34.87	37.95	27.44
3-Ability to design and apply computer-assisted audit techniques for a variety of audit purposes	24.10	63.59	13.85
4-Ability to specify identifies, and documents financial and operational controls in computer-based systems.	23.85	56.67	20.00
5-Ability to evaluate effectiveness and efficiency of management and operations in computer-based system	27.18	35.38	37.44
6-Auditing of Accounting Information Systems	17.95	66.41	15.13
7-Accounting systems internal control	17.18	68.46	14.36
8-Evaluation of Decision Support Systems	28.21	53.08	18.72
9-Legal, ethical, auditing and information system control standards	27.18	50.26	22.56
10-Evaluation objectives	29.23	35.38	35.13
11-Evaluation methods and techniques	31.03	37.44	31.79
12-Communicating results of evaluations	31.54	36.41	32.56
13-Specific types of evaluations	29.74	37.44	33.33
14-Computer-assisted audit techniques (CAATs)	22.05	62.82	15.13

3-3 - REPORTING EGYPT DATA

Tables 5-56 to 5-63 presented the demographics information for Egypt group

TABLE 5-56 Response Rate of the EGYPT Group

Questionnaire Forwarded	Questionnaire Returned	Questionnaire used	Response Rate
52	32	32	61%

3-3-1 GENERAL

Please indicate gender

TABLE 5-57 **EGYPT Gender**

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	28	87.5	87.5	87.5
Female	4	12.5	12.5	100.0
Total	32	100.0	100.0	

Academic position for the respondent:

TABLE 5-58 EGYPT Academic position

	Frequency	Percent	Valid Percent	Cumulative Percent
Lecturer	6	18.8	18.8	18.8
Professor	19	59.4	59.4	78.1
Assistant Professor	7	21.9	21.9	100.0
Total	32	100.0	100.0	

Overall level of IT/IS experience for the respondent:

TABLE 5-59 Overall level of IT/IS experience (EGYPT

	Frequency	Percent	Valid Percent	Cumulative Percent
Highly experienced	7	21.9	21.9	21.9
Fairly experienced	21	65.6	65.6	87.5
Novice	4	12.5	12.5	100.0
Total	32	100.0	100.0	

The numbers of years teaching Accounting experience:

TABLE 5-60 Teaching Accounting period (EGYPT)

	Frequency	Percent	Valid Percent	Cumulative Percent
1-5 Years	6	18.8	18.8	18.8
6-10 Years	2	6.3	6.3	25.0
11-14 years	5	15.6	15.6	40.6
15-20 years	19	59.4	59.4	100.0
Total	32	100.0	100.0	

Do you hold any accounting professional qualification?

TABLE 5-61 accounting professional qualification (EGYPT)

	Frequency	Percent	Valid Percent	Cumulative Percent
YES	32	100.0	100.0	100.0

Which of the following professional qualification you have obtained?

TABLE 5-62 Professional Qualification Egypt sample have obtained

	Frequency	Percent	Valid Percent	Cumulative Percent
(ECA)-Egyptian Chartered Accountant	32	100.0	100.0	100.0

The highest academic qualification the respondent have obtained:

Doctoral degree in Accounting 100%

The country which the respondent have obtain his highest academic qualification:

TABLE 5-63 Country obtain highest academic qualification (EGYPT)

	Frequency	Percent	Valid Percent	Cumulative Percent
USA	5	15.6	15.6	15.6
UK	2	6.3	6.3	21.9
EGYPT	20	62.5	62.5	84.4
USA + Egypt (Joint Supervision)	3	9.4	9.4	93.8
UK + Egypt (Joint Supervision)	2	6.3	6.3	100.0
Total	32	100.0	100.0	

3-3-2 OPINION ABOUT THE CURRENT STATE AND FUTURE FOR IT/IS ACCOUNTING PROGRAMMES

TABLE 5-64 EGYPT 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)

Table 5-64 contd.

University does not provide sufficient ounding in the use of IT/IS in a commercial vironment	53.1 17	34.4 11	9.4 3	3.1 1		100% (32)
University lecturers in accounting education e out of touch with the needs of the profession the real world with regard to IT/IS skills	53.1 17	34.4 11	9.4 3	3.1 1		100% (32)
University lecturers do not possess the cessary IT skills and knowledge to teach IT ccessfully in accounting	84.4 27	15.6 5				100% (32)
The accounting profession, industry and ommerce are unable to specify what IT/IS they quire to be taught at university	46.9 15	37.5 12	15.6 5			100% (32)
-The business community and those involved in ccounting education must first decide what their bjectives are with regard to IT training	56.3 18	37.5 12	6.3 2			100% (32)
0- Communication between the business ommunity and universities needs to be improved o that IT training can more closely match needs	46.9 15	53.1 17				100% (32)
1 Having more IT/IS available in undergraduate ccounting makes students more effective in their mployment 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 he 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 5-65 EGYPT views about content and delivery of IT/IS

	Extremely satisfied	Satisfied %	Neutral %	Dissatisfied %	Extremely dissatisfied %	Total %
fied degree with the CONTENT /IS skills/knowledge into nting curriculum				43.8 14	56.3 18	
fied degree with the DELIVERY /IS skills/knowledge into nting curriculum				56.3 18	43.8 14	

The following would be helpful in increasing integration of IT/IS into accounting education

TABLE 5-66 Helpful for Integrating IT/IS into EGYPT accounting programmes

	NO (%)	YES (%)
Staff Training		100
Updated Software		100
Updated Hardware		100
Funding		100
Increased computer literacy of staff		100
Increased recognition of need for integrating		100
Relevant text books		100
Availability of Systems Support		100

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

TABLE 5-67 Obstacles facing Integrating IT/IS into EGYPT accounting Programmes

	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

3-3-3 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 parts A, B, C, D, E. Tables 5-67 to 5-71 present the results.

PART A- GENERAL INFORMATION TECHNOLOGY KNOWLEDGE

TABLE 5-68 Level of General Information Technology Knowledge (EGYPT)

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

IT/IS SKILLS/KNOWLEDGE FOR THE ACCOUNTANT AS A USER OF INFORMATION TECHNOLOGY

TABLE 5-69 Level Of IT/IS Skills/Knowledge For The Accountant As A User Of Information Technology (EGYPT)

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

IT/IS SKILLS/KNOWLEDGE FOR ACCOUNTANT AS A MANAGER OF INFORMATION SYSTEMS

TABLE 5-70 Level of IT/IS Skills/Knowledge For Accountant As A Manager Of Information Systems (EGYPT)

	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
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

IT/IS SKILLS/KNOWLEDGE FOR ACCOUNTANT AS A DESIGNER OF INFORMATION SYSTEMS

TABLE 5-71 LEVEL of IT/IS SKILLS/KNOWLEDGE FOR ACCOUNTANT AS A DESIGNER OF INFORMATION SYSTEMS

	Current Situation				Three Years future			
	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %	No Knowledge %	Low Knowledge %	Moderate Knowledge %	High Knowledge %
1	50	50				21.9	65.6	12.5
2	71.9	28.1			25	75		
3	68.8	31.3				34.4	53.1	12.5
4	87.5	12.5			3.1	46.9	43.8	6.3
5	81.3	18.8			3.1	25	46.9	25
6	71.9	28.1			15.6	43.8	34.4	6.3
7	84.4	12.5	3.1		18.8	56.3	25	
8	81.3	18.8			25	56.3	18.8	
9	93.8	6.3			21.9	53.1	21.9	3.1
10	100				25	56.3	18.8	
11	96.9	3.1			18.8	59.4	21.9	
12	84.4	15.6			21.9	46.9	31.3	

RT E- IT/IS SKILLS/KNOWLEDGE FOR ACCOUNTANT AS AN EVALUATOR OF INFORMATION SYSTEMS

TABLE 5-72 Level of IT/IS SKILLS/KNOWLEDGE FOR ACCOUNTANT AS AN EVALUATOR OF INFORMATION SYSTEMS

	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

OVERALL "MOST COMMON " RATINGS:

TABLE 5-73 EGYPT OVERALL "MOST COMMON " RATINGS.

COMPETENCY	NOW	THREE YEARS FORWARD
GENERAL		
G1	1	2
G2	0	2
G3	1	3
G4	0	2
G5	0	3
G6	0	3
G7	1	2
USER		
U1	1	3
U2	0	3
U3	0	2
U4	0	3
U5	1	3
MANAGER		
M1	0	2
M2	0	2
M3	0	2
M4	0	2
M5	0	2
M6	0	2
M7	0	2
M8	0	2
M9	0	2
M10	0	2
M11	0	2
M12	0	2
M13	0	2
M14	0	2
DESIGNER		
D1	0	2
D2	0	1
D3	0	2
D4	0	1
D5	0	2
D6	0	1
D7	0	1
D8	0	1
D9	0	1
D10	0	1
D11	0	1
D12	0	1

TABLE 5-73 contd.

EVALUATOR		
E1	0	2
E2	0	2
E3	0	2
E4	0	2
E5	0	2
E6	1	2
E7	0	2
E8	0	2
E9	0	2
E10	0	2
E11	0	2
E12	0	2
E13	0	2
E14	0	2

-IT/IS SKILLS SHOULD BE INCREASED FROM NO KNOWLEDGE NOW TO LOW KNOWLEDGE IN THREE YEARS FORWARD IN THE FUTURE

(a most common rating of 0 to 1)

TABLE 5-74 **EGYPT IT/IS rating form NO to LOW Knowledge**

COMPETENCY	NOW	THREE YEARS FORWARD
D2	0	1
D4	0	1
D6	0	1
D7	0	1
D8	0	1
D9	0	1
D10	0	1
D11	0	1
D12	0	1

Table 5-74 presented IT/IS skills increasing from no knowledge now to low knowledge in three years forward in the future as follows:

-Ability to write simple file-processing and report-writing routines in several common programming languages e.g. COBOL, C, C++ (D2)

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

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

-Ability to participate as part of a system development team with an appreciation of information system development theories (D7)

-Knowledge of and ability to use state-of-the-art system analysis and design techniques (D8)

-Algorithm Concepts and Information Management (D9)

-Knowledge in the role of information in organisation design and behaviour (D10)

-System design techniques (D11)

-System acquisition/development life cycle phases, tasks and practices and maintaining control over system development processes D12)

-IT/IS SKILLS SHOULD BE INCREASED FROM NO KNOWLEDGE NOW TO MODERATE KNOWLEDGE IN THREE YEARS FORWARD IN THE FUTURE (a most common rating of 0 to 2)

TABLE 5-75 **EGYPT IT/IS rating form NO to MODERATE Knowledge**

COMPETENCY	NOW	THREE YEARS FORWARD
G2	0	2
G4	0	2
U3	0	2
M1	0	2
M2	0	2
M3	0	2
M4	0	2
M5	0	2
M6	0	2
M7	0	2
M8	0	2
M9	0	2
M10	0	2
M11	0	2
M12	0	2
M13	0	2
M14	0	2
D1	0	2
D3	0	2
D5	0	2
E1	0	2
E2	0	2
E3	0	2
E4	0	2
E5	0	2
E7	0	2
E8	0	2
E9	0	2
E10	0	2

TABLE 5-75 contd.

E11	**0**	**2**
E12	**0**	**2**
E13	**0**	**2**
E14	**0**	**2**

Table 5-75 reported that IT/IS skills should be increased from no knowledge now to moderate knowledge in three years forward in the future at accounting Education in Egyptian Universities are:

-Computer-Based Accounting Systems (G2)

-Communication Technology (G4)

-Ability to use database service and Internet for financial reporting and disclosure (U3)

-Data Resource Structures and Administration (M1)

-Management of Accounting Information Systems (M2)

-Global Information Management (M3)

-Executive Information Systems Management (M4)

-Ability to use financial database for planning and control purposes (M5)

-Ability for selection and acquisition of hardware/software (M6)

-Ability for reinforcement of investment analysis using software (M7)

-Ability to participate as part of system development team worth an appreciation of information and methods, behavioural consequences of project management (M8)

-Understanding of the methods of operating and managing business systems once implemented (M9)

-Understanding of the system development life cycle, its phases, and management principles for the system development process (M10)

-Appreciation of the social, economic, and legal implications of computer technology, including effects of automation on work, institutions, and freedoms (M11)

-Decision Support Systems (M12)

-Strategic considerations in IT/IS development (M13)

-Administrative issues (M14)

-Information Systems (IS) Design and Implementation (D1)

-Knowledge of financial accounting, managerial accounting, auditing and ability to use state-of-the-art system analysis and design techniques (D3)

-Ability to design and use decision support aids and financial modelling tools (D5)

-Internal control in computer-based systems (E1)

-Understanding of characteristics of EDP systems, their major components , and methods of operation (E2)

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

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

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

-Accounting systems internal control (E7)

-Evaluation of Decision Support Systems (E8)

-Legal, ethical, auditing and information system control standards (E9)

-Evaluation objectives (E10)

-Evaluation methods and techniques (E11)

-IT/IS SKILLS SHOULD BE INCREASED FROM NO KNOWLEDGE NOW TO HIGH KNOWLEDGE IN THREE YEARS FORWARD IN THE FUTURE (a most common rating of 0 to 3)

TABLE 5-76 **IT/IS rating form NO to HIGH Knowledge (EGYPT**

COMPETENCY	NOW	THREE YEARS FORWARD
G5	0	3
G6	0	3
U2	0	3
U4	0	3

IT/IS skills should be increased from no knowledge now to high knowledge in three years forward in the future at Egyptian Universities in accounting programmes as it is appears in table 5-76 are:

-Role of information within business and Information Management (G5)

-Electronic Commerce (Telecommunication in Business On-line Resource) (G6)

-Ability to use Accounting Systems packages (U2)

-Ability to search On-line Public Access Databases (U4)

-IT/IS SKILLS SHOULD BE INCREASED FROM LOW KNOWLEDGE NOW TO MODERATE KNOWLEDGE IN THREE YEARS FORWARD IN THE FUTURE (a most common rating of 1 to 2)

TABLE 5-77 IT/IS rating form LOW Knowledge to MODERATE (EGYPT)

COMPETENCY	NOW	THREE YEARS FORWARD
G1	1	2
G7	1	2
E6	1	2

Table 5-77 shows that IT/IS skills should be increased from low knowledge now to moderate knowledge in three years forward in the future are:

-Information Systems Technology (G1)

-Administrative Issues (G7)

-Auditing of Accounting Information Systems (E6)

-IT/IS SKILLS SHOULD BE INCREASED FROM LOW KNOWLEDGE NOW TO HIGH KNOWLEDGE IN THREE YEARS FORWARD IN THE FUTURE (a most common rating of 1 to 3)

TABLE 5-78 IT/IS rating form LOW Knowledge to HIGH (EGYPT)

COMPETENCY	NOW	THREE YEARS FORWARD
G3	1	3
U1	1	3
U5	1	3

IT/IS skills should be increased from low knowledge now to high knowledge in three years forward in the future as table 5-78 shows are:

-Files/Databases (G3)

-Hands-on exposure to major program *products (day-to-day application) (U1)*

-Ability to understand the structure of typical computerised accounting systems and subsystems (U5)

3-3-4 HOW SHOULD IT/IS SKILLS/KNOWLEDGE DELIVERED

In this section the respondent was asked how the following IT/IS skills/knowledge should be delivered into accounting programmes by inserting a percentage in each column (rows should sum to 100%). The respondent was given three options in three columns. Firstly, Individual IT/IS courses, secondly, Accounting courses, lastly, Workplace. Table 5-78 gives the results represented by mean and appendix 26 shows the results in graphics.

TABLE 5-79 EGYPT RESULTS ABOUT HOW SHOULD IT/IS SKILLS/KNOWLEDGE DELIVERED

	Individual IT/IS course %	Accounting course %	Work %
A- GENERAL INFORMATION TECHNOLOGY KNOWLEDGE			
1-Information Systems Technology	50.67	25.00	24.33
2-Computer-Based Accounting Systems	24.33	76.00	19.67
3-Files/Databases	54.33	38.67	7.00
4-Communication Technology	41.33	19.33	38.00
5-Role of information within business and Information Management	34.33	23.67	42.00
6-Electronic Commerce (Telecommunication in Business On-line Resource)	42.67	26.00	31.33
7-Administrative Issues	24.33	28.67	47.00
B- IT/IS SKILLS/KNOWLEDGE AS USER			
1-Hands-on exposure to major program products (day-to-day application)	54.33	20.33	25.33
2-Ability to use Accounting Systems packages	6.33	87.33	6.33
3-Ability to use database service and Internet for financial reporting and disclosure	24.00	52.00	24.00
4-Ability to search On-line Public Access Databases	56.33	21.67	22.00
5-Ability to understand the structure of typical computerised accounting systems and subsystems	25.00	51.67	23.33
C- IT/IS SKILLS/KNOWLEDGE AS MANAGER			
1-Data Resource Structures and Administration	41.33	18.33	40.33
2-Management of Accounting Information Systems	13.33	77.00	9.67
3-Global Information Management	63.33	9.67	27.00
4-Executive Information Systems Management	38.33	22.33	39.33
5-Ability to use financial database for planning and control purposes	60.00	17.00	22.00
6-Ability for selection and acquisition of hardware/software	63.33	14.67	22.00
7-Ability for reinforcement of investment analysis using software	30.67	31.67	38.00
8-Ability to participate as part of system development team worth an appreciation of information and methods, behavioural consequences of project management	24.00	31.67	44.33
9-Understanding of the methods of operating and managing business systems once implemented	21.67	13.33	65.00

Table 5-79 contd.

10-Understanding of the system development life cycle, its phases, and management principles for the system development process	45.00	21.00	34.00
11-Appreciation of the social, economic, and legal implications of computer technology, including effects of automation on work, institutions, and freedoms	40.33	19.00	40.67
12-Decision Support Systems	46.00	15.67	38.33
13-Strategic considerations in IT/IS development	65.00	12.33	22.67
14-Administrative issues	27.33	27.00	45.67
D- IT/IS SKILLS/KNOWLEDGE AS DESIGNER			
1-Information Systems (IS) Design and Implementation	41.33	16.00	42.67
2-Ability to write simple file-processing and report-writing routines in several common programming languages e.g. COBOL, C, C++	48.00	3.33	48.67
3-Knowledge of financial accounting, managerial accounting, auditing and ability to use state-of-the-art system analysis and design techniques	25.00	68.00	7.00
4-Ability to design and apply computer-assisted auditing techniques for a variety of audit purposes.	20.33	68.33	11.33
5-Ability to design and use decision support aids and financial modelling tools	42.00	51.67	6.33
6-Ability to design financial databases for planning and control purposes	33.67	32.67	34.33
7-Ability to participate as part of a system development team with an appreciation of information system development theories	56.67	19.67	23.67
8-Knowledge of and ability to use state-of-the-art system analysis and design techniques	57.67	18.00	24.33
9-Algorithm Concepts and Information Management	75.00	6.67	18.33
10-Knowledge in the role of information in organisation design and behaviour	55.00	18.33	26.67
11-System design techniques	59.67	16.67	23.67
12-System acquisition/development life cycle phases, tasks and practices and maintaining control over system development processes	57.33	19.33	23.33
E- IT/IS SKILLS/KNOWLEDGE AS EVALUATOR			
1-Internal control in computer-based systems	22.67	60.33	17.33
2-Understanding of characteristics of EDP systems, their major components, and methods of operation	33.00	39.67	27.67
3-Ability to design and apply computer-assisted audit techniques for a variety of audit purposes	25.67	62.67	13.67
4-Ability to specify, identifies, and documents financial and operational controls in computer-based systems.	25.33	56.67	18.33
5-Ability to evaluate effectiveness and efficiency of management and operations in computer-based system	29.00	33.67	37.33
6-Auditing of Accounting Information Systems	19.67	65.67	14.00
7-Accounting systems internal control	18.00	68.00	14.00
8-Evaluation of Decision Support Systems	31.33	48.00	20.67
9-Legal, ethical, auditing and information system control standards	27.00	53.00	20.00
10-Evaluation objectives	30.00	34.33	35.33
11-Evaluation methods and techniques	32.33	36.00	32.00
12-Communicating results of evaluations	32.00	36.00	32.33
13-Specific types of evaluations	30.33	37.00	33.33
14-Computer-assisted audit techniques (CAATs)	23.00	62.00	15.00

4- SUMMARY

This chapter reports on the findings of the focus groups, describes and summarises the data description from the questionnaire survey of accounting educators in accounting departments at the Universities in three groups which represent three countries namely, USA, UK, and Egypt. The aim of this chapter was to provide a summary of the data collected via the survey at USA sample, UK sample, and Egyptian sample.

The purpose of this survey was to collect opinions about the current state and future of IT/IS in accounting programmes, as well as perceptions and views about what level of IT/IS knowledge/skills are required by accounting education programmes, what they should contain and how these should be delivered.

This chapter was divided into four parts. The first part reports on-the line focus Group which was completed on the WWW. The second part examines the reporting on the USA data. The third part presents reporting on the UK data. The fourth part of this chapter discusses the data, which was collected from accounting academics in Egyptian Universities.

Statistical tests analysis and tests the hypotheses for the data and comparative analysis between the three samples will be expanded upon in the following chapter.

CHAPTER SIX:

DATA ANALYSIS

<u>**Chapter Structure**</u>

1- Introduction:

2- Analysis of American data:

3- Analysis of UK data:

4- Analysis of Egyptian data:

5- Second Type: Comparative countries hypotheses NOW and in the FUTURE.

6- Summary

1- INTRODUCTION:

The previous chapter was mainly directed at presenting and reporting the data using descriptive and exploratory methods, which was collected from three samples, which represented three countries (USA, UK, and Egypt). The data was about demographic variables, in addition to three questions related to the views and perceptions: The current state of IT/IS skills into accounting programmes, what the level of IT/IS skills should be integrated into accounting training, and how should these skills be delivered. This chapter focuses on analysing the data which was gathered from the three samples. This chapter will mainly focus of testing the hypotheses, which was introduced in the chapter on methodology (chapter three), either the individual hypotheses or comparative ones. Therefore, this chapter will be split into seven sections. The first three sections will deal with the individual countries as follows: the first one, analysis of the American data, secondly, analysis of British data, thirdly, analysis data for Egyptian sample. Sections from four to seven will concentrate on comparative analysis between the three groups in pairs as follow: Section four being a comparison between the USA and Egypt. Section five is being a comparison the UK data against Egyptian data. Section six deals with the American and the UK. Section seven will do a comparison between the USA and the UK as one group representing the developed countries against Egypt representing the developing country.

2- ANALYSIS OF AMERICAN DATA:

2-1 What is the current state for IT/IS into accounting programmes?

This question is divided to three angles: first, Features, the second is Why, and lastly is recommendation for the future. The research used set of statements to evaluate each angle. The respondents were asked to use 5 point scales 1= Strongly Agree, 2= Agree, 3= Neutral, 4= Disagree, and 5= Strongly Disagree

2-1-1 Features:

This feature was measured by asking for 7 statements from the respondents. From the respondents there is a gap between University and practice. Table 5-1 shows Mean, Standard Deviation for each statement as follows.

Table 6-1 Features of IT/IS skills into accounting programmes USA

STATEMENT	N	Mean*	Std. Deviation
1- Accounting education equips students with IT/IS skills for their role beyond graduation in their employment	21	3.71	.72
2- A gap exists 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	21	1.67	.58
3-IT/IS skills in accounting training at undergraduate level are not adequately covered	21	2.00	.77
4-Most IT/IS syllabuses in accounting degrees concentrate on programming languages rather than looking at the broad issues of IT/IS	21	3.57	.93
5- University does not provide sufficient grounding in the use of IT/IS in a commercial environment	21	2.33	.91
6- 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 improve business performance	21	2.29	.78
7- IT/IS education at University level is mostly theoretical	21	3.48	.93

* Using Likert 5 point scales 1= Strongly Agree, 2= Agree, 3= Neutral, 4= Disagree, and 5= Strongly Disagree

2-1-2 Why:

The reasons for the gap between what the accounting students do at University and what the accountants do in the real world is explained by three statements as they appear in table 6-2.

Table 6-2 The reason a gap exists in USA sample

STATEMENT	N	Mean*	Std. Deviation
1- 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	21	2.19	1.12
2- University lecturers do not possess the necessary IT skills and knowledge to teach IT successfully in accounting	21	2.24	.77
3- The accounting profession, industry and commerce are unable to specify what IT/IS they require to be taught at university	21	2.38	.97

* Using Likert 5 point scales 1= Strongly Agree, 2= Agree, 3= Neutral, 4= Disagree, and 5= Strongly Disagree

__2-1-3 Recommendation__

Table 6-3 shows some recommendations

Table 6-3 Recommendations to bridge the exiting gap USA

STATEMENT	N	Mean*	Std. Deviation
1- The business community and those involved in accounting education must first decide what their objectives are with regard to IT training	21	1.43	.60
2- Communication between the business community and universities needs to be improved so that IT training can more closely match needs	21	1.43	.51
3 Having more IT/IS available in undergraduate accounting makes students more effective in their employment and improve their work	21	1.52	.60
4- 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	21	1.52	.68
5- Accounting students should gain " Hands- on " experience of computers, not just BASIC or FORTRAN and C++ programming	21	1.43	.60
6- Accounting students should have experience in the use of applications , such as spreadsheets , word-processing, data base management and accounting packages	21	1.33	.48
7- The use of computers in accounting practice enhances the efficiency and effectiveness of the accountant's work	21	1.14	.36

* Using Likert 5 point scales 1= Strongly Agree, 2= Agree, 3= Neutral, 4= Disagree, and 5= Strongly Disagree

With regard to the extent the respondent was satisfied with the content and the delivery of IT/IS skills into accounting programmes. The respondent gave four options:

Extremely satisfied = 1, Satisfied = 2, Neutral =3, Dissatisfied =4 Extremely dissatisfied = 5

Table 6-4 shows the mean and standard deviation for the content and the delivery.

Table 6-4 USA opinion about the content and delivery IT/IS skills into accounting programmes

	N	Mean*	Std. Deviation
Satisfied degree with the CONTENT of IT/IS skills/knowledge into accounting curriculum	21	3.62	.80
Satisfied degree with the DELIVERY of IT/IS skills/knowledge into accounting curriculum	21	3.57	.87

* Using Likert 5 point scales Extremely satisfied = 1, Satisfied = 2, Neutral =3, Dissatisfied =4 Extremely dissatisfied = 5

2-2- LEVEL OF IT/IS SKILLS/KNOWLEDGE INTEGRATED INTO ACCOUNTING PROGRAMMES NOW AND WHAT IS EXPECTED IN THE FUTURE?

This part dealt with, one of the main research questions, what IT/IS skills/knowledge should be integrated into accounting programmes? Where the subjects have been asked to indicate his/her **assessment** about IT/IS both at **PRESENT in his/her accounting department, CURRENT SITUATION NOW**, and what is expected to be integrated into accounting education in **THREE YEARS** times. The respondents were asked to use a four point scale **No Knowledge = 0 Low Knowledge = 1 Moderate Knowledge = 2 High Knowledge = 3.** The respondents have been asked to indicate his/her **assessment** about IT/IS both at **PRESENT in** the first column and **THREE YEARS** into the future in the second column for parts A, B, C, D, E and have been asked to make circle around the numbers in each column. The questionnaire as appear in appendix seven gave the respondent five kinds of IT/IS skills/knowledge:

2-2-1 Part A- General Information Technology Knowledge

2-2-2 Part B- IT/IS skills/knowledge for the accountant as a user of information technology

2-2-3 Part C- IT/IS skills/knowledge for accountant as a manager of information systems

2-2-4 Part D- IT/IS skills/knowledge for accountant as a designer of information systems

2-2-5 Part E- IT/IS skills/knowledge for accountant as an evaluator of information systems

The tables 6-5 to 6-9 show the results. The abbreviation for G1 to G7, U1 to U5, M1 to M14, D1 to D12, and E1 to E14 appears in the front of the thesis

TABLE 6-5 PART A- GENERAL INFORMATION TECHNOLOGY KNOWLEDGE USA

IS mpetency	Current Situation				Three Years future			
	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level
1	1.43	Low to moderate			2.62	Moderate to High		
2	1.95	Low to moderate			2.67	Moderate to High		
3	1.24	Low to moderate			2.62	Moderate to High		
4	1.43	Low to moderate	1.4	Low	2.76	Moderate to High	2-65	High
5	1.43	Low to moderate			2.81	Moderate to High		
6	1.05	Low to moderate			2.76	Moderate to High		
7	1.24	Low to moderate			2.33	Moderate to High		

TABLE 6-6 PART B- IT/IS SKILLS/KNOWLEDGE FOR THE ACCOUNTANT AS A USER OF INFORMATION TECHNOLOGY USA

T/IS ompetency	Current Situation				Three Years future			
	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level
1	2.14	Moderate to High			2.86	Moderate to High		
2	2.29	Moderate to High			2.86	Moderate to High		
3	1.00	Low	1.754	Moderate	2.48	Moderate to High	2.754	High
4	1.67	Low to Moderate			2.76	Moderate to High		
5	1.67	Low to Moderate			2.81	Moderate to High		

ABLE 6-7 PART C- IT/IS SKILLS/KNOWLEDGE FOR ACCOUNTANT-AS A MANAGER OF INFORMATION SYSTEMS USA

IS Competency	Current Situation				Three Years future			
	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level
1	.71	NO to Low	.934	LOW	1.57	Low to Moderate	2.07	MODERATE
2	1.33	Low to Moderate			2.43	Moderate to High		
3	.71	No to Low			2.00	Moderate		
4	1.05	Low to Moderate			2.19	Moderate to High		
5	1.38	Low to Moderate			2.33	Moderate to High		
6	.62	No to Low			1.90	Low to Moderate		
7	.86	No to Low			1.86	Low to Moderate		
8	.90	No to Low			1.95	Low to Moderate		
9	1.00	Low			2.10	Moderate to High		
10	.86	No to Low			1.95	Low to Moderate		
11	.81	No to Low			1.90	Low to Moderate		
12	1.05	Low to Moderate			2.24	Moderate to High		
13	.90	No to Low			2.19	Moderate to High		
14	.90	No to Low			2.43	Moderate to high		

LE 6-8 PART D- IT/IS SKILLS/KNOWLEDGE FOR ACCOUNTANT AS A DESIGNER OF INFORMATION SYSTEMS USA

IS Competency	Current Situation				Three Years future			
	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level
1	.86	No to Low	.8625	LOW	2.00	Moderate	2,06	MODERATE
2	.29	No to Low			.57	No to Low		
3	1.29	Low to Moderate			2.76	Moderate to High		
4	1.10	Low to Moderate			2.71	Moderate to High		
5	1.14	Low to Moderate			2.67	Moderate to High		
6	1.10	Low to Moderate			2.67	Moderate to High		
7	1.19	Low to Moderate			2.38	Moderate to High		
8	.90	No to Low			1.95	Low to Moderate		
9	.57	No to Low			1.48	Low to Moderate		
10	.76	No to Low			2.14	Moderate to High		
11	.67	No to Low			1.81	Low to Moderate		
12	.48	No to Low			1.57	Low to Moderate		

TABLE 6-9 PART E- IT/IS SKILLS/KNOWLEDGE FOR ACCOUNTANT AS AN EVALUATOR OF INFORMATION SYSTEMS USA

IS Competency	Current Situation				Three Years future			
	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level
1	1.24	Low to Moderate	1.099	LOW	2.52	Moderate To High	2,61	HIGH
2	1.14	Low to Moderate			2.90	Moderate To High		
3	1.05	Low to Moderate			2.57	Moderate To High		
4	1.29	Low to Moderate			2.57	Moderate To High		
5	1.05	Low to Moderate			2.57	Moderate To High		
6	1.57	Low to Moderate			2.62	Moderate To High		
7	1.52	Low to Moderate			2.62	Moderate To High		
8	.86	No to Low			2.48	Moderate To High		
9	.76	No to Low			2.48	Moderate To High		
10	.86	No to Low			2.71	Moderate To High		
11	1.00	Low			2.48	Moderate To High		
12	.90	No to Low			2.52	Moderate To High		
13	.86	No to Low			2.52	Moderate To High		
14	1.29	Low to Moderate			2.95	Moderate To High		

TEST THE HYPOTHESES:

The researcher used three kinds of statistical tests to test the individual hypotheses for two related samples NOW and in the FUTURE for each sample (UK, USA, and Egypt). First was a *t*-test as a parametric test to compare the means of the same subjects in two conditions or at two points in time NOW and FUTURE. The advantage of using the same subjects is that the amount of error deriving from the difference between subjects is dramatically reduced. The related t-test compares the mean difference between pairs of scores within the sample with that of the population in terms of the standard error of the difference in means. Secondly, the Wilcoxon Signed-Rank test helps to determine whether a hypothesized median is reasonable for a given dataset. The test calculates the difference between the data values and the hypothesized median, and ranks the absolute values of the difference. By comparing the sum of the ranks for observations above the median to those below the median, the program forms a test statistic for the hypothesis. Thirdly, a Sign test compares the number of positive and negative differences between two scores from the same or similar (i.e. matched) samples. This test helps to determine whether a hypothesised median is reasonable for a given dataset. The test uses counts of the number of observations above and below the hypothesised value, but not the magnitudes of the differences.

2-3 USA HYPOTHESES

Hypothesis 1a: There is no significant difference in the level of GENERAL IT/IS skills/Knowledge which in USA accounting programmes NOW and the level which should be in the FUTURE ($P < 0.05$).

Hypothesis 1b There is no significant difference in the level of IT/IS skills/Knowledge as USER, which in USA accounting programmes NOW and the level which should be in the FUTURE ($P < 0.05$).

Hypothesis 1c: There is no significant difference in the level of IT/IS skills/Knowledge as MANAGER which in USA accounting programmes NOW and the level which should be in the FUTURE ($P < 0.05$).

Hypothesis 1d: There is no significant difference in the level of IT/IS skills/Knowledge as DESIGNER which in USA accounting programmes NOW and the level which should be in the FUTURE ($P < 0.05$).

Hypothesis 1e There is no significant difference in the level of IT/IS skills/Knowledge as EVALUATOR, which in USA accounting programmes NOW and the level, which should be in the FUTURE ($P < 0.05$).

The following procedure is designed to test for significant differences between two data samples where the data were collected as pairs. The three tests concern the centre of the population from which the sample of user skills comes. The first test is a t-test of the null hypothesis that the mean equals 0.0 versus the alternative hypothesis that the mean is not equal to 0.0. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. The second test is a sign test of the null hypothesis that the median equals 0.0 versus the alternative hypothesis that the median is not equal to 0.0. It is based on counting the number of values above and below the hypothesised median. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. The third test is a signed rank test of the null hypothesis that the median equals 0.0 versus the alternative hypothesis that the median is not equal to 0.0. It is based on comparing the average ranks of values above and below the hypothesised median. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. The sign and signed rank tests are less sensitive to the presence of outliers Nevertheless, are somewhat less powerful than the t-test if the data all come from a single normal distribution.

A t-test-paired sample was used to test the above null hypothesis at 0.05 level of significance. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. Therefore, the researcher may, at the 5% significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-10.

Table 6-10: *t*-test for hypotheses 1a, 1b, 1c, 1d, and 1e USA

hypotheses	IT/IS skills	Mean	Paired Differences					t Value	DF	Sig. (2-tailed)	Result
			Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
						Lower	Upper				
1a	G_P	1.3946	-1.2585	.3876	.085	-1.4349	-1.0821	-14.879	20	.000	Rejected
	G_F	2.6531									
1b	U_P	1.7524	-1.0000	.2608	.057	-1.1187	-.8813	-17.573	20	.000	Rejected
	U_F	2.7524									
1c	M_P	.9354	-1.1395	.2743	.060	-1.2643	-1.0146	-19.036	20	.000	Rejected
	M_F	2.0748									
1d	D_P	.8611	-1.1984	.2952	.064	-1.3328	-1.0640	-18.604	20	.000	Rejected
	D_F	2.0595									
1e	E_P	1.0986	-1.5102	.3881	.085	-1.6869	-1.3335	-17.830	20	.000	Rejected
	E_F	2.6088									

* P mean Present and F means Future

A Wilcoxon test was used to confirm t-test results which the above null hypothesis at 0.05 level of significance. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. Therefore, the researcher may, at the 5% significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-11.

Table 6-11: wilcoxon test statistics for hypotheses 1a, 1b, 1c, 1d, and 1e USA

hypotheses	IT/IS skills	Z	Asymp. Sig. (2-tailed)	Result
1a	G_P,G_F	-4.031	.000	Rejected
1b	U_P, U_F	-4.042	.000	Rejected
1c	M_P, M_F	-4.022	.000	Rejected
1d	D_P, D_F	-4.020	.000	Rejected
1e	E_P, E_F	-4.021	.000	Rejected

A Sign test was used to confirm t-test results which the above null hypothesis at 0.05 level of significance. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. Therefore, the researcher may, at the 5% significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-12.

Table 6-12: **Sign test statistics for hypotheses 1a, 1b, 1c, 1d, and 1e USA**

hypotheses	IT/IS skills	Exact Sig. (2-tailed)	Result
1a	G_P,G_F	.000	Rejected
1b	U_P, U_F	.000	Rejected
1c	M_P, M_F	.000	Rejected
1d	D_P, D_F	.000	Rejected
1e	E_P, E_F	.000	Rejected

The results are in tables 6-10, 6-11, and 6-12 *for hypotheses 1a, 1b, 1c, 1d, and 1e. All the* individual null hypotheses were rejected. In other words, all the alternative hypotheses (There is a *significant difference* in the level of IT/IS skills/Knowledge as general, user, manager, designer and evaluator in accounting programmes in USA samples NOW and the level which should be in the FUTURE) were accepted.

The conclusion is that the improved technology brings new roles requiring new skills and knowledge from the accountant, for example, knowledge of components of information systems technology (H/W, S/W), information systems processing methods in organisations and the structure of information systems in organisations, are needed by accountants. The skills involved in the use of expert systems in accounting and auditing technology and financial systems are of greater importance for the accountants today.

The above tables show the results which sum up the testing of the hypotheses 1a, 1b, 1c, 1d, 1e. The general IT/IS skills (hypothesis 1a) consisted of 7 skills and knowledge, user skills (hypothesis 1b) include 5 skills, manager skills (hypothesis 1c) which include 14 skills, designer skills (hypothesis 1d) include 12 skills, and evaluator skills (hypothesis 1e) include 14 skills. Therefore, the researcher did the same three tests *t*-test paired sample, Wilcoxon, and sign test. Each group of skills tested the significance for each skill between **NOW** and **FUTURE.** Results for the three tests are summarised in the tables in Appendix twelve for *t*-test, Wilcoxon test and sign test respectively

3- ANALYSIS OF THE UK DATA:

3-1 What are the opinions about the current state and future of IT/IS in accounting undergraduate programmes?

The respondents were asked to use a 5 point scale 1= Strongly Agree, 2= Agree, 3= Neutral, 4= Disagree, and 5= Strongly Disagree

Table 6-13 shows the Mean and Standard Deviation for each statement as follows.

Table 6-13 UK opinions about the current state and future for IT/IS in accounting

STATEMENT	N	Mean*	Std. Deviation
1- Accounting education equips students with IT/IS skills for their role beyond graduation in their employment	53	3.45	.97
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	53	1.49	.64
3-IT/IS skills in accounting training at undergraduate level are not adequately covered	53	2.02	.84
4-Most IT/IS syllabuses in accounting degrees concentrate on programming languages rather than looking at the broad issues of IT/IS	53	3.53	.82
5- University does not provide sufficient grounding in the use of IT/IS in a commercial environment	53	2.15	.99
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	2.15	.97
7- University lecturers do not possess the necessary IT skills and knowledge to teach IT successfully in accounting	53	1.79	.97
8- The accounting profession, industry and commerce are unable to specify what IT/IS they require to be taught at university	53	2.25	.85
9- The business community and those involved in accounting education must first decide what their objectives are with regard to IT training	53	1.66	.55
10- Communication between the business community and universities needs to be improved so that IT training can more closely match needs	53	1.62	.49
11 Having more IT/IS available in undergraduate accounting makes students more effective in their employment and improve their work	53	1.62	.53
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	53	1.74	.62

13- Accounting students should gain " Hands- on " experience of computers, not just BASIC or FORTRAN and C++ programming	53	1.51	.54
14- Accounting students should have experience in the use of applications , such as spreadsheets , word-processing, data base management and accounting packages	53	1.45	.50
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	53	2.55	.85
16- IT/IS education at University level is mostly theoretical	53	3.02	1.03
17- The use of computers in accounting practice enhances the efficiency and effectiveness of the accountant's work	53	1.32	.47

* Using Likert 5 point scales 1= Strongly Agree, 2= Agree, 3= Neutral, 4= Disagree, and 5= Strongly Disagree

With regard to what extent the respondent satisfied with the content and the delivery way for IT/IS skills into accounting programmes. The respondent gave four options:

Extremely satisfied = 1, Satisfied = 2, Neutral =3, Dissatisfied =4 Extremely dissatisfied = 5

Table 6-14 shows the mean and standard deviation for the content and the delivery.

Table 6-14 UK opinions about the content and delivery

	N	Mean*	Std. Deviation
Satisfied degree with the CONTENT of IT/IS skills/knowledge into accounting curriculum	53	3.49	.97
Satisfied degree with the DELIVERY of IT/IS skills/knowledge into accounting curriculum	53	3.62	.88

* Using Likaret 5 point scales Extremely satisfied = 1, Satisfied = 2, Neutral =3, Dissatisfied =4 Extremely dissatisfied = 5

3-2 LEVEL OF IT/IS SKILLS/KNOWLEDGE IS INTEGRATED INTO ACCOUNTING PROGRAMMES NOW AND WHAT SHOULD BE IN THE FUTURE?

As I mentioned above, this part dealt with one of the main research questions, what IT/IS skills/knowledge should be integrated into accounting programmes? Where the subjects have been asked to indicate his/her **assessment** about IT/IS both at **PRESENT in his/her accounting department, CURRENT SITUATION NOW**, and what should be integrated into accounting education in **THREE YEARS** into the future. The respondents were asked to use four point scale **No Knowledge = 0 Low Knowledge = 1 Moderate Knowledge = 2 High Knowledge = 3.** The respondents have been asked to indicate his/her **assessment** about IT/IS both at **PRESENT in** the first column and **THREE YEARS** into the future in the second column for parts A, B, C, D, E and have been asked to make circle around the numbers in each column.

The questionnaire (see appendix seven) gave the respondent five kinds of IT/IS skills/knowledge:

3-2-1 Part A- General Information Technology Knowledge

3-2-2 Part B- IT/IS skills/knowledge for the accountant as a user of information technology

3-2-3 Part C- IT/IS skills/knowledge for accountant as a manager of information systems

3-2-4 Part D- IT/IS skills/knowledge for accountant as a designer of information systems

3-2-5 Part E- IT/IS skills/knowledge for accountant as an evaluator of information systems

Tables 6-15 to 6-19 show the results. The abbreviation for G1 to G7, U1 to U5, M1 to M14, D1 to D12, and E1 to E14 appear in the front of thesis.

TABLE 6-15 PART A- GENERAL INFORMATION TECHNOLOGY KNOWLEDGE UK

IT/IS Competency	Current Situation				Three Years future			
	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level
G1	1.32	Low to Moderate			2.66	Moderate to High		
G2	1.40	Low to Moderate			2.51	Moderate to High		
G3	1.25	Low to Moderate			2.68	Moderate to High		
G4	1.28	Low to Moderate	1.16	LOW	2.79	Moderate to High	2.60	HIGH
G5	.98	No to Low			2.60	Moderate to High		
G6	.91	No to Low			2.62	Moderate to High		
G7	.98	No to Low			2.36	Moderate to High		

ABLE 6-16 PART B- IT/IS SKILLS/KNOWLEDGE FOR THE ACCOUNTANT AS A USER OF INFORMATION TECHNOLOGY UK

IS Competency	Current Situation				Three Years future			
	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level
1	1.91	Low to Moderate	1.54	LOW	2.92	Moderate to High	2.68	HIGH
2	1.75	Low to Moderate			2.70	Moderate to High		
3	.92	No to Low			2.43	Moderate to High		
4	1.55	Low to Moderate			2.74	Moderate to High		
5	1.58	Low to Moderate			2.60	Moderate to High		

TABLE 6-17 ART C- IT/IS SKILLS/KNOWLEDGE FOR ACCOUNTANT AS A MANAGER OF INFORMATION SYSTEMS UK

IS npetency	Current Situation				Three Years future			
	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level
1	.79	No to Low			2.00	Moderate		
2	1.13	Low to Moderate			2.23	Moderate to High		
3	.79	No to Low			2.21	Moderate to High		
4	.94	No to Low			2.38	Moderate to High		
5	1.28	Low To Moderate			2.51	Moderate to High		
6	.77	No to Low			2.02	Moderate to High		MODERATE
7	.98	No to Low			2.17	Moderate to High		
8	.92	No to Low	.902	LOW	1.94	Low To Moderate	2.15	
9	1.02	Low To Moderate			2.04	Moderate to High		
10	.75	No to Low			1.89	Low To Moderate		
11	.64	No to Low			2.09	Moderate to High		
12	1.00	Low			2.30	Moderate to High		
13	.83	No to Low			2.11	Moderate to High		
14	.79	No to Low			2.26	Moderate to High		

TABLE 6-18 PART D- IT/IS SKILLS/KNOWLEDGE FOR ACCOUNTANT AS A DESIGNER OF INFORMATION SYSTEMS UK

T/IS ompetency	Current Situation				Three Years future			
	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level
1	.87	No to Low			1.94	Low to Moderate		
2	.21	No to Low			.70	No to Low		
3	.94	No to Low			2.09	Moderate to High		
4	.72	No to Low			2.30	Moderate to High		
5	.87	No to Low			1.98	Low to Moderate		
6	.92	No to Low			2.09	Moderate to High		
7	.98	No to Low	.75	LOW	1.92	Low to Moderate	1.75	MODERATE
8	.91	No to Low			1.83	Low to Moderate		
9	.49	No to Low			1.53	Low to Moderate		
10	.70	No to Low			1.60	Low to Moderate		
11	.66	No to Low			1.58	Low to Moderate		
12	.77	No to Low			1.72	Low to Moderate		

TABLE 6-19 PART E- IT/IS SKILLS/KNOWLEDGE FOR ACCOUNTANT AS AN EVALUATOR OF INFORMATION SYSTEMS UK

IS mpetency	Current Situation				Three Years future			
	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level	Mean Score s	Level of Competency	Overal l Mean Scores	Overall Competenc y Level
1	1.13	Low to Moderate			2.36	Moderate to High		
2	.96	No to Low			2.34	Moderate to High		
3	1.00	Low			2.19	Moderate to High		
4	1.09	Low to Moderate			2.25	Moderate to High		
5	1.04	Low to Moderate			2.30	Moderate to High		
6	1.13	Low to Moderate			2.25	Moderate to High		
7	1.17	Low to Moderate	.99	LOW	2.32	Moderate to High	2.32	MODERATE
8	1.00	Low			2.30	Moderate to High		
9	.83	No to Low			2.25	Moderate to High		
10	.98	No to Low			2.42	Moderate to High		
11	.74	No to Low			2.30	Moderate to High		
12	.92	No to Low			2.26	Moderate to High		
13	.89	No to Low			2.38	Moderate to High		
14	.94	No to Low			2.55	Moderate to High		

3-3- UK HYPOTHESES

Hypothesis 2a: There is no significant difference in the level of GENERAL IT/IS skills/Knowledge which in UK accounting programmes NOW and the level which should be in the FUTURE ($P < 0.05$).

Hypothesis 2b There is no significant difference in the level of IT/IS skills/Knowledge as USER, which in UK accounting programmes NOW and the level, which should be in the FUTURE ($P < 0.05$).

Hypothesis 2c: There is no significant difference in the level of IT/IS skills/Knowledge as MANAGER which in UK accounting programmes NOW and the level which should be in the FUTURE ($P < 0.05$).

Hypothesis 2d: There is no significant difference in the level of IT/IS skills/Knowledge as DESIGNER which in UK accounting programmes NOW and the level which should be in the FUTURE ($P < 0.05$).

Hypothesis 2e There is no significant difference in the level of IT/IS skills/Knowledge as EVALUATOR, which in UK accounting programmes NOW and the level, which should be in the FUTURE ($P < 0.05$).

The following procedure is designed to test for significant differences between two data samples where the data were collected as pairs. The three tests concern the centre of the population from which the sample of user skills comes. The first test is a t-test of the null hypothesis that the mean equals 0.0 versus the alternative hypothesis that the mean is not equal to 0.0. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. The second test is a sign test of the null hypothesis that the median equals 0.0 versus the alternative hypothesis that the median is not equal to 0.0. It is based on counting the number of values above and below the hypothesised median. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. The third test is a signed rank test of the null hypothesis that the median equals 0.0 versus the alternative hypothesis that the median is not equal to 0.0. It is based on comparing the average ranks of values above and below the hypothesised median. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. The sign and signed rank tests are less sensitive to the presence of outliers Nevertheless, are somewhat less powerful than the t-test if the data all come from a single normal distribution.

A t-test-paired sample was used to test the above null hypothesis at 0.05 level of significance. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. Therefore, the researcher may, at the 5% significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-20.

Table 6-20: t-test for hypotheses 2a, 2b, 2c, 2d, and 2e UK

Hypotheses	IT/IS skills	Mean	Paired Differences					T Value	DF	Sig. (2-tailed)	Result
			Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
						Lower	Upper				
2a	G_P	1.1590	-1.4447	.4427	.061	-1.5668	-1.3227	-23.760	52	.000	Rejected
	G_F	2.6038									
2b	U_P	1.5434	-1.1358	.5502	.076	-1.2875	-.9842	-15.029	52	.000	Rejected
	U_F	2.6792									
2c	M_P	.9043	-1.2493	.4783	.066	-1.3812	-1.1175	-19.017	52	.000	Rejected
	M_F	2.1536									
2d	D_P	.7531	-1.0220	.2947	.040	-1.1032	-.9408	-25.248	52	.000	Rejected
	D_F	1.7752									
2e	E_P	.9879	-1.3302	.6121	.084	-1.4989	-1.1615	-15.821	52	.000	Rejected
	E_F	2.3181									

A Wilcoxon test was used to confirm t-test results which the above null hypothesis at 0.05 level of significance. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. Therefore, the researcher may, at the 5% significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-21.

Table 5-21: Wilcoxon test statistics for hypotheses 2a, 2b, 2c, 2d, and 2e UK

hypotheses	IT/IS skills	Z	Asymp. Sig. (2-tailed)	Result
2a	G_P,G_F	-6.344	.000	Rejected
2b	U_P, U_F	-6.344	.000	Rejected
2c	M_P, M_F	-6.337	.000	Rejected
2d	D_P, D_F	-6.343	.000	Rejected
2e	E_P, E_F	-6.338	.000	Rejected

A Sign test was used to confirm t-test results which the above null hypothesis at 0.05 level of significance. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. Therefore, the researcher may, at the 5% significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-22.

Table 6-22: **Sign test statistics for hypotheses 2a, 2b, 2c, 2d, and 2e** UK

hypotheses	IT/IS skills	Z	Asymp. Sig. (2-tailed)	Result
2a	G_P,G_F	-7.143	.000	Rejected
2b	U_P, U_F	-7.143	.000	Rejected
2c	M_P, M_F	-7.143	.000	Rejected
2d	D_P, D_F	-7.143	.000	Rejected
2e	E_P, E_F	-7.143	.000	Rejected

The results are in tables 6-19, 6-20, and 6-22 for hypotheses 2a, 2b, 2c, 2d, and 2e. All the individual null hypotheses were rejected. The conclusion is that there is a significant difference in the level of IT/IS skills/Knowledge as general, user, manager, designer and evaluator in accounting programmes in UK samples NOW and the level which there should be in the FUTURE. The probable reason for this result is that the technology is changing faster and brings new roles with new skills and knowledge which the accountant should possess.

The above tables show the results which sum up testing of the hypotheses 2a, 2b, 2c, 2d, 2e. However, a general IT/IS skills (hypothesis 2a) consist of 7 skills and knowledge, user skills (hypothesis 2b) include 5 skills, manager skills (hypothesis 2c) include 14 skills, designer skills (hypothesis 2d) include 12 skills, and evaluator skills (hypothesis 2e) include 14 skills. Therefore, the researcher did the same three tests t-test paired sample, Wilcoxon, and sign test each group of skills to test the significance for each skill between **NOW** and **FUTURE.** Results for the three tests are summarised in the tables in Appendix thirteen for *t*-test, Wilcoxon test and sign test respectively.

4- ANALYSIS OF EGYPTIAN DATA:

4-1 What are their opinions about the current state and future for IT/IS in accounting undergraduate programmes?

The respondents were asked to use 5 point scales 1= Strongly Agree, 2= Agree, 3= Neutral, 4= Disagree, and 5= Strongly Disagree

Table 6-23 shows Mean, Standard Deviation for each statement as follow.

Table 6-23 : EGYPT opinions about the current state and future for IT/IS in accounting

STATEMENT	N	Mean*	Std. Deviation
1- Accounting education equips students with IT/IS skills for their role beyond graduation in their employment	32	4.53	1.11
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	32	1.13	.34
3-IT/IS skills in accounting training at undergraduate level are not adequately covered	32	1.59	.50
4-Most IT/IS syllabuses in accounting degrees concentrate on programming languages rather than looking at the broad issues of IT/IS	32	2.75	1.02
5- University does not provide sufficient grounding in the use of IT/IS in a commercial environment	32	1.62	.79
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	32	1.62	.79
7- University lecturers do not possess the necessary IT skills and knowledge to teach IT successfully in accounting	32	1.16	.37

8- The accounting profession, industry and commerce are unable to specify what IT/IS they require to be taught at university	32	1.69	.74
9- The business community and those involved in accounting education must first decide what their objectives are with regard to IT training	32	1.50	.62
10- Communication between the business community and universities needs to be improved so that IT training can more closely match needs	32	1.53	.51
11 Having more IT/IS available in undergraduate accounting makes students more effective in their employment and improve their work	32	1.50	.51
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	32	1.41	.50
13- Accounting students should gain " Hands- on " experience of computers, not just BASIC or FORTRAN and C++ programming	32	1.47	.51
14- Accounting students should have experience in the use of applications , such as spreadsheets , word-processing, data base management and accounting packages	32	1.50	.51
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	32	2.25	.57
16- IT/IS education at University level is mostly theoretical	32	1.81	.93
17- The use of computers in accounting practice enhances the efficiency and effectiveness of the accountant's work	32	1.41	.50

* Using Likert 5 point scales 1= Strongly Agree, 2= Agree, 3= Neutral, 4= Disagree, and 5= Strongly Disagree

With regard to the extent that the respondent was satisfied with the content and the delivery of IT/IS skills in accounting programmes, the respondent had four options:

Extremely satisfied = 1, Satisfied = 2, Neutral =3, Dissatisfied =4 Extremely dissatisfied = 5

Table 6-24 shows the mean and standard deviation for the content and the delivery.

Table 6-24: Content and delivery of IT/IS skills in accounting programmes in Egypt

	N	Mean	Std. Deviation
Satisfied degree with the CONTENT of IT/IS skills/knowledge into accounting curriculum	32	4.56	.50
Satisfied degree with the DELIVERY of IT/IS skills/knowledge into accounting curriculum	32	4.44	.50

* Using Likaret 5 point scales Extremely satisfied = 1, Satisfied = 2, Neutral =3, Dissatisfied =4 Extremely dissatisfied = 5

4-2 LEVEL OF IT/IS SKILLS/KNOWLEDGE IS INTEGRATED INTO ACCOUNTING PROGRAMMES NOW AND WHAT SHOULD BE IN THE FUTURE?

As I mentioned above, this part dealt with one of the main research questions, what IT/IS skills/knowledge should be integrated into accounting programmes? The subjects have been asked to indicate his/her **assessment** about IT/IS both at **PRESENT in his/her accounting department, CURRENT SITUATION NOW**, and what should be integrated into accounting education in **THREE YEARS** into the future. The respondents were asked to use four point scale **No Knowledge = 0 Low Knowledge = 1 Moderate Knowledge = 2 High Knowledge = 3. The respondents have been asked** to indicate his/her **assessment** about IT/IS both at **PRESENT in** the first column and **THREE YEARS** into the future in the second column for parts A, B, C, D, E and have been asked to make circle around the numbers in each column.

The questionnaire as appear in appendix seven gave the respondent five kinds of IT/IS skills/knowledge:

4-2-1 Part A- General Information Technology Knowledge

4-2-2 Part B- IT/IS skills/knowledge for the accountant as a user of information technology

4-2-3 Part C- IT/IS skills/knowledge for accountant as a manager of information systems

4-2-4 Part D- IT/IS skills/knowledge for accountant as a designer of information systems

4-2-5 Part E- IT/IS skills/knowledge for accountant as an evaluator of information systems

The tables 6-25 to 6-29 show the results. The abbreviation for G1 to G7, U1 to U5, M1 to M14, D1 to D12, and E1 to E14 appears in the front of the thesis.

TABLE 6-25 PART A- GENERAL INFORMATION TECHNOLOGY KNOWLEDGE EGYPT

S …petency	Current Situation				Three Years future			
	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level	Mean Score s	Level of Competency	Overal l Mean Scores	Overall Competenc y Level
[illegible]	.88	No to Low	.61	LOW	2.22	Moderate to High	2.35	MODERATE
[illegible]	.56	No to Low			2.09	Moderate to High		
[illegible]	.97	No to Low			2.59	Moderate to High		
[illegible]	.56	No to Low			2.41	Moderate to High		
5	.44	No to Low			2.50	Moderate to High		
6	.28	No to Low			2.69	Moderate to High		
7	.56	No to Low			1.97	Low to Moderate		

'ABLE 6-26 PART B- IT/IS SKILLS/KNOWLEDGE FOR THE ACCOUNTANT AS A USER OF INFORMATION TECHNOLOGY EGYPT

/IS …mpetency	Current Situation				Three Years future			
	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level	Mean Score s	Level of Competency	Overal l Mean Scores	Overall Competenc y Level
1	.78	No to Low	.54	LOW	2.78	Moderate to High	2.57	HIGH
2	.56	No to Low			2.69	Moderate to High		
3	.19	No to Low			2.00	Moderate		
4	.50	No to Low			2.69	Moderate to High		
5	.66	No to Low			2.69	Moderate to High		

TABLE 6-27 PART C- IT/IS SKILLS/KNOWLEDGE FOR ACCOUNTANT AS A MANAGER OF INFORMATION SYSTEMS EGYPT

...petency	Current Situation				Three Years future			
	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level
[illegible]	.38	No to Low			1.63	Low to Moderate		
[illegible]	.44	No to Low			2.12	Moderate to High		
[illegible]	.34	No to Low			1.88	Low to Moderate		
[illegible]	.25	No to Low			2.03	Moderate to High		
5	.41	No to Low			2.09	Moderate to High		
6	.50	No to Low			1.69	Low to Moderate		
7	.25	No to Low			1.81	Low to Moderate		
8	.59	No to Low	.39	NO KNOWLEDGE	1.81	Low to Moderate	1.99	MODERATE
9	.38	No to Low			1.97	Low to Moderate		
10	.28	No to Low			1.91	Low to Moderate		
11	.34	No to Low			1.94	Low to Moderate		
12	.31	No to Low			2.28	Moderate to High		
13	.44	No to Low			2.38	Moderate to High		
14	.47	No to Low			2.28	Moderate to High		

TABLE 6-28 PART D- IT/IS SKILLS/KNOWLEDGE FOR ACCOUNTANT AS A DESIGNER OF INFORMATION SYSTEMS EGYPT

/IS ompetency	Current Situation				Three Years future			
	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level
1	.50	No to Low			1.91	Low to Moderate		
2	.28	No to Low			.75	No to Low		
3	.31	No to Low			1.78	Low to Moderate		
4	.13	No to Low			1.53	Low to Moderate		
5	.19	No to Low			1.94	Low to Moderate		
6	.28	No to Low			1.31	Low to Moderate		
7	.19	No to Low	.016	NO KNOWLEDGE	1.06	Low to Moderate	1.28	LOW
8	.19	No to Low			.94	No to Low		
9	6.25E-02	NO			1.06	Low to Moderate		
10	.00	NO			.94	No to Low		
11	3.13E-02	NO			1.03	Low to Moderate		
12	.16	No to Low			1.09	Low to Moderate		

TABLE 6-29 PART E- IT/IS SKILLS/KNOWLEDGE FOR ACCOUNTANT AS AN EVALUATOR OF INFORMATION SYSTEMS EGYPT

IS mpetency	Current Situation				Three Years future			
	Mean Scores	Level of Competency	Overall Mean Scores	Overall Competency Level	Mean Score s	Level of Competency	Overal l Mean Scores	Overall Competenc y Level
1	.59	No to Low	.44	NO KNOWLEDGE	2.25	Moderate to High	2.24	MODERATE
2	.72	No to Low			2.16	Moderate to High		
3	.13	No to Low			2.25	Moderate to High		
4	.50	No to Low			2.41	Moderate to High		
5	.47	No to Low			2.22	Moderate to High		
6	.75	No to Low			2.31	Moderate to High		
7	.41	No to Low			2.28	Moderate to High		
8	.13	No to Low			2.16	Moderate to High		
9	.41	No to Low			1.94	Low to Moderate		
10	.41	No to Low			2.19	Moderate to High		
11	.41	No to Low			2.28	Moderate to High		
12	.44	No to Low			2.22	Moderate to High		
13	.41	No to Low			2.28	Moderate to High		
14	.44	No to Low			2.47	Moderate to High		

4-3 - EGYPT HYPOTHESES

Hypothesis 3a: There is no significant difference in the level of GENERAL IT/IS skills/Knowledge which in EGYPT accounting programmes NOW and the level which should be in the FUTURE ($P < 0.05$).

Hypothesis 3b There is no significant difference in the level of IT/IS skills/Knowledge as USER, which in EGYPT accounting programmes NOW and the level, which should be in the FUTURE ($P < 0.05$).

Hypothesis 3c: There is no significant difference in the level of IT/IS skills/Knowledge as MANAGER which in EGYPT accounting programmes NOW and the level which should be in the FUTURE ($P < 0.05$).

Hypothesis 3d: There is no significant difference in the level of IT/IS skills/Knowledge as DESIGNER which in EGYPT accounting programmes NOW and the level which should be in the FUTURE ($P < 0.05$).

Hypothesis 3e There is no significant difference in the level of IT/IS skills/Knowledge as EVALUATOR which in EGYPT accounting programmes NOW and the level which should be in the FUTURE ($P < 0.05$).

The following procedure is designed to test for significant differences between two data samples where the data were collected as pairs. The three tests concern the centre of the population from which the sample of user skills comes. The first test is a t-test of the null hypothesis that the mean equals 0.0 versus the alternative hypothesis that the mean is not equal to 0.0. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. The second test is a sign test of the null hypothesis that the median equals 0.0 versus the alternative hypothesis that the median is not equal to 0.0. It is based on counting the number of values above and below the hypothesised median. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. The third test is a signed rank test of the null hypothesis that the median equals 0.0 versus the alternative hypothesis that the median is not equal to 0.0. It is based on comparing the average ranks of values above and below the hypothesised median. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. The sign and signed rank tests are less sensitive to the presence of outliers Nevertheless, are somewhat less powerful than the t-test if the data all come from a single normal distribution.

A t-test-paired sample was used to test the above null hypothesis at 0.05 level of significance. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. Therefore, the researcher may, at the 5% significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-30 .

Table 6-30 : **t-test for hypotheses 3a, 3b, 3c, 3d, and 3e** **EGYPT**

Hypotheses	IT/IS skills	Paired Differences						T Value	DF	Sig. (2-tailed)	Result
		Mean	Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
						Lower	Upper				
3a	G_P	.6071	-1.7455	.2660	.047	-1.8414	-1.6496	-37.123	31	.000	Rejected
	G_F	2.3527									
3b	U_P	.5375	-2.0312	.3257	.058	-2.1487	-1.9138	-35.278	31	.000	Rejected
	U_F	2.5687									
3c	M_P	.3839	-1.6027	.3691	.065	-1.7358	-1.4696	-24.561	31	.000	Rejected
	M_F	1.9866									
3d	D_P	.1927	-1.0859	.3323	.059	-1.2057	-.9661	-18.486	31	.000	Rejected
	D_F	1.2786									
3e	E_P	.4420	-1.8013	.4265	.075	-1.9551	-1.6476	-23.889	31	.000	Rejected
	E_F	2.2433									

A Wilcoxon test was used to confirm t-test results which the above null hypothesis at 0.05 level of significance. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. Therefore, the researcher may, at the 5% significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-31.

Table 6-31: **Wilcoxon test statistics for hypotheses 3a, 3b, 3c, 3d, and 3e**

Hypotheses	IT/IS skills	Z	Asymp. Sig. (2-tailed)	Result
3a	G_P,G_F	-4.955	.000	Rejected
3b	U_P, U_F	-4.957	.000	Rejected
3c	M_P, M_F	-4.942	.000	Rejected
3d	D_P, D_F	-4.947	.000	Rejected
3e	E_P, E_F	-4.940	.000	Rejected

A Sign test was used to confirm t-test results which the above null hypothesis at 0.05 level of significance. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. Therefore, the researcher may, at the 5% significance level (p

< 0.05), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-32.

Table 6-32: **Sign test statistics for hypotheses 3a, 3b, 3c, 3d, and 3e**

hypotheses	IT/IS skills	Z	Asymp. Sig. (2-tailed)	Result
3a	G_P,G_F	-5.480	.000	Rejected
3b	U_P, U_F	-5.480	.000	Rejected
3c	M_P, M_F	-5.480	.000	Rejected
3d	D_P, D_F	-5.480	.000	Rejected
3e	E_P, E_F	-5.480	.000	Rejected

The results are in tables 6-30, 6-31, and 6-32 for hypotheses 3a, 3b, 3c, 3d, and 3e. All the individual null hypotheses were rejected. The conclusion is that there is a significant difference in the level of IT/IS skills/Knowledge as general, user, manager, designer and evaluator in accounting programmes in the Egyptian samples NOW and the level which there should be in the FUTURE. The reason for this result is like the results in developed countries (USA and UK) that the technology is changing faster and brings new roles with new skills and knowledge which the accountant should possess. There is another factor that developing countries, for example Egypt, would like to catch up as there are many companies and international organisations which may invest in these countries.

The above tables show the results which sum up the testing of the hypotheses 3a, 3b, 3c, 3d, 3e. The general IT/IS skills (hypothesis 3a) consist of 7 skills and knowledge, user skills (hypothesis 3b) include 5 skills, manager skills (hypothesis 3c) include 14 skills, designer skills (hypothesis 3d) include 12 skills, and evaluator skills (hypothesis 3e) include 14 skills. Therefore, the researcher did the same three tests t-test paired sample, Wilcoxon, and sign test each group of skills to test the significance for each skill between **NOW** and **FUTURE.** Results for the three tests summarised in tables in Appendix fourteen for t-test, Wilcoxon test and sign test respectively

5- SECOND TYPE: COMPARATIVE COUNTRIES HYPOTHESES NOW AND IN THE FUTURE.

In this kind of hypotheses the researcher will use the procedure which is designed to compare the same variable between two samples or two groups. It will run several tests to determine whether there are statistically significant differences between the two samples or not.
The researcher will use two kinds of statistics tests to determine the significant. Firstly, a t-test for independent two sample to compare the means of the two samples as a paramatireic test. Secondly, Mann-Whitney U test as nonparamatric test to compare medians This test runs to compare the medians of the two samples. This test is constructed by combining the two samples, sorting the data from smallest to largest, and comparing the average ranks of the two samples in the combined data.
The following sections to compare between each pair. Egypt Vs USA with regard the level of IT/IS skills now and at the future. Egypt Vs UK with regard the level of IT/IS skills now and at the future and so on for each two countries. As well the research will compare between the developing country (using Egypt data) and the developed country (using USA and UK data) with regarding to IT/IS skills now and at the future.

5-1 EGYPT Vs USA (NOW)

Hypothesis 4a: There is no significant difference in the level of GENERAL IT/IS skills/Knowledge in Egyptian accounting programmes compared to USA accounting programmes NOW ($P < 0.05$)

Hypothesis 4b: There is no significant difference in the level of IT/IS skills/Knowledge as USER in Egyptian accounting programmes compared to USA accounting programmes NOW ($P < 0.05$)

Hypothesis 4c: There is no significant difference in the level of IT/IS skills/Knowledge as MANAGER in Egyptian accounting programmes compared to USA accounting programmes NOW ($P < 0.05$)

Hypothesis 4d: There is no significant difference in the level of IT/IS skills/Knowledge as DESIGNER in Egyptian accounting programmes compared to USA accounting programmes NOW ($P < 0.05$)

Hypothesis 4e: There is no significant difference in the level of IT/IS skills/Knowledge as EVALUATOR in Egyptian accounting programmes compared to USA accounting programmes NOW ($P < 0.05$)

A t-test for Independent Samples was used to test the above null hypothesis at 0.05 level of significance. Since the P-value is less than 0.05, there is a statistically significant difference between the medians at the 95.0% confidence level. The researcher may, at the 5% significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-33.

Table 6-33 : t-test for hypotheses 4a, 4b, 4c, 4d, and 4e

Hypotheses	IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
					F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	
4a	G_P	USA	21	1.3946	3.583	.064	11.229*	51	.000	.7874	Rejected
		Egypt	32	.6071							
4b	U_P	USA	21	1.7524	.122	.729	14.551*	51	.000	1.2149	Rejected
		Egypt	32	.5375							
4c	M_P	USA	21	.9354	1.681	.201	5.073*	51	.000	.5514	Rejected
		Egypt	32	.3839							
4d	D_P	USA	21	.8611	14.651	.000	7.759**	23.975	.000	.6684	Rejected
		Egypt	32	.1927							
4e	E_P	USA	21	1.0986	8.603	.005	5.032**	28.967	.000	.6567	Rejected
		Egypt	32	.4420							

* t-test reported **Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

** t-test reported **Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)**

Mann-Whitney U Test was used to confirm t-test results which the above null hypothesis at 0.05 level of significance. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. Therefore, the researcher may, at the 5% significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-34.

Table 6-34: Mann-Whitney U statistics for hypotheses 4a, 4b, 4c, 4d, and 4e

Hypotheses	IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
4a	G_P	13.000	541.000	-5.925	.000	Rejected
4b	U_P	.000	528.000	-6.151	.000	Rejected
4c	M_P	119.000	647.000	-3.960	.000	Rejected
4d	D_P	9.500	537.500	-5.974	.000	Rejected
4e	E_P	97.000	625.000	-4.356	.000	Rejected

The results are in tables 6-32, 6-33 and 6-34 for hypotheses 4a, 4b, 4c, 4d and 4e. The level of IT/IS skills NOW between Egypt as a developing country and USA as a developed country is significantly different for general, user, manager, designer, and evaluator. The reason for this situation is the different technology level between the countries.

The above tables show the results which sum up the testing of the hypotheses 4a, 4b, 4c, 4d, 4e. Where, as I mentioned earlier, general IT/IS skills consists of 7 skills and knowledge, user skills include 5, manager skills include 14, designer skills include 12, and evaluator skills include 14. Therefore, the researcher did the same two tests. Firstly, a t-test for independent two sample to compare the means of the two samples as a paramateric test. Secondly, Mann-Whitney U test as nonparamatric test to compare medians for the overall score for each group of skills. Therefore, the researcher used the t-test to test the significance for level of each skill NOW between Egypt and USA. The results for the three tests summarized in tables at appendix fifteen for t-test and Mann-Whitney U respectively

5-2 EGYPT Vs UK (NOW)

Hypothesis 5a: There is no significant difference in the level of GENERAL IT/IS skills/Knowledge in Egyptian accounting programmes compared to UK accounting programmes NOW ($P < 0.05$)

Hypothesis 5b: There is no significant difference in the level of IT/IS skills/Knowledge as USER in Egyptian accounting programmes compared to UK accounting programmes NOW ($P < 0.05$)

Hypothesis 5c: There is no significant difference in the level of IT/IS skills/Knowledge as MANAGER in Egyptian accounting programmes compared to UK accounting programmes NOW ($P < 0.05$)

Hypothesis 5d: There is no significant difference in the level of IT/IS skills/Knowledge as DESIGNER in Egyptian accounting programmes compared to UK accounting programmes NOW ($P < 0.05$)

Hypothesis 5e: There is no significant difference in the level of IT/IS skills/Knowledge as EVALUATOR in Egyptian accounting programmes compared to UK accounting programmes NOW ($P < 0.05$)

A t-test for Independent Samples was used to test the above null hypothesis at 0.05 level of significance. Since the P-value is less than 0.05, there is a statistically significant difference between the medians at the 95.0% confidence level. The researcher may, at the 5% significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-35.

Table 6-35 : **t-test for hypotheses 5a, 5b, 5c, 5d, and 5e**

Hypotheses	IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
					F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	
5a	G_P	UK	53	1.1590	22.946	.000	7.716**	75.868	.000	.5519	Rejected
		Egypt	32	.6071							
5b	U_P	UK	53	1.5434	19.028	.000	11.065**	81.450	.000	1.0059	Rejected
		Egypt	32	.5375							
5c	M_P	UK	53	.9043	.178	.674	5.163*	83	.000	.5204	Rejected
		Egypt	32	.3839							
5d	D_P	UK	53	.7531	10.656	.002	11.145**	78.860	.000	.5604	Rejected
		Egypt	32	.1927							
5e	E-P	UK	53	.9879	2.850	.095	5.633*	83	.000	.5459	Rejected
		Egypt	32	.4420							

* t-test reported **Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

** t-test reported **Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)**

Mann-Whitney U Test was used to confirm t-test results which the above null hypothesis at 0.05 level of significance. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. Therefore, the researcher may, at the 5% significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-36.

Table 6-36: Mann-Whitney U statistics for hypotheses 5a, 5b, 5c, 5d, and 5e

Hypotheses	IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
5a	G_P	217.500	745.500	-5.769	.000	Rejected
5b	U_P	39.000	567.000	-7.385	.000	Rejected
5c	M_P	311.500	839.500	-4.885	.000	Rejected
5d	D_P	41.500	569.500	-7.339	.000	Rejected
5e	E_P	290.500	818.500	-5.067	.000	Rejected

The results for hypotheses 5a, 5b, 5c, 5d, and 5e show a significant difference in the level of IT/IS skills between Egypt and UK. This result is not surprisingly as UK has progressed more in IT/IS than Egypt. Electronic Data Interchange (EDI), Electronic Payment Schemes, electronic markets and catalogues, Point Of Sale (POS) and Electronic Funds Transfer System (EFTS) are utilised in UK more than in Egypt. Accounting Systems packages are used more in UK organisations than in Egyptian organisations. Ability to understand the structure of typical computerised accounting systems and subsystems, including the flow of transactions, data file organisations, and programmed accounting procedures, financial modelling, general ledger systems packages, revenue/expenditure/Payroll cycles is lower in Egypt compared with the UK.

The above tables show the results which sum up the testing of the hypotheses 5a, 5b, 5c, 5d, 5e. Where, as I mentioned earlier, general IT/IS skills consists of 7 skills and knowledge, user skills include 5, manager skills include 14, designer skills include 12, and evaluator skills include 14. Therefore, the researcher did the same two tests. Firstly, a t-test for independent two sample to compare the means of the two samples as a paramateric test. Secondly, Mann-Whitney U test as nonparamatric test to compare medians for the overall score for each group of skills. Therefore, the researcher used the t-test to test the significance for level of each skill NOW between Egypt and UK. Results for the three tests summarized in tables at appendix sixteen for t-test and Mann-Whitney U respectively.

<u>5-3 USA Vs UK (NOW)</u>

<u>*Hypothesis 6a:*</u> There is no significant difference in the level of GENERAL IT/IS skills/Knowledge in USA accounting programmes compared to UK accounting programmes NOW ($P < 0.05$)

<u>*Hypothesis 6b:*</u> There is no significant difference in the level of IT/IS skills/Knowledge as USER in USA accounting programmes compared to UK accounting programmes NOW ($P < 0.05$)

<u>*Hypothesis 6c:*</u> There is no significant difference in the level of IT/IS skills/Knowledge as MANAGER in USA accounting programmes compared to UK accounting programmes NOW ($P < 0.05$)

<u>*Hypothesis 6d:*</u> There is no significant difference in the level of IT/IS skills/Knowledge as DESIGNER in USA accounting programmes compared to UK accounting programmes NOW ($P < 0.05$)

<u>*Hypothesis 6e:*</u> There is no significant difference in the level of IT/IS skills/Knowledge as EVALUATOR in USA accounting programmes compared to UK accounting programmes NOW ($P < 0.05$)

A t-test for Independent Samples was used to test the above null hypothesis at 0.05 level of significance. Since the P-value is less than 0.05, there is a statistically significant difference between the medians at the 95.0% confidence level. The researcher may, at the 5%

significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-37.

Table 6-37 : t-test for hypotheses 6a, 6b, 6c, 6d, and 6e

Hypotheses	IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
					F	Sig.	T	df	Sig. (2-tailed)	Mean Differ-ence	
6a	G_P	USA	21	1.3946	5.295	.024	2.509**	52.552	.015	.2355	Rejected
		UK	53	1.1590							
6b	U_P	USA	21	1.7524	10.970	.001	2.042**	62.449	.045	.2090	Rejected
		UK	53	1.5434							
6c	M_P	USA	21	.9354	2.001	.161	.269*	72	.789	.0311	Supported
		UK	53	.9043							
6d	D_P	USA	21	.8611	.816	.369	1.258*	72	.212	.1080	Supported
		UK	53	.7531							
6e	E_P	USA	21	1.0986	.995	.322	.851*	72	.397	.1107	Supported
		UK	53	.9879							

* t-test reported **Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

** t-test reported **Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)**

Mann-Whitney U Test was used to confirm t-test results which the above null hypothesis at 0.05 level of significance. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. Therefore, the researcher may, at the 5% significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-38.

Table 6-38: Mann-Whitney U statistics for hypotheses 6a, 6b, 6c, 6d, and 6e

Hypotheses	IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
6a	G_P	358.500	1789.500	-2.402	.016	Rejected
6b	U_P	397.500	1828.500	-1.925	.049	Rejected
6c	M_P	533.000	1964.000	-.283	.777	Supported
6d	D_P	462.000	1893.000	-1.140	.254	Supported
6e	E_P	483.000	1914.000	-.884	.377	Supported

Hypothesis 6a confirms that there is a difference in the level of GENERAL IT/IS skills/Knowledge in USA accounting programmes compared to UK accounting programmes NOW. For example, global information resources management, information technology and global marketing, information technology and international financial services, information technology and global operations, information technology and research & development, information technology and global human resources are more advanced in USA than UK

Hypothesis 6b shows that there is a difference in the level of IT/IS skills/Knowledge as **USER** in USA accounting programmes compared to UK accounting programmes NOW. Executive Information Systems Management such as executive decision-making, executive direction of information systems, strategic application of information systems, executive information systems and control of information. Hypothesis 6c shows that there is no difference in the level of IT/IS skills/Knowledge as **MANAGER** in USA accounting programmes compared to UK accounting programmes NOW. This means those Data Resource Structures for example, data resources and information, applications of data administration, management of system maintenance and change. Management of Accounting Information Systems for example, management of end-user computing, information resources management principles, information concepts and requirements.

Global Information Management includes 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.

Hypothesis 6d shows that there is no difference in the level of IT/IS skills/Knowledge as **DESIGNER** in USA accounting programmes compared to UK accounting programmes NOW. Information Systems (IS) Design and Implementation such as 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 are the same level in USA and UK including ability to write simple file-processing and report-writing routines in several common programming languages e.g. COBOL, C, C++. Ability to design and use decision support aids and financial modelling tools such as linear programming, statistical tools, simulation packages, and network models for enhancing managerial decision making and ability to design financial databases for planning and control purposes are the same level in USA compared with UK.

Hypothesis 6e: shows that there is no difference in the level of IT/IS skills/Knowledge as **EVALUATOR** in USA accounting programmes compared to UK accounting programmes NOW. This means that skills and Knowledge such as internal control in computer-based systems for example, control objectives, effect of IT/IS audit on the organisation, compliance with applicable laws and regulations, cost effectiveness of control procedures and control and auditing in a computer environment are the same in both countries. This includes understanding of characteristics of EDP systems, their major components, and methods of operation.

The above tables show the results which sum up the testing of the hypotheses 6a, 6b, 6c, 6d, 6e. General IT/IS skills consist of 7 skills and knowledge, user skills include 5, manager skills include 14, designer skills include 12, and evaluator skills include 14. Therefore, the researcher did the same two tests. Firstly, a t-test for two independent samples to compare the means of the two samples as a parametric test. Secondly, Mann-Whitney U test as nonparametric test to compare medians for the overall score for each group of skills.

Therefore, the researcher used the t-test to test the significance for level of each skill NOW between UK and USA. Results for the three tests summarized in tables at appendix seventeen for t-test and Mann-Whitney U respectively

5-4 EGYPT (DEVELOPING COUNTRY) Vs (USA +UK) (DEVELOPED COUNTRIES) (NOW)

Hypothesis 7a: There is no significant difference in the level of GENERAL IT/IS skills/Knowledge in DEVELOPING COUNTRY accounting programmes compared to DEVELOPED COUNTRY accounting programmes NOW ($P < 0.05$)

Hypothesis 7b: There is no significant difference in the level of IT/IS skills/Knowledge as USER in DEVELOPING COUNTRY accounting programmes compared to DEVELOPED COUNTRY accounting programmes NOW ($P < 0.05$)

Hypothesis 7c: There is no significant difference in the level of IT/IS skills/Knowledge as MANAGER in DEVELOPING COUNTRY accounting programmes compared to DEVELOPED COUNTRY accounting programmes NOW ($P < 0.05$)

Hypothesis 7d: There is no significant difference in the level of IT/IS skills/Knowledge as DESIGNER in DEVELOPING COUNTRY accounting programmes compared to DEVELOPED COUNTRY accounting programmes NOW ($P < 0.05$)

Hypothesis 7e: There is no significant difference in the level of IT/IS skills/Knowledge as EVALUATOR in DEVELOPING COUNTRY accounting programmes compared to DEVELOPED COUNTRY accounting programmes NOW ($P < 0.05$)

A t-test for Independent Samples was used to test the above null hypothesis at 0.05 level of significance. Since the P-value is less than 0.05, there is a statistically significant difference between the medians at the 95.0% confidence level. The researcher may, at the 5% significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-39.

Table 6-39 : t-test for hypotheses 7a, 7b, 7c, 7d, and 7e

Hypotheses	IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
					F	Sig.	T	df	Sig. (2-tailed)	Mean Differ-ence	
7a	G_P	USA+UK	74	1.2259	22.790	.000	10.164**	103.919	**.000**	.6187	**Rejected**
		Egypt	32	.6071							
7b	U_P	USA+UK	74	1.6027	14.586	.000	13.811**	96.435	**.000**	1.0652	**Rejected**
		Egypt	32	.5375							
7c	M_P	USA+UK	74	.9131	.009	.923	5.779*	104	**.000**	.5292	**Rejected**
		Egypt	32	.3839							
7d	D_P	USA+UK	74	.7838	13.635	.000	12.679**	103.972	**.000**	.5911	**Rejected**
		Egypt	32	.1927							
7e	E_P	USA+UK	74	1.0193	4.594	.034	7.146**	90.466	**.000**	.5773	**Rejected**
		Egypt	32	.4420							

* t-test reported **Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

** t-test reported **Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)**

Mann-Whitney U Test was used to confirm t-test results which the above null hypothesis at 0.05 level of significance. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. Therefore, the researcher may, at the 5% significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-40.

Table 6-40: **Mann-Whitney U statistics for hypotheses 7a, 7b, 7c, 7d, and 7e**

Hypotheses	IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
7a	G_P	230.500	758.500	-6.612	.000	Rejected
7b	U_P	39.000	567.000	-7.919	.000	Rejected
7c	M_P	430.500	958.500	-5.204	.000	Rejected
7d	D_P	51.000	579.000	-7.823	.000	Rejected
7e	E_P	387.500	915.500	-5.492	.000	Rejected

As a result from the hypotheses 7a, 7b, 7c, 7d and 7e the level of IT/IS skills NOW between Egypt as a developing country and USA and UK as a developed country there is a significant difference in general, user, manager, designer, and evaluator. The research has demonstrated this situation is bearing in mind the technology level in both hardware and software between the two countries. Communication Technology such as data communication and networks, communication technology, design, communication controls, business *telecommunications* (LAN, WAN, INTERNET) in Egypt is still not used on a large scale compared to that used in the USA. This also applies to Transaction Processing System (TPS), Management information system (MIS), Decision support system (DSS), Executive information system (EIS), -Expert system (ES) and neural network (NN).

Professional accountants in USA and UK companies use various information technology tools and techniques to help them meet their objectives. However, in Egypt the use of these tools is less common and is used alongside the use of traditional tools. Professional accountants in Egypt need to be familiar with these tools and the way in which information technologies and systems can be applied.

The above tables show the results which sum up the testing of the hypotheses 7a, 7b, 7c, 7d, 7e. General IT/IS skills consists of 7 skills and knowledge, user skills include 5, manager skills include 14, designer skills include 12, and evaluator skills include 14. Therefore, the researcher did the same two tests. Firstly, a t-test for two independent samples to compare the means of the two samples as a parametric test. Secondly, Mann-Whitney U test as nonparametric test to compare medians for the overall score for each group of skills. Therefore, the researcher used the t-test to test the significance for level of each skill NOW between Egypt as a developing country and USA&UK as developed countries . Results for the three tests summarized in tables at appendix eighteen for t-test and Mann-Whitney U respectively.

5-5 EGYPT Vs USA (FUTURE)

Hypothesis 8a: There is no significant difference in the level of GENERAL IT/IS skills/Knowledge in Egyptian accounting programmes compared to USA accounting programmes IN THE FUTURE ($P < 0.05$)

Hypothesis 8b: There is no significant difference in the level of IT/IS skills/Knowledge as USER in Egyptian accounting programmes compared to USA accounting programmes IN THE FUTURE ($P < 0.05$)

Hypothesis 8c: There is no significant difference in the level of IT/IS skills/Knowledge as MANAGER in Egyptian accounting programmes compared to USA accounting programmes IN THE FUTURE ($P < 0.05$)

Hypothesis 8d: There is no significant difference in the level of IT/IS skills/Knowledge as DESIGNER in Egyptian accounting programmes compared to USA accounting programmes IN THE FUTURE ($P < 0.05$)

Hypothesis 8e: There is no significant difference in the level of IT/IS skills/Knowledge as EVALUATOR in Egyptian accounting programmes compared to USA accounting programmes IN THE FUTURE ($P < 0.05$)

A t-test for Independent Samples was used to test the above null hypothesis at 0.05 level of significance. Since the P-value is less than 0.05, there is a statistically significant difference between the medians at the 95.0% confidence level. The researcher may, at the 5% significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-41.

Table 6-41 : **t-test for hypotheses 8a, 8b, 8c, 8d, and 8e**

Hypotheses	IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
					F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	
8a	G_F	USA	21	2.6531	12.858	.001	2.399**	24.088	**.025**	.3004	**Rejected**
		Egypt	32	2.3527							
8b	U_F	USA	21	2.7524	.296	.589	2.610*	51	**.012**	.1836	**Rejected**
		Egypt	32	2.5687							
8c	M_F	USA	21	2.0748	3.183	.080	1.276*	51	**.020**	.0882	**Rejected**
		Egypt	32	1.9866							
8d	D_F	USA	21	2.0595	.010	.921	9.636*	51	**.000**	.7809	**Rejected**
		Egypt	32	1.2786							
8e	E_F	USA	21	2.6088	14.439	.000	3.744**	33.120	**.001**	.3655	**Rejected**
		Egypt	32	2.2433							

* t-test reported **Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

** t-test reported **Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)**

Mann-Whitney U Test was used to confirm t-test results which the above null hypothesis at 0.05 level of significance. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. Therefore, the researcher may, at the 5% significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-42.

Table 6-42: Mann-Whitney U statistics for hypotheses 8a, 8b, 8c, 8d, and 8e

Hypotheses	IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
8a	G_F	140.000	668.000	-3.595	.000	Rejected
8b	U_F	194.500	722.500	-2.643	.008	Rejected
8c	M_F	221.000	749.000	-2.108	.035	Rejected
8d	D_F	24.500	552.500	-5.683	.000	Rejected
8e	E_F	146.000	674.000	-3.472	.001	Rejected

As it is appears in tables 6-41, 6-42, As a result from the hypotheses 8a, 8b, 8c, 8d and 8e you will find the level of IT/IS skills in the future between Egypt and USA, there is a significant difference in general, user, manager, designer, and evaluator. The reason for this situation results from the technology level between both countries.

The above tables show the results which sum up the testing of the hypotheses. General IT/IS skills consists of 7 skills and knowledge, user skills include 5, manager skills include 14, designer skills include 12, and evaluator skills include 14. Therefore, the researcher did the same two tests. Firstly, a t-test for two independent samples to compare the means of the two samples as a parametric test. Secondly, Mann-Whitney U test as nonparametric test to compare medians for the overall score for each group of skills. Therefore, the researcher used the t-test to test the significance for level of each skill at the FUTURE between Egypt and USA. Results for the three tests summarized in tables at appendix nineteen for t-test and Mann-Whitney U respectively.

5-6 EGYPT Vs UK (FUTURE)

Hypothesis 9a: There is no significant difference in the level of GENERAL IT/IS skills/Knowledge in Egyptian accounting programmes compared to UK accounting programmes IN THE FUTURE ($P < 0.05$)

Hypothesis 9b: There is no significant difference in the level of IT/IS skills/Knowledge as USER in Egyptian accounting programmes compared to UK accounting programmes IN THE FUTURE ($P < 0.05$)

Hypothesis 9c: There is no significant difference in the level of IT/IS skills/Knowledge as MANAGER in Egyptian accounting programmes compared to UK accounting programmes IN THE FUTURE ($P < 0.05$)

Hypothesis 9d: There is no significant difference in the level of IT/IS skills/Knowledge as DESIGNER in Egyptian accounting programmes compared to UK accounting programmes IN THE FUTURE ($P < 0.05$)

Hypothesis 9e: There is no significant difference in the level of IT/IS skills/Knowledge as EVALUATOR in Egyptian accounting programmes compared to UK accounting programmes IN THE FUTURE ($P < 0.05$)

A t-test for Independent Samples was used to test the above null hypothesis at 0.05 level of significance. Since the P-value is less than 0.05, there is a statistically significant difference between the medians at the 95.0% confidence level. The researcher may, at the 5% significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-43.

Table 6-43 : t-test for hypotheses 9a, 9b, 9c, 9d, and 9e

Hypotheses	IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
					F	Sig.	t	df	Sig. (2-tailed)	Mean Differ-Ence	
9a	G_F	UK	53	2.6038	7.156	.009	3.743**	81.993	.000	.2511	Rejected
		Egypt	32	2.3527							
9b	U_F	UK	53	2.6792	3.684	.058	1.431*	83	.156	.1105	Supported
		Egypt	32	2.5687							
9c	M_F	UK	53	2.1536	9.860	.002	2.524**	72.689	.014	.1670	Rejected
		Egypt	32	1.9866							
9d	D_F	UK	53	1.7752	7.690	.007	6.410**	79.797	.000	.4965	Rejected
		Egypt	32	1.2786							
9e	E_F	UK	53	2.3181	16.108	.000	.761**	77.626	.449	.0748	Supported
		Egypt	32	2.2433							

*** t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

**** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)**

Mann-Whitney U Test was used to confirm t-test results which the above null hypothesis at 0.05 level of significance. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. Therefore, the researcher may, at the 5% significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-44.

Table 6-44: **Mann-Whitney U statistics for hypotheses 9a, 9b, 9c, 9d, and 9e**

Hypotheses	IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
9a	G_F	424.000	952.000	-3.884	.000	**Rejected**
9b	U_F	569.000	1097.000	-2.592	.050	**Supported**
9c	M_F	394.500	922.500	-4.127	.000	**Rejected**
9d	D_F	279.500	807.500	-5.173	.000	**Rejected**
9e	E_F	678.500	1206.500	-1.547	.122	**Supported**

As table 6-43 and table 6-44 shows hypotheses 9a, 9c, and 9d: There is no significant difference in the level of GENERAL, MANAGER, and DESIGNER IT/IS skills/Knowledge in Egyptian accounting programmes compared to UK accounting programmes IN THE FUTURE. The hypothesis was rejected. This means that the level of IT/IS skills for manager and designer roles in three years time still different between Egypt and UK. But hypotheses 9b and 9e state that there is no significant difference in the level of IT/IS skills/Knowledge as USER and EVALUATOR in Egyptian accounting programmes compared to UK accounting programmes IN THE FUTURE. This means that there is no difference between Egypt and UK in the user and evaluator role in three years time.

The above tables show the results which sum up the testing of the hypotheses 9a, 9b, 9c, 9d, 9e. General IT/IS skills consist of 7 skills and knowledge, user skills include 5, manager skills include 14, designer skills include 12, and evaluator skills include 14. Therefore, the researcher did the same two tests. Firstly, a t-test for two independent samples to compare the means of the two samples as a parametric test. Secondly, Mann-Whitney U test as nonparametric test to compare medians for the overall score for each group of skills. Therefore, the researcher used the t-test to test the significance for level of each skill NOW between Egypt and UK. Results for the three tests summarized in tables at appendix twenty for t-test and Mann-Whitney U respectively

<u>5-7 USA Vs UK (FUTURE)</u>

<u>Hypothesis 10a:</u> There is no significant difference in the level of GENERAL IT/IS skills/Knowledge in USA accounting programmes compared to UK accounting programmes IN THE FUTURE ($P < 0.05$)

<u>Hypothesis 10b:</u> There is no significant difference in the level of IT/IS skills/Knowledge as USER in USA accounting programmes compared to UK accounting programmes IN THE FUTURE ($P < 0.05$)

<u>Hypothesis 10c:</u> There is no significant difference in the level of IT/IS skills/Knowledge as MANAGER in USA accounting programmes compared to UK accounting programmes IN THE FUTURE ($P < 0.05$)

<u>Hypothesis 10d:</u> There is no significant difference in the level of IT/IS skills/Knowledge as DESIGNER in USA accounting programmes compared to UK accounting programmes IN THE FUTURE ($P < 0.05$)

<u>Hypothesis 10e:</u> There is no significant difference in the level of IT/IS skills/Knowledge as EVALUATOR in USA accounting programmes compared to UK accounting programmes IN THE FUTURE ($P < 0.05$)

A t-test for Independent Samples was used to test the above null hypothesis at 0.05 level of significance. Since the P-value is less than 0.05, there is a statistically significant difference between the medians at the 95.0% confidence level. The researcher may, at the 5% significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-45.

Table 6-45 : t-test for hypotheses 10a, 10b, 10c, 10d, and 10e

Hypotheses	IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
					F	Sig.	T	df	Sig. (2-tailed)	Mean Differ-Ence	
10a	G_F	USA	21	2.6531	2.124	.149	.427	72	.671	.0493	Supported
		UK	53	2.6038							
10b	U_F	USA	21	2.7524	4.142	.046	.988	59.424	.327	.0732	Supported
		UK	53	2.6792							
10c	M_F	USA	21	2.0748	1.332	.252	-.748	72	.457	-.0788	Supported
		UK	53	2.1536							
10d	D_F	USA	21	2.0595	6.925	.010	3.495	55.699	.001	.2844	Rejected
		UK	53	1.7752							
10e	E_F	USA	21	2.6088	3.080	.084	1.993	72	.050	.2908	Supported
		UK	53	2.3181							

* t-test reported **Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

** t-test reported **Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)**

Mann-Whitney U Test was used to confirm t-test results which the above null hypothesis at 0.05 level of significance. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. Therefore, the researcher may, at the 5% significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-46.

Table 6-46: **Mann-Whitney U statistics for hypotheses 10a, 10b, 10c, 10d, and 10e**

Hypotheses	IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
10a	G_F	438.000	1869.000	-1.451	.147	Supported
10b	U_F	550.000	1981.000	-.081	.935	Supported
10c	M_F	392.000	623.000	-1.980	.058	Supported
10d	D_F	331.500	1762.500	-2.706	.007	Rejected
10e	E_F	386.000	1817.000	-2.061	.051	Supported

The above tests was the results to sum up testing the hypotheses 3a, 3b, 3c, 3d, 3e. Where, as I mentioned earlier, general IT/IS skills consists of 7 skills and knowledge, user skills include 5, manager skills include 14, designer skills include 12, and evaluator skills include 14. Therefore, the researcher did the same two tests. Firstly, a t-test for independent two sample to compare the means of the two samples as a paramateric test. Secondly, Mann-Whitney U test as nonparamatric test to compare medians for the overall score for each group of skills. Therefore, the researcher used the t-test to test the significance for level of each skill FUTURE between UK and USA. Results for the three tests summarized in tables at appendix twenty-one for t-test and Mann-Whitney U respectively

5-8 EGYPT (DEVELOPING COUNTRY) Vs (USA +UK) (DEVELOPED COUNTRIES) (AT FUTURE)

Hypothesis 11a: There is no significant difference in the level of GENERAL IT/IS skills/Knowledge in DEVELOPING COUNTRY accounting programmes compared to DEVELOPED COUNTRY accounting programmes AT FUTURE ($P < 0.05$)

Hypothesis 11b: There is no significant difference in the level of IT/IS skills/Knowledge as USER in DEVELOPING COUNTRY accounting programmes compared to DEVELOPED COUNTRY accounting programmes AT FUTURE (P < 0.05)

Hypothesis 11c: There is no significant difference in the level of IT/IS skills/Knowledge as MANAGER in DEVELOPING COUNTRY accounting programmes compared to DEVELOPED COUNTRY accounting programmes AT FUTURE (P < 0.05)

Hypothesis 11d: There is no significant difference in the level of IT/IS skills/Knowledge as DESIGNER in DEVELOPING COUNTRY accounting programmes compared to DEVELOPED COUNTRY accounting programmes AT FUTURE (P < 0.05)

Hypothesis 11e: There is no significant difference in the level of IT/IS skills/Knowledge as EVALUATOR in DEVELOPING COUNTRY accounting programmes compared to DEVELOPED COUNTRY accounting programmes AT FUTURE (P < 0.05)

A t-test for Independent Samples was used to test the above null hypothesis at 0.05 level of significance. Since the P-value is less than 0.05, there is a statistically significant difference between the medians at the 95.0% confidence level. The researcher may, at the 5% significance level (p < 0.05), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-47.

Table 6-47 : **t-test for hypotheses 11a, 11b, 11c, 11d, and 11e**

Hypotheses	IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
					F	Sig.	T	df	Sig. (2-tailed)	Mean Differ-ence	
11a	G_F	USA+UK	74	2.6178	9.645	.002	4.132**	102.687	.000	.2651	Rejected
		Egypt	32	2.3527							
11b	U_F	USA+UK	74	2.7000	1.822	.180	1.902*	104	.036	.1313	Rejected
		Egypt	32	2.5687							
11c	M_F	USA+UK	74	2.1313	9.016	.003	2.607**	103.663	.010	.1447	Rejected
		Egypt	32	1.9866							
11d	D_F	USA+UK	74	1.8559	5.785	.018	7.378*	104	.000	.5772	Rejected
		Egypt	32	1.2786							
11e	E_F	USA+UK	74	2.4006	17.942	.000	1.897**	102.900	.041	.1573	Rejected
		Egypt	32	2.2433							

* t-test reported **Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

** t-test reported **Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)**

Mann-Whitney U Test was used to confirm t-test results which the above null hypothesis at 0.05 level of significance. Since the P-value for this test is less than 0.05, we can reject the null hypothesis at the 95.0% confidence level. Therefore, the researcher may, at the 5% significance level ($p < 0.05$), determine that a null hypothesis will be rejected if it is false. The results are summarised in table 6-48.

Table 6-48: Mann-Whitney U statistics for hypotheses 11a, 11b, 11c, 11d, and 11e

Hypotheses	IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
11a	G_F	564.000	1092.000	-4.310	.000	Rejected
11b	U_F	763.500	1291.500	-2.974	.003	Rejected
11c	M_F	615.500	1143.500	-3.926	.000	Rejected
11d	D_F	304.000	832.000	-6.071	.000	Rejected
11e	E_F	824.500	1352.500	-2.487	.013	Rejected

The above tables show the results which sum up the testing of the hypotheses 11a, 11b, 11c, 11d, 11e. General IT/IS skills consist of 7 skills and knowledge, user skills include 5, manager skills include 14, designer skills include 12, and evaluator skills include 14. Therefore, the researcher did the same two tests. Firstly, a t-test for two independent samples to compare the means of the two samples as a parametric test. Secondly, Mann-Whitney U test as nonparametric test to compare medians for the overall score for each group of skills. Therefore, the researcher used the t-test to test the significance for level of each skill FUTURE between Egypt as a developing country and USA&UK as developed countries. Results for the three tests summarized in tables at appendix twenty-two for t-test and Mann-Whitney U respectively

6- SUMMARY

This chapter focused on the analysis of the data which was gathered from the three samples. Mainly, this chapter pays attention to testing the hypotheses, which was introduced in the methodology chapter (chapter four), either by individual hypotheses or by using comparative ones. Therefore, this chapter was split into seven sections. The first three sections dealt with the USA, the UK and Egypt. Sections from four to seven concentrated on comparative analysis between the three groups as pairs as follows: Section four compared USA and Egypt. Section five compared UK against Egypt. Section six dealt with the USA and the UK. Section seven did comparative analysis between USA and UK as one-group representing the developed countries against Egypt, which is an example of a developing country.

From the discussion in this chapter, there are vast differences between the levels of IT/IS skills and knowledge in Egypt and the UK and the USA. In addition, in the future the gap may become too great to be bridged if the government and policy makers in the developing countries do nothing to increase the skill levels in these countries. The only solution is for IT/IS skills to be delivered in the Universities, since the professional and business organisations are not willing to train the students.

Furthermore, many graduates lack the basic and higher-level IT/IS skills required in the modern commercial corporate world. We need to recognise that the initial short-term costs of improving Egyptian 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.

Accounting educators are the keys to success in any accounting educational change. They must be trained, supported, and provided with adequate resources in order to be successful in implementing new teaching methods and integrating IT/IS skills into accounting programmes.

CHAPTER SEVEN

SUMMARY, DISCUSSION AND CONCLUSIONS

Chapter Structure

In earlier chapters of this thesis the research questions and research hypotheses concerning the role of IT in accounting education were presented. The literature related to the subject was reviewed and discussed. The data was collected by means of focus groups on the Internet, and a mailed and self-administered questionnaire. The data was examined and analysed by using statistical analysis software. This chapter will present a summary, discussion and conclusion for the study. It will conclude with the limitations of the study, contributions and finally, some suggestions for further research.

Therefore, this chapter will be divided into the following sections:

1. Introduction and summary
2. The Results
3. Discussion and Conclusion
4. Limitations of the study
5. Contributions
6. Suggestions for further research

1- INTRODUCTION AND SUMMARY

The use of information technology in business has increased rapidly in recent years to permeate organisations at every level. At the same time, the accounting literature has witnessed a tremendous increase in the volume of writing about Information Technology (IT). Concepts, applications, problems, and future potential have been discussed and assessed not only by researchers but also by practitioners too. Each group has recognised the value and importance of IT in the achievement of success in a very competitive business world and IT skills are essential to the long-term success of the accountants.

The IT revolution has highlighted the various roles of accountants as a service function drawn upon as and when required for auditing, stewardship, taxation, and trusteeship. This includes acting as a consultant in specific financial and related services, as an expert providing general business advice and as a manager managing accounting information service, financial resources or other functions. The auditor has been affected in two ways, firstly, the audit itself has become more complex and challenging as organisations move towards on-line and "paperless" systems. Secondly, the auditor is faced with the opportunity of using the technology itself to increase the efficiency and effectiveness of the audit.

There is a growing need for accountants to understand the nature of this technology and the way it can best be harnessed to provide information for business functions. Accounting was the first successful, far-reaching application area of business computing. After years of little change in traditional transaction processing, accounting has again recently found itself to be the target of many technological innovations. Imaging, Electronic data Interchange (EDI), integrated client/server systems, workflow systems and electronic commerce have all made dramatic impacts on transaction-oriented accounting information systems (AIS). The complexity of AIS has placed increased pressure on accountants to maintain proper controls to ensure the security and integrity of transaction databases. In addition, the demand for traditional accounting and audit services has diminished. For example, financial statements resulting from annual external audits do not carry the same weight with investors as they have in the past, thanks to the widespread demand for and availability of real-time financial data. Auditors, as a result, may need to move to a continuous audit function and diversify their consulting techniques in order to avoid becoming redundant. These shifts in professional activity will be accompanied by significant changes in the systems that support actual transaction processing, the flow of operational work throughout the value chain, and the organisational support systems employed by auditors as they redefine work processes, work groups and their scope of business. Accountants who are working in this technological environment should ideally have a new set of skills in IT.

The challenges facing organisations in the 1990s require skills of a special kind of accountant which this research called "The hybrid accountant" (combining IT/IS competencies and mainstream accounting capabilities). A "hybrid" accountant blends different skills and knowledge of business management and information management.
The integration of IT into the accounting curriculum must be designed to provide students with the knowledge and skills required by graduates entering employment. The emphasis is on the application of information technology rather than on traditional computer science.

This study aims to:

- Determine what IT skills and knowledge the professional accountants should possess.
- Determine how IT skills and knowledge should be delivered into accounting education
- Compare the integrating of IT/IS skills/knowledge in accounting programmes in one of the developing countries (Egypt) and of two developed countries (USA and UK).

The achievement of the above aims involves the establishment of the following set of objectives:

A. Determining what and how IT/IS skills/knowledge should be integrated into accounting education in USA.
B. Determining what and how IT/IS skills/knowledge should be integrated into accounting education in UK.
C. Determining what and how IT/IS skills/knowledge should be integrated into accounting education in Egypt.

D. Testing set of hypotheses related to the level of IT/IS skills in accounting programmes.

The fulfilment of the above aims and objectives required a set of steps:

1) Conducting a comprehensive review of literature carried out in developed countries related to the impact of IT in accounting education and accounting practices.
2) Adopting a sound research methodology to collect field data about the views, attitudes and perceptions toward the Information Technology Systems knowledge and skills, this should be integrated in accounting education. These views will be collected from three groups in three countries USA, UK, and Egypt.
3) Adopting a sound way of analysing the collected data to give a clear picture about what IT knowledge and skills should be delivered in accounting programme.
4) Drawing conclusions based on a comparative analysis of the current state in developed countries and the current state in Egypt.

The study is organised into seven chapters: **chapter one** is an attempt to introduce a preliminary discussion of the importance of IT skills in accounting practice and the relationship between accounting education and the accounting profession. In addition this chapter provides a research problem, the significance of the study, the research questions, a brief review of the methodology of the study, and the organisation of the study.

Chapter two is devoted to the review of the literature available in the developed countries such as USA and UK related to IT in accounting practice and accounting education. The chapter in addition deals with why IT should be integrated in accounting education.

In **Chapter three** other aspects for integrating IT/IS into accounting education are presented. This chapter targets three main issues: firstly, what IT/IS skills and knowledge should accountants possess? Secondly, how should IT skills be delivered in accounting education? Thirdly, the chapter refers to literature related to the problems that face the integrating process in the accounting curriculum.

Chapter four sets out the research methodology design and describes the collection of the data. It clarifies the scope and nature of the study, and discusses research techniques. It covers the instruments used to collect data, the focus groups, which have been conducted on the Internet, the pilot study, and how the questionnaire was administered.

Chapter five reports the findings of the focus groups and of the questionnaire survey of accounting educators in accounting departments at the Universities in the USA, UK, and Egypt. This chapter presents the pattern of the results including their relevance to the research questions.

Chapter six tests the hypotheses for the data and provides a comparative analysis between the three samples. The first three sections deal with the individual countries. Sections four to seven provide a comparative analysis between the countries.

Chapter seven provides the final summary and conclusions of the study. Therefore, the study concludes with regard to the research questions what IT/IS skills should be integrated in accounting programmes and how it is to be delivered. It also summarises the results related to research hypotheses. These hypotheses are related to the level of integrating IT/IS skills and knowledge into accounting programmes in three samples. In addition, this chapter explains how the thesis contributes to knowledge and illustrates the limitations of the study. At the end of this chapter, it will make recommendations for further research.

2- The Results

The present study seeks the following:

First, to obtain opinions about the current state and the future for IT/IS into accounting programmes.

Second, to determine what are the skills and knowledge of IT/IS, which the accountants should possess, which employers expect and would prefer them to have?

Thirdly, to determine what *level of IT/IS skills which* are *included* in accounting programmes **now** and at three years in **the future**?

Fourthly, to determine how IT/IS skills should be integrated into accounting programmes?

Finally, to test a set of hypotheses related to the level of IT/IS in three samples (USA, UK, Egypt) NOW and THREE YEARS IN THE FUTURE.

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

A- General Information Technology Knowledge

The level of IT/IS knowledge NOW in the three samples, as the survey mentioned, was low knowledge (see tables 6-5 page 235, 6-15 page 244 and table 6-25 page 252). For the future, in USA and UK sample it was high knowledge (see table 6-5 and table 6-15) but in Egypt it was only moderate (see table 6-25). This might be because the level of hardware and software technology used in Egypt is lower than in the USA and UK.

B- IT/IS skills/knowledge for the accountant as a user of information technology

The level of IT/IS Skills/knowledge NOW in the USA sample, as the survey mentioned, was moderate (see table 6-6 page 235) but in the UK and Egypt it was low (see table 6-16 and table 6-26). For the future in the three samples, it should be high level (see tables 6-6, 6-16, and 6-26). The reason for this is accountants role as a user of information systems does not depend on the physical level of technology in each country but upon accounting application packages which are at the same level in developing and developed countries.

C- IT/IS skills/knowledge for accountant as a manager of information systems

The level of IT/IS skills NOW in the USA and UK samples, as the survey mentioned, was low (see tables 6-7 and 6-17) as in the Egyptian sample (see table 6-27). 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. This role does not extend as a priority for accountants. Therefore, the level was low knowledge. But in the future, as accountants become more involved, it was expected to be moderate level in the three samples (see tables 6-7, 6-17, and 6-27).

D- IT/IS skills/knowledge for accountant as a designer of information systems

These sets of skills/knowledge included twelve skills. The average level for all of them NOW in USA and UK was low (see tables 6-8 and 6-18) but in Egypt it was no level of knowledge (see table 6-28). 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. The position of accountants in Egypt is not clear when the computer science person has this role.

The level of the same skills /knowledge after three years in USA and UK was moderate (see tables 6-8 and 6-18) but in the Egyptian sample was expected to be low (see table 6-28). As a result accountants in developed countries have more of a role as a designer of accounting information systems than accountants in Egypt.

E- IT/IS skills/knowledge for accountant as an evaluator of information systems

IT/IS skills as evaluator included fourteen skills. The level of these skills NOW in the USA and UK was low (see tables 6-9 and 6-19) but in the Egyptian sample was again no knowledge (see table 6-29). In the future, the USA's average is expected to be high (see table 6-9) but in UK and Egypt it is expected to only reach a moderate level (see table 6-19 and table 6-29).

This study also considered findings with regard to how IT/IS skills/knowledge should be delivered into accounting programmes for the five sets of IT/IS skills/knowledge. The respondents were given three options. Firstly, "Individual IT/IS courses", secondly, "Accounting courses", lastly, "The Workplace" (see table 5-27 for USA results, table 5-55 for UK results and table 5-79 for Egyptian results).

The study also tested two types of hypotheses as follows:

First type: individual country hypotheses

Second type: comparative countries hypotheses

The results show that accounting education does not equip the students with enough IT/IS skills for their role beyond graduation in their employment. A gap exists between the IT/IS skills that students currently learn in accounting education at University level and what accountants practise in the real world with regard to IT/IS. The business community and those involved in accounting education must first decide what their objectives are with regard to IT education; Communication between the business community and Universities needs to be improved so that IT education can more closely match needs. Accounting education systems within the Universities should give students the opportunity to acquire both IT/IS knowledge and IT/IS practical skills for both information processing and communication. The accounting education program should increase accountants' IT competency and their awareness of technological developments and the use of applications. Also, the program should build on a strong education concerning systems and information technology to its accountants, alongside the core of a business program which prepares students for the social and technical analysis, design, development, implementation and management of systems.

Individual Hypotheses for USA, UK and Egypt

All the individual null hypotheses (There is no significant difference in the level of IT/IS skills/Knowledge as general, user, manager, designer and evaluator, which is in accounting programmes in the three samples NOW and the level which should be in the FUTURE) were rejected. In other words, all the alternative hypotheses (There is significant difference in the level of IT/IS skills/Knowledge as general, user, manager, designer and evaluator, which is in accounting programmes in the three samples NOW and the level which should be in the FUTURE) were accepted.

The probable reason for this result is that the improved technology brings new roles requiring new skills and knowledge of the accountant. For example, knowledge of components of information systems technology (H/W, S/W), information systems processing methods in organisations and the structure of information systems in organisations, has become very demanding for accountants. The skills involved in the use of expert systems in accounting and auditing technology and financial systems are greater importance.

Comparative Hypotheses between USA and Egypt

The level of IT/IS skills NOW is lower in Egypt than in the USA. The research has demonstrated this situation is bearing in mind the technology level in both hardware and software between the two countries. Communication Technology, such as data communication and networks, communication technology, design, communication controls, business telecommunications, is still not used on a large scale in Egypt compared to use in the USA. This also applies to Transaction Processing System (TPS), Management information system (MIS), Decision support system (DSS), Executive information system (EIS), -Expert system (ES) and neural network (NN). Professional accountants in USA companies use various information technology tools and techniques to help them meet their objectives. However, in Egypt the use of these tools is less common and is used alongside the use of traditional tools.

Comparative Hypotheses between UK and Egypt

The level of IT/IS skills in Egypt and the UK is different. This result is not surprising as UK has a longer track record in use of IT compared with Egypt. Electronic Data Interchange (EDI), Electronic Payment Schemes, electronic markets and catalogues, Point Of Sale (POS) and Electronic Funds Transfer System (EFTS) are utilised in UK more than in Egypt. Accounting Systems packages are used more in UK organisations than in Egyptian organisations. Ability to understand the structure of typical computerised accounting systems and subsystems, including the flow of transactions, data file organisations, and programmed accounting procedures, financial modelling, general ledger systems packages, revenue/expenditure/Payroll cycles is lower in Egypt compared with the UK

Comparative Hypotheses between USA and UK

There is a difference in the national level of GENERAL IT/IS skills/knowledge in USA accounting programmes compared to UK accounting programmes NOW. For example, global information resources management, information technology and global marketing, information technology and international financial services, information technology and global operations, information technology and research & development, information technology and global human resources are more advanced in the USA than in the UK

Also, there is difference in the level of IT/IS skills/Knowledge as **USER** in USA accounting programmes compared to UK accounting programmes NOW. However, there is no difference in the level of IT/IS skills/Knowledge as **MANAGER** in USA accounting programmes compared to UK accounting programmes NOW.

There is no difference in the national level of IT/IS skills/Knowledge as **DESIGNER** in USA accounting programmes compared to UK accounting programmes NOW. Information Systems (IS) Design and Implementation, such as 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 are at the same level in USA and UK.

Ability to design and use decision support aids and financial modelling tools such as linear programming, statistical tools, simulation packages, and network models for enhancing managerial decision making and ability to design financial databases for planning and control purposes are the same level in USA compared with UK

There is no difference in the national level of IT/IS skills/Knowledge as **EVALUATOR** in USA accounting programmes compared to UK accounting programmes NOW. This means that skills and knowledge such as internal control in computer-based systems, control objectives, effect of IT/IS audit on organisation, compliance with applicable laws and regulations, cost effectiveness of control procedures and control auditing in a computer environment are the same in both countries. As well understanding of characteristics of EDP systems, their major components, and methods of operation.

3 - Discussion and Conclusion

From the discussion above, there are vast differences between the levels of IT/IS skills and knowledge in Egypt and the UK and the USA (see tables 6-5, 6-6, 6-7, 6-8, 6-25, 6-26, 6-27 and 6-28). In addition, in the future the gap may become too great to be bridged if the government and policy makers in the developing countries do nothing to increase the skill levels in these countries. One solution is for IT/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.

Accounting educators in Egypt feel that the accounting educational system is in crisis (see table 5-64). Egyptian students do not compare well to those of other countries with whom they should compete in the business world (see table 5-10 and table 5-38). Business spends a lot of money every year teaching 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 basic and higher-level IT/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 latter part of the nineteenth century, the educational system of Egypt was designed to provide workers for agricultural and industrial work. The country's national and international success was due, in no small measure, to the education provided through this system. In the decades since, the world has changed dramatically. The Information Age imposes significant changes and different requirements on an educated citizenry. Egyptian current 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 IT skills and knowledge.

Egypt should keep abreast with the march of advanced countries in the IT/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 IT/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 WWW, interactive multimedia. Increased recognition of need for integrating and the ways concerning how to integrate IT/IS are helpful for successful integrating IT/IS into Egyptian accounting programmes (see tables 5-67).

Concerns regarding the movement of information technology tools from developed countries to developing countries should be expressed, and the need for further development of IT 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 IT 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 thesis comes from the national shortage of accountants who are equipped with the necessary skills and knowledge of the IT in the context of business and industry and how the understanding of the application of IT 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 which will done by expatriates.

4 - LIMITATIONS OF THE STUDY

All research has its limitations, and this is no exception. Every effort was made to keep them to the minimum. In spite of that, the following limitations remain:

1- As with any social study, the empirical part of the study depended on the attitudes, views, experiences, education and opinions of all the participants.

2- The study investigated only IT/IS skills/knowledge.

3- In the pre-test stage, the questionnaire was sent to accounting educators in general. But the final questionnaire was directed to all the people within accounting departments who actually had expertise in IT/IS in the teaching or research.

4- The research limited the USA sample to one state, Florida.

5- Egypt was used as an example of a developing country, UK and USA were used as an example of a developed countries.

5 - CONTRIBUTIONS

The thesis contributes to knowledge as follows:

1 –It presents a comparative study between different countries, (Egypt, UK and the USA) regarding to the level of IT/IS skills/knowledge in accounting programmes.

2 –It demonstrates how accounting practitioners and accounting educators should co-operate with each other over the IT core skills and knowledge that are taught in accounting education programmes.

3 -This study is the first one concerning the use of IT/IS skills in accounting in a developing country.

4 –It uses focus groups on the Internet as a means of collecting views and perceptions. The web site was open to any search engine on the Internet. Therefore, local and global views were collected. The results from these focus groups addressed the views of accounting practitioners on IT/IS educational requirements and the needs of accountancy graduates. The main advantages of the use of the Internet were easy access for users, cheap to use, fast collection of data and world-wide coverage.

5 -This study links the needs of the customers (the profession and business) in the real world with the quality of the product (accounting students) regarding IT/IS skills and the producers (accounting educators in the Universities).

6 –It examines the current level of IT/IS skills in accounting programmes as well as what is expected in the future for this level.

7 –It considers the ways of delivering IT/IS skills through individual IT courses, by integrating them into accounting courses or by employers in the workplace.

8 -The survey revealed that many practising accountants felt that their poor understanding of IT/IS affects their performance.

Hopefully, the information contained in this study will help the decision makers, who are responsible for the development of accounting education, to encourage changes in the curriculum more rapidly to incorporate the information technological revolution. This must happen in order to prepare accountants to do more efficient work in practice.

6 - SUGGESTIONS FOR FURTHER RESEARCH

This study should be seen as only a preliminary one into accounting and Information Technology in developing countries. It has revealed a lack of IT/IS skills and knowledge in accounting programmes in one of these countries (Egypt) as well in developed countries (USA and UK), but it has also raised many questions, which are beyond its scope to answer. These require further studies:

1- This study reveals the need for accountants to use IT/IS skills in the real world. A study could clarify the extent of this need via more investigation.

2- Another issue is the need to integrate IT/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- This research was limited to one state in the USA. Investigation of other accounting educational systems is needed.

5- The feedback from practitioners and accounting educators concerning the results of this study should be examined to improve and update integrating IT/IS skills and knowledge into accounting programmes.

6- As we have multinational companies with international investment across the globe, an international study should investigate the level of IT/IS skills that the accountant should possess.

7- The views and opinions of recent accounting graduates on the usefulness of their IT/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.

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APPENDICES

APPENDIX ONE

ACCOUNTING AND INFORMATION TECHNOLOGY FOCUS GROUP

This focus Group survey is planned and conducted by Adel Ahmed, PhD Research student in the Liverpool Business School, part of Liverpool John Moores University (LJMU). My supervisory team includes:

- **Mr Roger Pegum,** Head of the Accounting and Finance Group of Liverpool Business School
- **Professor Les Bell,** Director of Education Community Studies School at LJMU
- **Professor Alan Doig,** Public Service Management in Liverpool Business School

The intended research project will explore to what extent information technology(IT) skills is included in accounting education and whether this meets the needs of accounting practitioners and professionals in accountancy work in industry and commerce, public practice and the public sector (Expectation Gap). It will also consider the possibility of achieving an agreed framework for IT skills for accountants.

One of the information gathering steps of the research is being conducted through Three **Focus Groups** - *Accounting Education, Accounting Practitioners, and Learning Technology*. Each group is being asked to comment on broad areas and invited to suggest questions for further analysis.

I would very much appreciate your taking a few minutes to answer a few questions with regard to information technology (IT) skills in *Accounting Education and Accounting Practitioners*.

ALL INFORMATION WILL BE TREATED CONFIDENTIALLY

- Accounting Education Group
- Accounting Practitioners Group
- Learning Technology Group

Expertise Area:

Accounting Education Group

NB: Please use the tab key or the mouse to move from one question to another.

1. a- What do you think is the current status of IT skills in accounting education?

   b- What developments would you suggest?

2. What are would be helpful in increasing integration of IT/IS training into accounting education?

3. Do you think that there exists a gap between what the students currently learn in accounting education and what accountants do in the real world, with regard to IT skills?

4. If you think there exists a gap how do you think that we may bridge this gap?

5. **What do your undergraduate accounting students currently receive in terms of computer support?**

(Please specify e.g word-processing, spreadsheet, database, statistic packages, Email, WWW, graphics software, network, client/server, paint/draw/photo software, etc. and which version ?

6. **What do your accounting students use to support their learning?**

(Please specify e.g Computer-Aided-Learning (CAL), Computer-Assisted Instruction (CAI), Computer-Managed instruction (CMI), Commercial Accounting Packages?)

7. **Are there, in your opinion, general IT skills for the students in accounting education? or is there a specific IT skills depending on the accounting work e.g. as users of information technology , as managers of information systems, as designers of business systems and as evaluators of information systems?**

8. **In your opinion what should educators have IT focus for student learning and to what extent should computers be involved?**

9. **To what extent do you think undergraduate accounting education equips the student with skills in IT for the real world, for their role beyond graduation?**

10.Please describe a few examples, of best practice (with which you are familiar) in integrating IT skills into the accounting curriculum

11.How are your curricula and content of undergraduate courses designed to currently meet the IT requirements in commerce and industry?

12.What is your opinion with regard to information technology and its potential future direction in the next five years, i.e. directly affecting accounting education?

13.Please add any further comments you may have concerning IT and accounting education or write any questions that you feel should be included in a questionnaire to academics.

It would be very helpful if I could contact you at some point in the future in order to revisit some of the issues raised. This would not take any longer than it took to complete this focus group questionnaire. If you would be willing for me to do so, please tick YES.

I am willing to be contacted: YES ☐ NO ☐

Thank you for your assisting my research and completing this questionnaire.

Please enter your details:

Name: ______ Email: ______

Organisation: ______ Country: ______

SUBMIT

Please click the button to submit your answers.
An acknowledgement message will appear on your screen shortly after you have submitted the form. If you do not receive an acknowledgement, your form has not been submitted successfully. In that event, please check that you are still connected to the server and resubmit.

PLEASE GO TO
Accounting Practitioners Group
Learning Technology Group
If you have any query please contact :

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Expertise Area:

Accounting Practitioners Group

NB: Please use the tab key or the mouse to move from one question to another.

1. In your opinion, what does the accounting profession need from its entry-level accountants, regarding IT skills? You may wish to outline IT qualifications that the profession needs from the accountants to work in the accounting field.

2. Do you think that IT requirements for accounting differ from sector to sector, for example: industry and commerce, public practice and the public sector, or are there general IT skills that the accountants should possess regardless of the kind of the sector they work in?

3. Are there general IT skills for accountants dependent on their roles in accounting practice? or are there specific IT skills depending on the accounting work e.g. as user of information technology , as manager of information systems , as a designer of business systems or as an evaluator of information systems?

4. Do you think that there exists a gap between what the students currently learn in accounting education and what accountants do in the real world, with regard to IT skills?

5. If you think there exists a gap how do you think that we may bridge this gap?

6. What, in your opinion, will be the major factors affecting accounting work in the next five years, and what role, if any, will IT contribute to these?

7. Please add any further comments you may have concerning IT and accounting practice or suggest any questions that you feel should be included in a questionnaire

It would be very helpful if I could contact you at some point in the future in order to revisit some of the issues raised. This would not take any longer than it took to complete this focus group questionnaire. If you would be willing for me to do so, please tick YES.

I am willing to be contacted: YES ☐ NO ☐

Thank you for your assisting my research and completing this focus group questionnaire.

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Expertise Area:

Learning Technology Group

NB: Please use the tab key or the mouse to move from one question to another.

1. **In your opinion, what should be the focus for undergraduate students learning, with regard to IT skills?**

2. **How would you summarise the extent of depth/coverage undergraduate students learning experience with the subject of Information Technology?**

(You can be specific specify e.g word-processing, spreadsheet, database, statistics packages, Email, WWW, graphics software, network, client/server, paint/draw/photo software, etc.)

3. **In your opinion what specific learning applications do students currently experience using computers ?**

(Please specify e.g Computer-Aided-Learning (CAL), Computer-Assisted Instruction (CAI), Computer-Managed instruction (CMI), Commercial Packages.)

4. **In your opinion, what should current graduates possess with regard to IT skills?**

5. **In your opinion, which aspects of information technology, in recent years, have had the most important influence on teaching and learning process?**

6. **What is your opinion with regard to the direction of development of information technology over the next five years? How will this effect teaching and learning processes?**

7. **Please add any further comments you may have concerning IT and education processes or write any**

questions that you feel should be included in a questionnaire

It would be very helpful if I could contact you at some point in the future in order to revisit some of the issues raised in this questionnaire. This would not take any longer than it took to complete this questionnaire. If you would be willing for me to do so, please tick YES.

I am willing to be contacted: YES ☐ NO ☐

Thank you for your assisting my research and completing this questionnaire.

Please enter your details:

Name: Email:

Institution: Country:

SUBMIT

Please click the button to submit your answers.
An acknowledgement message will appear on your screen shortly after you have submitted the form. If you do not receive an acknowledgement, your form has not been submitted successfully. In that event, please check that you are still connected to the server and resubmit.

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APPENDIX TWO

Skills level by Armitage and Boritz (1986)

Level 1: Introductory Conceptual Knowledge:

- Understanding of characteristics of EDP systems, their major components , and methods of operation
- Understanding of the system development life cycle, its phases, and management principles for the system development process
- Understanding of the methods of operating and managing business systems once implemented
- Ability to write simple file-processing and report-writing routines in several common programming languages
- Appreciation of the social, economic, and legal implications of computer technology, including effects of automation on work, institutions, and freedoms (e.g., privacy)

Level 2: Broad Skills

- Knowledge of financial accounting, managerial accounting, auditing and ability to use state-of-the-art system analysis and design techniques
- Hands-on exposure to major program products e.g.
  - ⇒ Word processors
  - ⇒ Spread sheets
  - ⇒ Statistical packages
  - ⇒ Database management system
  - ⇒ Report writers
  - ⇒ Modelling packages
  - ⇒ Accounting packages

Level 3: Specialised Skills

For each of the four main accounting program (i.e. Financial Accounting, Managerial accounting / information systems, Auditing, taxation) we should be identified a set of computer-related skills/ capabilities/ knowledge sets that students should be expected to obtain through the program.

Financial Accounting

- Ability to understand the structure of typical computerised accounting systems and subsystems including the flow of transactions, data file organisations and programmed accounting procedures.
- Ability to evaluate and use special or general-purpose software "packages" for consolidation, foreign currency translation, current value accounting, lease accounting, etc.
- Ability to use database service for financial reporting and disclosure research.

Managerial accounting / information systems

- Ability to participate as part of system development team worth an appreciation of information and methods, behavioural consequences of project management
- Ability to design and use financial database for planning and control purposes
- Ability to design and use decision support aids and financial modelling tools such as linear programming, statistical tools, simulation packages and networks models for enhancing managerial decision-making.

Auditing

- Ability to specify, identifies, and documents financial and operational controls in computer-based systems.
- Ability to evaluate effectiveness and efficiency of management and operational in computer-based systems
- Ability to design and apply computer-assisted audit techniques for a variety of audit purposes

Taxation

- Ability to use computer-assisted tax planning tools
- Ability to use on-line retrieval services for tax case research

APPENDIX THREE

Summarises the findings of Van Meer (1993)

Topics rated as 'Essential' and requiring an 'Intermediate' knowledge level

·Management use of information

-Information concepts and requirements

-Shortcomings of AISs

-Management information systems

-Budgeting and budgetary control on an AIS

·Database concepts

-Database controls and security

-Extracting data from databases

·Accounting systems internal control

-Purpose of internal controls

-Classification of internal controls

-System documentation standards

-Computer systems controls

-Control costs and benefits

·Conceptual/theoretical knowledge of the 'Professional Workers Tool Kit' and AISs

-Financial modelling

-General ledger systems packages

-Revenue cycle

-Expenditure cycle

-Payroll cycle

-Product conversion cycle

-Fixed asset cycle

·Practical experience with the 'Professional Workers Tool Kit'

-Financial modelling

-Basic accounting package

·Management of AISs

-Management of end-user computing

·Auditing of AISs

-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

APPENDIX FOUR

Desired level of knowledge of microcomputer topics as Heagy and Gallun study 1994

-Spreadsheets

-Spreadsheet concepts and features in general

-Spreadsheet strategy and design

-Conditional or logical functions

-Using multiple worksheets

-Macros, programming

-Graphics

-Database management functions

-Database management systems

-Database management system concepts in general

-Using report generator

-Sorting and indexing records

-Creating and modifying databases

-Query by example

-Using multiple files

-Structured Query Language (SQL) Using branches, loops, subroutines Developing programs using application generators

-Deveioping programs using programming language

-Telecommunications

-Telecommunication concepts and features in general

-Transferring files between programs

-Uploading and downloading data

-External databases

-Local area networks

-Processors (modems, multiplexers, front-end processors)

-Transmission speed, mode, direction

-Media (cables, fiber optics, satellites)

-Architectures and protocots

Accounting systems

-Accounting system concepts and features in general

-Internal controls

-Audit trails

-Evaluation of accounting systems

-Coding system for accounts

Systems development

-Identification of new system requirements

-Evaluation of computer software

-Design of system

-Evaluation of computer hardware

-Conversion to new system

Other topics

-Word processing

-Typing

-Backup procedures

-Tax software

-Microcomputer security

-File operations

-Data entry validation

-Installation of programs, automatic program execution

-Documentation of programs

-Memory organisational location

-Multitasking

-Programming language

APPENDIX FIVE

levels of skills as presented at The ASCPA'study

A-GRADUATE CORE SKILLS

B- INFORMATION TECHNOLOGY SUBJECT SEQUENCES

C- ASCPA PROFESSIONAL SCHEDULE IT ELECTIVE UNIT

A-GRADUATE CORE SKILLS

1- Analysis/Design/Development/Implementation of Computer Systems

2- Accounting Systems, in particular

2.1 Transaction Cycles/Accounting Subsystems

2.2 Accounting Packages - Hands-on

2.3 Implementation & Assessment of general and application controls

3- Selection and Acquisition of hardware/soft-ware (including contract negotiation)

4- The history and role of computers in business

5- Components of Computerised Information Systems (e.g. personnel; input/output devices; CPU; storage devices; software)

6- Files/Databases, in particular

6.1 File organisations

6.2 Types of Databases

6.3 Data Modelling/Normalisation/ Schematic Notations

7- Computer Structures and Architectures (e.g. operation of CPU; trees; tables; stacks; queues;

8- Use of software Packages on Personal Computers, in particular

8.1 Word processing

8.2 Spreadsheets

8.3 Graphics

8.4 DOS

8-5 Database

8.6 SQL (4GL)

8.7 Statistical Analysis

8.8 Forecasting Models

9- Programming languages (e.g. Basic, COBOL, PASCAL, Assembler

10- Computers in Society (e.g, ethics; privacy; security software piracy, employment situation)

11- Others, in particular

11.1 SearchingOn-line Public Access Databases

11.2 reinforcement of investment analysis using software

11.3 Systems Theory

11.4 Decision-making Theory

11.5 Decision-support systems

11.6 Knowledge-based systems

11,7 Office Automation

1 1.8 EDI

11.9 Specification Languages and Prepositional Calculus

12- The integration of the relevant theory of IT in traditional accounting units (e.g. describing the features of a general ledger package in a financial accounting unit)

13- The integration of the relevant practical components of IT into traditional accounting units (e.g. students do master budgeting using spreadsheet package in a managerial accounting unit)

B INFORMATION TECHNOLOGY SUBJECT SEQUENCES

1 An in-depth knowledge of computer internal (e.g. CPU memory organisation; Architecture of microcomputers/mainframes Von Neumann memory hierarchies; input/ devices; control units; memory interleaving automata theory; distributed computing; and parallel computing)

2- An in-depth exposure to programming languages and the formulation of solution algorithms e.g.,

2-1 Assembler

2-2 COBOL, PASCAL

2-3 4GLs , SQL

2-4 Object-oriented (C++)

3- An in-depth exposure to analysis, design and implementation of systems e.g.

3-1 Project Management

3-2 Comparison of System Development Methodologies

3-3 Systems Life Cycle Phases

3-4 CASE tools

4- An in-depth knowledge of file organisations and databases (e.g. types of databases; schema design; data modelling; repositories; languages; database administration and data administration

5- An in-depth knowledge of security and controls with computer systems (e.g. EDO controls, computer assisted audit techniques, general audit software packages, fraud, privacy, cryptography)

6- An in-depth knowledge of data communications features (e.g. boolean algebra, gate logic, combinational logic, Karnaugh design methods, sequential circuits, network types, protocols, telecommunication products)

7- An in-depth knowledge of the application of computing, in particular

7-1 Executive Information Systems (EIS)

7.2 Expert Systems,

7.3 Decision Support Systems (e.g.linear programming, queuing theory and simulation model)

7-4 Management Information Systems

7-5 Electronic Funds Transfer (EFT)

7-6 Electronic Data Interchange (EDI)

7-7 Reverse Engineering

8- An in-depth knowledge of internal data structures (e.g.arrays;lists;stacks;queues;trees; indexes)

<u>D-ASCPA PROFESSIONAL SCHEDULE IT ELECTIVE UNIT</u>

1- The information age (e.g. who uses information systems)

2- The enabling role of information technology (e.g. *how IT enables changes within* organisation

3- Roles and responsibilities in information system (e.g the accountant and information technology

4- The impact of information technology in industry (e.g.some case examples of how IT is used in industry)

5- The need for information technology education for accountants

6- How the "orgainsation" differs from "business" (e.g.not letting office politics dominate business issues)

7- Management theories (e.g. human motivation and management levels)

8- Organisational strictures (e.g. different types of organisational structure - networks)

9- Strategic planning (e.g. vision; mission; leadership)

10 What happening to organisations in the 1990s (e.g total quality management (TQM); customs focus and service; business process re-engineering; business before organisation)

11- Managing change

12- How users feel about their systems

13- Information and decision-making (e.g. the relevance of management accounting and information systems)

14- Sources and use of business information (e.g. electronic meetings; distributing information electronically)

15- The nature of information (e.g. the value of information and decision-making)

16- Information and systems (e.g. transaction processing systems; office automation systems; groupware; executive information systems; geographic information systems; document management systems)

17- Protecting information (e.g. privacy; data and software theft; corporate espionage)

18- Adding value to information systems (e.g. enhancing task-oriented systems into decision-support systems)

19- The human computer interface

20- Looking beneath the surface (e.g. what lies beneath the user interface)

21- Major elements of IT infrastructure (e.g. software; operating systems; databases; processors; networks)

22- Bringing some order to IT (e.g. the need for information technology architecture planning in organisations)

23- Data planning (e.g. data modelling; normalisation)

24- Data capture and storage techniques (e.g. optical readers; bar-coding; smart cards; capturing and storing images)

25- Storage media

26- Data protection

27- Electronic data interchange (EDI)

28- Systems planning (e.g. linking business strategy and IS strategy,. risk assessment)

29- Project management issues (e.g.project planning and monitoring; change controls; role of systems integrator; why large projects often fail)

30- Systems development (e.g. traditional development; end-user development; Prototyping; using packages; selecting a supplier planning)

31- Disaster recovery planning

APPENDIX SIX

Invitation E-Mail for Focus Group

Dear Sir/Madam,

Re: Focus Group for IT Skills Research Project

One of the most important forces for change in the business surroundings in recent years has been the revolution which has taken place in information technology for processing and communication data.

As you know, Information technology has made a fundamental impact on the work and role of accountants and the implications for accounting have been widespread. The profession of accounting is currently experiencing dramatic changes. Major changes have occurred in the competitive and technological environmental areas of which the profession is practised. New skills and knowledge for accountants may be required and may be necessary to meet these changes?

The intention of this research will aim to explore what IT skills should practitioners in accounting work possess. It will further examine whether these IT skills differ from sector to sector and address whether there are a general IT skills within the domain of accountancy. Other questions related to this matter may be explored.

Another aim will consider the possibility of achieving an internationally agreed framework for IT skills for accountants regardless of nationality, and where there has been an increase in international co-operation of companies in the marketplace.

One of the information gathering approaches of this research is to target, initially, three focus Groups: Accounting Educators, Accounting Practitioners, and Learning Technologists. Each group is being asked to comment on broad areas and are invited to suggest questions for further analysis.

I would appreciate your co-operation as a focus group participant by visiting the web page on the internet. This will require you taking a few minutes to answer some questions, in line with your area of expertise, concerning information technology (IT) skills in accounting.

The URL address is as follows:

http://www.livjm.ac.uk/~busaahme/

Thank you very much for assisting my research

Adel Ahmed
Liverpool Business School
Liverpool John Moores University
Tel. (44) (151) 231 3530
Fax. (44) (151) 707 0423
Email busaahme@livjm.ac.uk

APPENDIX SEVEN

ACCOUNTING EDUCATORS QUESTIONNAIRE

Dear accounting educators

I am currently engaged in research for Ph.D. at Liverpool Business School, UK. I am particularly interested in accounting and Information Technology/System (IT/IS) skills/knowledge.

The purpose of this survey is to collect opinions about the current state and future for IT/IS in accounting undergraduate programmes, as well as your perceptions and views about what are the IT/IS knowledge/skills that accounting education programmes should contain and how these should be delivered.

The survey will target accounting educators at university level who are interested area is information systems and information technology in accounting education. Therefore, I approach you as you are an accounting educator with IS/IT expertise.

All surveys of this type depend upon the co-operation of the individuals who answer the questions. All responses will be used for research purposes only and will be treated as confidential. No individual responses will be identified.

The time to complete this questionnaire will take approximately twenty minutes

Your co-operation is very much appreciated and I thank you in advance.

Adel Ahmed

Liverpool Business School

Liverpool John Moores University

E-mail : BUSAAHME@livjm.ac.uk

SECTION ONE: GENERAL INFORMATION

1- Please indicates your gender? *(Please tick the relevant box)* Male ❑ Female ❑

2- What is your Academic position? *(Please tick one box)*

Lecturer ❑ Senior Lecturer ❑ Associate Professor ❑
Professor ❑ Assistant Professor ❑ Other (Please specify)________________

3- In which type of University are you employed? *(Please tick one box)*
Government ❑ Private ❑

4- What accounting degrees does your Accounting Department offer? *(Please tick all that apply)*
Bachelor in Accounting ❑
Postgraduate Diploma ❑
Master in Accounting ❑
PhD in Accounting ❑
Other (please describe) ________________

5- How would you rate your overall level of IT/IS experience? *(Please tick one box)*

Highly experienced	Fairly experienced	Novice	No experience

6- How long have you been teaching Accounting? *(Please tick one box)*
Less than 1 year ❑ 1-5 years ❑ 6-10 years ❑
11-14 years ❑ 15-20 years ❑ More than 20 years ❑

7- Do you hold any accounting professional qualification? YES ❑ NO ❑

If YES which of the following qualification you have obtained?

The Institute of Chartered Accountants in England and Wales (ICAEW) ❑
The Chartered Institute of Management Accountants (CIMA) ❑
The Association of Chartered Certified Accountants (ACCA) ❑
The Chartered Institute of Public Finance and Accountancy (CIPFA) ❑
The Institute of Chartered Accountants of Scotland (ICAS) ❑
Irish Accounting & Finance Association (IAFA) ❑
Certified Public Accountant (CPA) ❑
Other *(Please specify)*

____

8- What is the highest academic qualification you have obtained? *(Please tick one box)*

Technical Institute in Accounting (two years) ❑
Bachelor in Accounting ❑
Bachelor in non-Accounting ❑
Postgraduate Diploma in Accounting ❑
Master's Degree in Accounting ❑
Doctoral Degree in Accounting ❑
Other (please specify)________________

9- In which country did you obtain your highest academic qualification? (Please tick one box)

USA ❑ UK ❑ Other *(Please specify)* ________________

SECTION TWO: OPINION ABOUT THE CURRENT STATE AND FUTURE FOR IT/IS ACCOUNTING PROGRAMMES

Please indicate the extent to which you agree or disagree with the following statements in YOUR accounting department in the university. Please use the following scale for your ratings Strongly Agree = 1, Agree = 2, Neutral = 3, Disagree = 4, and Strongly Disagree = 5 **(please tick one only for each statement in the relevant column)**

The statements	Strongly Agree 1	Agree 2	Neutral 3	Disagree 4	Strongly Disagree 5
1- Accounting education equips students with IT/IS skills for their role beyond graduation in their employment					
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					
3-IT/IS skills in accounting training at undergraduate level are not adequately covered					
4-Most IT/IS syllabuses in accounting degrees concentrate on programming languages rather than looking at the broad issues of IT/IS					
5- University does not provide sufficient grounding in the use of IT/IS in a commercial environment					
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					
7- University lecturers do not possess the necessary IT skills and knowledge to teach IT successfully in accounting					
8- The accounting profession, industry and commerce are unable to specify what IT/IS they require to be taught at university					
9- The business community and those involved in accounting education must first decide what their objectives are with regard to IT training					
10- Communication between the business community and universities needs to be improved so that IT training can more closely match needs					
11 Having more IT/IS available in undergraduate accounting makes students more effective in their employment and improve their work					
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					
13- Accounting students should gain " Hands- on " experience of computers, not just BASIC or FORTRAN and C++ programming					
14- Accounting students should have experience in the use of applications , such as spreadsheets , word-processing, data base management and accounting packages					
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					
16- IT/IS education at University level is mostly theoretical					
17- The use of computers in accounting practice enhances the efficiency and effectiveness of the accountant's work					

18- How satisfied are you in your university with the <u>*CONTENT*</u> of *IT/IS* skills/knowledge that exist within the current accounting curriculum? *(Please tick one box only)*

Extremely satisfied	Satisfied	Neutral	Dissatisfied	Extremely dissatisfied

19- How satisfied are you with the <u>*DELIVERY*</u> of IT/IS skills and knowledge in accounting education NOW in your university? *(Please tick one box only)*

Extremely satisfied	Satisfied	Neutral	Dissatisfied	Extremely dissatisfied

20- Which of the following would be helpful in increasing integration of IT/IS into accounting education? *(Please tick all that apply)*

Training ❑
Updated Software ❑
Updated Hardware ❑
Funding ❑
Increased computer literacy of staff ❑
Increased recognition of need for integrating ❑
Relevant text books ❑
Availability of Systems Support ❑
Other [please specify]____

21- What are your views about the integration of computers into your teaching area(s)?
(Please tick all that apply)

Lack of suitable software ❑
Lack of suitable hardware ❑
Too expensive (Financial Shortage) ❑
Lack of interest in integration ❑
Lack support systems staff in IT/IS ❑
Lack of training ❑
Need more information on how to integrate IT/IS ❑
Staff must become computer literate before students ❑
Other [please specify]____

24- What kind of IT/IS training would you like to see in accounting curriculum?
(Please tick all that apply)

Students trained to become a USER for information technology ❑
Students trained to become a MANAGER for information system ❑
Students trained to become a DESIGNER for information system ❑
Students trained to become a EVALUATOR (auditors) information systems ❑

25- What is the best way for the delivery of IT/IS training in accounting programme?
(Please tick all that apply)

Individual IT/IS skills/knowledge courses ❑
Integrating IT/IS skills/knowledge into the accounting courses ❑
Combination of two above ❑
Workplace ❑

SECTION THREE: WHAT IT/IS SKILLS/KNOWLEDGE SHOULD BE INTEGRATED INTO ACCOUNTING PROGRAMMES?

the following 4 point scale to indicate your **assessment** about IT/IS both at **PRESENT in your accounting department**, RRENT SITUATION NOW, (the first column) and what should be integrated into accounting education in **THREE** ARS into the future (the second column) for parts A, B, C, D, E Please Circle around the numbers in each column

0	1	2	3
No Knowledge	Low Knowledge	Moderate Knowledge	High Knowledge

Part A- General Information Technology Knowledge

Professional accountants may need to acquire general IT/IS knowledge related to business information systems.

	Present				Three Years			
1-Information Systems Technology for example, components of information systems technology (H/W, S/W), information systems processing methods in organisations, structure of information systems in organisations .etc.	0	1	2	3	0	1	2	3
2-Computer-Based Accounting Systems for example expert systems in accounting and auditing, technology and financial systems etc.	0	1	2	3	0	1	2	3
3-Files/Databases (file organisations. Database Management Systems (DBMS), database concepts, controls and security .etc.)	0	1	2	3	0	1	2	3
4-Communication Technology (data communication and networks, communication technology, design, communication controls, business Telecommunications (LAN, WAN, INTERNET)	0	1	2	3	0	1	2	3
5-Role of information within business and Information Management For example, Transaction Processing System (TPS), Management information system (MIS), Decision support system (DSS), Executive information system (EIS), -Expert system (ES), neural network (NN)	0	1	2	3	0	1	2	3
6-Electronic Commerce (Telecommunication in Business On-line Resource) (Electronic Data Interchange (EDI), Electronic Payment Schemes, electronic markets and catalogues, Point Of Sale (POS), Electronic Funds Transfer System (EFTS)	0	1	2	3	0	1	2	3
7-Administrative issues (reporting relationships of the IT/IS department, approaches to staffing, personnel development and performance evaluation)	0	1	2	3	0	1	2	3

rt B- IT/IS skills/knowledge for the accountant as a USER of information technology

ofessional accountants use various information technology tools and techniques to help them et their objectives. Professional accountants may need to be familiar with these tools and e way in which information technologies and systems can be applied.

	Present				Three Years			
1-Hands-on exposure to major program products (day-to-day application) for example word processors, spread sheets, statistical packages, database management system, .etc.	0	1	2	3	0	1	2	3

	Present				Three Years			
2-Ability to use Accounting Systems packages 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.	0	1	2	3	0	1	2	3
3-Ability to use database service and Internet for financial reporting and disclosure	0	1	2	3	0	1	2	3
4-Ability to search On-line Public Access Databases such as use on-line retrieval services for tax case research from CD-ROM or WWW	0	1	2	3	0	1	2	3
5-Ability to understand the structure of typical computerised accounting systems and subsystems, including the flow of transactions, data file organisations, and programmed accounting procedures, financial modelling, general ledger systems packages, revenue/expenditure/Payroll cycles	0	1	2	3	0	1	2	3

C- IT/IS skills/knowledge for accountant as a MANAGER of information systems

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

	Present				Three Years			
1-Data Resource Structures for example, data resources and information, applications of data administration, management of system maintenance and change	0	1	2	3	0	1	2	3
2-Management of Accounting Information Systems for example, management of end-user computing, information resources management principles, information concepts and requirements .etc.	0	1	2	3	0	1	2	3
3-Global Information Management 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	0	1	2	3	0	1	2	3
4-Executive Information Systems Management (executive decision-making, executive direction of information systems, strategic application of information systems, executive information systems and control of information)	0	1	2	3	0	1	2	3
5-Ability to use financial database and spreadsheet for planning and control purposes	0	1	2	3	0	1	2	3
6-Ability for selection and acquisition of hardware/software (including contract negotiation)	0	1	2	3	0	1	2	3
7-Ability for reinforcement of investment analysis using software	0	1	2	3	0	1	2	3
8-Ability to participate as part of system development team, appreciation of information and methods, behavioural consequences of project management	0	1	2	3	0	1	2	3
9-Understanding of the methods of operating and managing business systems once implemented	0	1	2	3	0	1	2	3
10-Understanding of the system development life cycle, its phases, and management principles for the system development process	0	1	2	3	0	1	2	3

	Present				Three Years			
11-Appreciation of the social, economic, and legal implications of computer technology, including effects of automation on work, institutions, and freedoms (e.g., privacy)	0	1	2	3	0	1	2	3
12-Decision Support Systems (roles of decision support systems, approaches to decision support systems, decision support systems development)	0	1	2	3	0	1	2	3
13-Strategic considerations in IT/IS development (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)	0	1	2	3	0	1	2	3
14-Administrative issues reporting relationships of the IT/IS department, approaches to staffing, personnel development and performance evaluation)	0	1	2	3	0	1	2	3

(D)- IT/IS skills/knowledge for accountant as a DESIGNER of information systems

...essional accountants, as employees or external advisors, have been involved in the design of financial ...ems for decades. In the past, such design roles have been in the context of manual record-keeping ...ems. Today, accountants are expected to continue to provide similar services, albeit in an IT/IS context. ...may be as a member of an in-house team or task force working to establish business system ...irements, as a member of an in-house system development team for an employer, or as an external ...isor helping to design a business system for a client.

0	1	2	3
No Knowledge	Low Knowledge	Moderate Knowledge	High Knowledge

	Present				Three Years			
1-Information Systems (IS) Design and Implementation (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)	0	1	2	3	0	1	2	3
2-Ability to write simple file-processing and report-writing routines in several common programming languages e.g. COBOL, C, C++	0	1	2	3	0	1	2	3
3-Knowledge of financial accounting, managerial accounting, auditing and ability to use state-of-the-art system analysis and design techniques	0	1	2	3	0	1	2	3
4-Ability to design and apply computer-assisted auditing techniques for a variety of audit purposes.	0	1	2	3	0	1	2	3
5-Ability to design and use decision support aids and financial modelling tools such as linear programming, statistical tools, simulation packages, and network models for enhancing managerial decision making.	0	1	2	3	0	1	2	3
6-Ability to design financial databases for planning and control purposes	0	1	2	3	0	1	2	3
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,	0	1	2	3	0	1	2	3
8-Knowledge of and ability to use state-of-the-art system analysis and design techniques. e.g. Object-oriented programming, object-based programming	0	1	2	3	0	1	2	3

	Present				Three Years			
9-Algorithm Concepts and Information Management (algorithm planning and processing information systems, algorithm validation concepts, algorithm technology and database management)	0	1	2	3	0	1	2	3
10-Knowledge in the role of information in organisation design and behaviour (For example data bases and data base management systems, system development life cycle (SDLC) .etc.)	0	1	2	3	0	1	2	3
11-System design techniques (for example, data flow diagrams, entity-relationship model, decision tables and trees, prototyping, computer aided software engineering methodology (CASE) .etc.)	0	1	2	3	0	1	2	3
12-System acquisition/development life cycle phases, tasks and practices and maintaining control over system development processes (for example, investigation and feasibility study, requirements analysis and initial design, detailed design specification/documentation, hardware evaluation and acquisition, software evaluation , acquisition, development	0	1	2	3	0	1	2	3

E- IT/IS skills/knowledge for accountant as an EVALUATOR of information systems

role of the accountant as **EVALUATOR** encompasses the functions of internal audit, external audit and r evaluative roles filled by accountants, whether or not formally identified as audit roles.

0	1	2	3
No Knowledge	Low Knowledge	Moderate Knowledge	High Knowledge

	Present				Three Years			
1-Internal control in computer-based systems (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.)	0	1	2	3	0	1	2	3
2-Understanding of characteristics of EDP systems, their major components , and methods of operation	0	1	2	3	0	1	2	3
3-Ability to design and apply computer-assisted audit techniques for a variety of audit purposes	0	1	2	3	0	1	2	3
4-Ability to specify, identify, and documents financial and operational controls in computer-based systems.	0	1	2	3	0	1	2	3
5-Ability to evaluate effectiveness and efficiency of management and operations in computer-based system	0	1	2	3	0	1	2	3
6-Auditing of Accounting Information Systems (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)	0	1	2	3	0	1	2	3
7-Accounting systems internal control (for example, purpose of internal controls, classification of internal controls, system documentation standards, computer systems controls, control costs and benefits etc.)	0	1	2	3	0	1	2	3

	Present				Three Years			
8-Evaluation of Decision Support Systems (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)	0	1	2	3	0	1	2	3
9-Legal, ethical, auditing and information system control standards (for example, legal and ethical requirements, auditing standards relevant to IT/IS, computer control guidelines and standards, computer Security, Viruses and Computer fraud	0	1	2	3	0	1	2	3
10-Evaluation objectives (efficiency/effectiveness/economy of IT/IS use, compliance with policies, statutes and regulations, evaluation of Internal control in computer-based systems etc.)	0	1	2	3	0	1	2	3
11-Evaluation methods and techniques (obtaining an understanding of systems in business context, documenting systems and elements of control structure, tests of features, controls, transactions and balances etc.)	0	1	2	3	0	1	2	3
12-Communicating results of evaluations (for example types of reports, levels of assurance)	0	1	2	3	0	1	2	3
13-Specific types of evaluations (system maintenance, IT/IS asset safeguarding, data integrity, privacy and security, continuity of processing/disaster recovery planning, system processing operations/activities, application processing)	0	1	2	3	0	1	2	3
14-Computer-assisted audit techniques (CAATs) such as approaches (auditing around the computer, auditing through the computer, auditing with the computer), professional standards feasibility considerations, categories of CAATs	0	1	2	3	0	1	2	3

SECTION FOUR: HOW SHOULD IT/IS SKILLS/KNOWLEDGE DELIVERED

e indicate in the relevant column how the following IT/IS skills/knowledge should be delivered accounting programmes by inserting a percentage in each column (rows should sum to 100%).

	Individual IT/IS course %	Accounting course %	Work %
A-GENERAL INFORMATION TECHNOLOGY KNOWLEDGE			
1-Information Systems Technology			
2-Computer-Based Accounting Systems			
3-Files/Databases			
4-Communication Technology			
5-Role of information within business and Information Management			
6-Electronic Commerce (Telecommunication in Business On-line Resource)			
7-Administrative Issues			
B-IT/IS SKILLS/KNOWLEDGE AS USER			
1-Hands-on exposure to major program products (day-to-day application)			
2-Ability to use Accounting Systems packages			
3-Ability to use database service and Internet for financial reporting and disclosure			
4-Ability to search On-line Public Access Databases			
5-Ability to understand the structure of typical computerised accounting systems and subsystems			
C-IT/IS SKILLS/KNOWLEDGE AS MANAGER			
1-Data Resource Structures and Administration			
2-Management of Accounting Information Systems			
3-Global Information Management			
4-Executive Information Systems Management			
5-Ability to use financial database for planning and control purposes			
6-Ability for selection and acquisition of hardware/software			
7-Ability for reinforcement of investment analysis using software			
8-Ability to participate as part of system development team worth an appreciation of information and methods, behavioural consequences of project management			
9-Understanding of the methods of operating and managing business systems once implemented			
10-Understanding of the system development life cycle, its phases, and management principles for the system development process			
11-Appreciation of the social, economic, and legal implications of computer technology, including effects of automation on work, institutions, and freedoms			
12-Decision Support Systems			
13-Strategic considerations in IT/IS development			
14-Administrative issues			
D-IT/IS SKILLS/KNOWLEDGE AS DESIGNER			
1-Information Systems (IS) Design and Implementation			
2-Ability to write simple file-processing and report-writing routines in several common programming languages e.g. COBOL, C, C++			
3-Knowledge of financial accounting, managerial accounting, auditing and ability to use state-of-the-art system analysis and design techniques			
4-Ability to design and apply computer-assisted auditing techniques for a variety of audit purposes.			

	Individual IT/IS course %	Accounting course %	Work %
5-Ability to design and use decision support aids and financial modelling tools			
6-Ability to design financial databases for planning and control purposes			
7-Ability to participate as part of a system development team with an appreciation of information system development theories			
8-Knowledge of and ability to use state-of-the-art system analysis and design techniques			
9-Algorithm Concepts and Information Management			
10-Knowledge in the role of information in organisation design and behaviour			
11-System design techniques			
12-System acquisition/development life cycle phases, tasks and practices and maintaining control over system development processes			
E-IT/IS SKILLS/KNOWLEDGE AS EVALUATOR			
1-Internal control in computer-based systems			
2-Understanding of characteristics of EDP systems, their major components, and methods of operation			
3-Ability to design and apply computer-assisted audit techniques for a variety of audit purposes			
4-Ability to specify, identifies, and documents financial and operational controls in computer-based systems.			
5-Ability to evaluate effectiveness and efficiency of management and operations in computer-based system			
6-Auditing of Accounting Information Systems			
7-Accounting systems internal control			
8-Evaluation of Decision Support Systems			
9-Legal, ethical, auditing and information system control standards			
10-Evaluation objectives			
11-Evaluation methods and techniques			
12-Communicating results of evaluations			
13-Specific types of evaluations			
14-Computer-assisted audit techniques (CAATs)			

THANK YOU FOR COMPLETING THE QUESTIONNAIRE

PLEASE ADD ANY FURTHER COMMENTS YOU MAY HAVE CONCERNING THIS QUESTIONNAIRE IN THE SPACE BELOW

APPENDIX EIGHT

Letter for conducting an interview in UK

Dear ,

I am writing to you to enquire about the possibility of conducting an interview with you based upon the research for my PhD thesis which relates to what Information Technology Skills and Knowledge (IT) should be present in accounting undergraduate level. Also, I am investigating how these IT skills should be delivered in the Accounting curriculum.

I would appreciate if you could send me by E-Mail some details about when you would available within June 98 for such an interview.

I thank you in advance for your help in this matter

I look forward to hearing from you soon

Yours sincerely

Adel Ahmed

PhD Student

Liverpool Business School

E-mail BUSAAHME@livjm.ac.uk

APPENDIX NINE

E-mail for conducting an interview in USA

Dear Sir/Madam,

First of all, I would like to introduce myself to you. My name is Adel Ahmed, PhD Research student in the Liverpool Business School, part of Liverpool John Moores University (LJMU), UK. My research area related to "Integrating information systems technology skills and knowledge into accounting education in developing countries". The intention of this research will aim to explore what IT skills/knowledge should accounting practitioners in developing countries possess and how integrate it into accounting education in developing countries. The research aim as well to design a framework from the developed countries like USA and. UK and test it in one of the developing countries

One of the information gathering steps of the research is being conducted through interview with few of accounting educators in Florida Region to collect perceptions and views from them.

I am writing to request an interview with you. Please kindly can you advice of the date and time which suitable and convenience to you to do an interview which will take around half an hour.
I am planning to come to Florida for two month start from 20 June until the end of July

Thank you very much for your help in advance and I look forward to hearing from you soon

Adel Ahmed
Liverpool Business School
Tel (+44) 0151-280 1795
E-mail busaahme@livjm.ac.uk

APPENDIX TEN

Follow Up letter in UK sample

Dear ,

A month ago I sent you my questionnaire which I believe may interest you, as your interested area is accounting education and you are expertise in IT/IS but I have not received the completed questionnaire yet. Therefore, I have sent another copy of the questionnaire three days ago, in case you did not receive the first one. I would like to stress that without your valuable and useful opinions and views my research can not be completed.

Therefore, I would be very grateful if you would complete and return the questionnaire. The questionnaire look *at opinions* about the current state and future for IT/IS in accounting programmes, also what IT/IS skills and knowledge accounting students should possess; and how should it be delivered in Accounting programmes.

Please return the questionnaire using the self addressed envelope *provided*.

Thank you in advance for your help and your participation.

I am looking forward to receiving your completed questionnaire.

Yours Sincerely

Adel Ahmed
PhD student
Liverpool Business School
Liverpool John Moores University
E-mail: BUSAAHME@livjm.ac.uk

APPENDIX ELEVEN

Director of Study letter

Wednesday, 30 June 1999

TO WHOM IT MAY CONCERN

I am writing to inform you that Adel EL-Said Ahmed is currently registered in PhD program full-time at Liverpool Business School, Liverpool John Moores University, UK

He works under the supervision team include Professor Les Bell, Professor Alan Doig and myself in the field of Accounting Information Systems. He particularly interested in accounting and Information Technology/System (IT/IS) skills/knowledge

Adel will be travelling to Egypt to collect some data as a part of the fieldwork related to his Ph.D. His work requires data from a sample of accounting educators and accounting practitioners. His research questions are:

- 1- What are the information systems technology skills and knowledge which accountants should acquire to do their tasks efficiency and effectively?
- 2- How should the information systems technology skills and knowledge be delivered to the accountants?

It is hoped that the research findings will be of interest and valuable.

I would very much appreciate it, if you would assist Adel with his study.

May I take this opportunity to thank you in anticipation of your assistance.

Yours sincerely

Roger Pegum

Supervisor and Director of Study

APPENDIX TWELVE

STATISTICS DETAILS T-TEST PAIRED SAMPLE, WILCOXON, AND SIGN TEST FOR EACH SKILL BETWEEN NOW AND FUTURE FOR USA SAMPLE

T-TEST FOR GENERAL IT/IS SKILLS NOW AND THREE YEARS FORWARD IN USA SAMPLE

General IT/IS skills	Mean	Paired Differences: Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference: Lower	Upper	t Value	DF	Sig. (2-tailed)	Result
G1_P	1.43	-1.19	.60	.13	-1.46	-.92	-9.068	20	**0.0000346**	Rejected
G1_F	2.62									
G2_P	1.95	-.71	.64	.14	-1.01	-.42	-5.085	20	0.0000564	Rejected
G2_F	2.67									
G3_P	1.33	-1.29	.78	.17	-1.64	-.93	-7.517	20	**0.000024**	Rejected
G3_F	2.62									
G4_P	1.43	-1.33	.58	.13	-1.60	-1.07	-10.583	20	**0.000045**	Rejected
G4_F	2.76									
G5_P	1.43	-1.38	.74	.16	-1.72	-1.04	-8.552	20	**0.000036**	Rejected
G5_F	2.81									
G6_P	1.05	-1.71	.64	.14	-2.01	-1.42	-12.205	20	**0.000056**	Rejected
G6_F	2.76									
G7_P	1.24	-1.10	.54	.12	-1.34	-.85	-9.312	20	**0.000078**	Rejected
G7_F	2.33									

WILCOXON SIGNED-RANK TEST STATISTICS FOR GENERAL IT/IS SKILLS NOW AND THREE YEARS FORWARD IN USA SAMPLE

General IT/IS Paired sample	Wilcoxon signed rank test: Z	Asymp. Sig. (2-tailed)	Result
G1_F - G1_P	-3.987	0.0000592125	Rejected
G2_F - G2_P	-3.419	0.00493335	Rejected
G3_F - G3_P	-3.739	0.000203324	Rejected
G4_F - G4_P	-4.053	0.0000454611	Rejected
G5_F - G5_P	-3.923	0.000072362	Rejected
G6_F - G6_P	-4.093	0.0000391415	Rejected
G7_F - G7_P	-4.065	0.0000465572	Rejected

SIGN TEST STATISTICS FOR GENERAL IT/IS SKILLS NOW AND THREE YEARS FORWARD IN USA SAMPLE

	Exact Sig. (2-tailed)	Result
G1_F - G1_P	0.0000363785	Rejected
G2_F - G2_P	0.000874198	Rejected
G2_F - G2_P	0.000874198	Rejected
G3_F - G3_P	0.000104252	Rejected
G3_F - G3_P	0.000104252	Rejected
G4_F - G4_P	0.0000215322	Rejected
G4_F - G4_P	0.0000215322	Rejected

G5_F - G5_P	0.0000363785	Rejected
G6_F - G6_P	0.0000215322	Rejected
G7_F - G7_P	0.0000363785	Rejected

T-TEST FOR USER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN USA SAMPLE

Paired Differences							t Value	DF	Sig. (2-tailed)	Result
User IT/IS skills	Mean	Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper				
U1_P	2.14	-.71	.56	.12	-.97	-.46	-5.839	20	0.00001	Rejected
U1_F	2.86									
U2_P	2.29	-.57	.51	.11	-.80	-.34	-5.164	20	0.00004	Rejected
U2_F	2.86									
U3_P	1.00	-1.48	.60	.13	-1.75	-1.20	-11.245	20	0.00003	Rejected
U3_F	2.48									
U4_P	1.67	-1.10	.44	.095	-1.29	-.90	-11.500	20	0.00005	Rejected
U4_F	2.76									
U5_P	1.67	-1.14	.48	.10	-1.36	-.93	-10.954	20	0.00007	Rejected
U5_F	2.81									

WILCOXON TEST STATISTICS FOR USER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN USA SAMPLE

User IT/IS	Wilcoxon signed rank test		Results
Paired sample	Z	Asymp. Sig. (2-tailed)	Rejected
U1_F - U1_P	-3.638	0.00178043	Rejected
U2_F - U2_P	-3.464	0.0120309	Rejected
U3_F - U3_P	-4.132	0.0000389571	Rejected
U4_F - U4_P	-4.234	0.0000230618	Rejected
U5_F - U5_P	-4.179	0.0000283484	Rejected

SIGN TEST STATISTICS FOR USER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN USA SAMPLE

	Exact Sig. (2-tailed)	Results
U1_F - U1_P	0.000512096	Rejected
U2_F - U2_P	0.00149629	Rejected
U3_F - U3_P	0.0000127596	Rejected
U4_F - U4_P	0.0000215322	Rejected
U5_F - U5_P	0.0000215322	Rejected

T-TEST FOR MANAGER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN USA SAMPLE

Manager IT/IS skills	Mean	Paired Differences: Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference: Lower	Upper	t Value	DF	Sig. (2-tailed)	Result
M1_P	.71	-.86	.57	.13	-1.12	-.60	-6.852	20	0.0001	Rejected
M1_F	1.57									
M2_P	1.33	-1.10	.54	.12	-1.34	-.85	-9.312	20	.000	Rejected
M2_F	2.43									
M3_P	.71	-1.29	.56	.12	-1.54	-1.03	-10.510	20	.000	Rejected
M3_F	2.00									
M4_P	1.05	-1.14	.48	.10	-1.36	-.93	-10.954	20	.000	Rejected
M4_F	2.19									
M5_P	1.38	-.95	.22	.048	-1.05	-.85	-20.000	20	.000	Rejected
M5_F	2.33									
M6_P	.62	-1.29	.78	.17	-1.64	-.93	-7.517	20	.000	Rejected
M6_F	1.90									
M7_P	.86	-1.00	.63	.14	-1.29	-.71	-7.246	20	.000	Rejected
M7_F	1.86									
M8_P	.90	-1.05	.50	.11	-1.27	-.82	-9.648	20	.000	Rejected
M8_F	1.95									
M9_P	1.00	-1.10	.54	.12	-1.34	-.85	-9.312	20	.000	Rejected
M9_F	2.10									
M10_P	.86	-1.10	.44	.095	-1.29	-.90	-11.500	20	.000	Rejected
M10_F	1.95									
M11_P	.81	-1.10	.62	.14	-1.38	-.81	-8.032	20	.000	Rejected
M11_F	1.90									
M12_P	1.05	-1.19	.68	.15	-1.50	-.88	-8.027	20	.000	Rejected
M12_F	2.24									
M13_P	.90	-1.29	.72	.16	-1.61	-.96	-8.216	20	.000	Rejected
M13_F	2.19									
M14_P	.90	-1.52	.60	.13	-1.80	-1.25	-11.608	20	.000	Rejected
M14_F	2.43									

WILCOXON TEST STATISTICS FOR MANAGER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN USA SAMPLE

Manager IT/IS	Wilcoxon signed rank test		Results
Paired sample	Z	Asymp. Sig. (2-tailed)	Rejected
M1_F - M1_P	-3.819	0.000308815	Rejected
	-3.819		
M2_F - M2_P	-4.065	0.0000465572	Rejected
M3_F - M3_P	-4.072	0.0000423599	Rejected
M4_F - M4_P	-4.179	0.0000283484	Rejected
M5_F - M5_P	-4.472	0.00000932645	Rejected
M6_F - M6_P	-3.825	0.000115945	Rejected
M7_F - M7_P	-3.827	0.000169827	Rejected
M8_F - M8_P	-4.119	0.0000393649	Rejected

M9_F - M9_P	-4.065	0.0000465572	Rejected
M10_F - M10_P	-4.234	0.0000230618	Rejected
M11_F - M11_P	-3.906	0.0000943786	Rejected
M12_F - M12_P	-3.852	0.000108291	Rejected
M13_F - M13_P	-3.834	0.000113256	Rejected
M14_F - M14_P	-4.122	0.0000406512	Rejected

SIGN TEST STATISTICS FOR MANAGER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN USA SAMPLE

	Exact Sig. (2-tailed)	Results
M1_F - M1_P	0.000176889	Rejected
M2_F - M2_P	0.0000363785	Rejected
M3_F - M3_P	0.0000215322	Rejected
M4_F - M4_P	0.0000215322	Rejected
M5_F - M5_P	0.0000215322	Rejected
M6_F - M6_P	0.0000615398	Rejected
M7_F - M7_P	0.000104252	Rejected
M8_F - M8_P	0.0000363785	Rejected
M9_F - M9_P	0.0000363785	Rejected
M10_F - M10_P	0.0000215322	Rejected
M11_F - M11_P	0.0000615398	Rejected
M12_F - M12_P	0.0000615398	Rejected
M13_F - M13_P	0.0000615398	Rejected
M14_F - M14_P	0.0000127596	Rejected

T-TEST FOR DESIGNER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN USA SAMPLE

Paired Differences							t Value	DF	Sig. (2-tailed)	Result
Designer IT/IS skills	Mean	Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
					Lower	Upper				
D1_P	.86	-1.14	.73	.16	-1.47	-.81	-7.204	20	.000	Rejected
D1_F	2.00									
D2_P	.29	-.29	.46	.10	-.50	-.075	-2.828	20	.010	Rejected
D2_F	.57									
D3_P	1.29	-1.48	.75	.16	-1.82	-1.13	-9.024	20	.000	Rejected
D3_F	2.76									
D4_P	1.10	-1.62	.74	.16	-1.96	-1.28	-10.026	20	.000	Rejected
D4_F	2.71									
D5_P	1.14	-1.52	.68	.15	-1.83	-1.21	-10.275	20	.000	Rejected
D5_F	2.67									
D6_P	1.10	-1.57	.75	.16	-1.91	-1.23	-9.648	20	.000	Rejected
D6_F	2.67									
D7_P	1.19	-1.19	.75	.16	-1.53	-.85	-7.278	20	.000	Rejected
D7_F	2.38									
D8_P	.90	-1.05	.59	.13	-1.32	-.78	-8.143	20	.000	Rejected
D8_F	1.95									

D9_P	.57	-.90	.70	.15	-1.22	-.59	-5.920	20	.000	Rejected
D9_F	1.48									
D10_P	.76	-1.38	.50	.11	-1.61	-1.15	-12.717	20	.000	Rejected
D10_F	2.14									
D11_P	.67	-1.14	.65	.14	-1.44	-.84	-8.000	20	.000	Rejected
D11_F	1.81									
D12_P	.48	-1.10	.54	.12	-1.34	-.85	-9.312	20	.000	Rejected
D12_F	1.57									

WILCOXON TEST STATISTICS FOR DESIGNER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN USA SAMPLE

Designer IT/IS	Wilcoxon signed rank test		Results
Paired sample	Z	Asymp. Sig. (2-tailed)	Rejected
D1_F - D1_P	-3.739	0.000203324	Rejected
	3.739		
D2_F - D2_P	-2.449	0.01999994	Rejected
D3_F - D3_P	-3.923	0.000072362	Rejected
D4_F - D4_P	-4.008	0.000053625	Rejected
D5_F - D5_P	-4.123	0.0000404793	Rejected
D6_F - D6_P	-4.005	0.0000542801	Rejected
D7_F - D7_P	-3.866	0.000104281	Rejected
D8_F - D8_P	-3.947	0.0000848679	Rejected
D9_F - D9_P	-3.578	0.000854262	Rejected
D10_F - D10_P	-4.158	0.0000348095	Rejected
D11_F - D11_P	-3.874	0.000102318	Rejected
D12_F - D12_P	-4.065	0.0000465572	Rejected

SIGN TEST STATISTICS FOR DESIGNER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN USA SAMPLE

	Exact Sig. (2-tailed)	Results
D1_F - D1_P	0.000104252	Rejected
D2_F - D2_P	0.0412266	Rejected
D3_F - D3_P	0.0000363785	Rejected
D4_F - D4_P	0.0000215322	Rejected
D5_F - D5_P	0.0000127596	Rejected
D6_F - D6_P	0.0000215322	Rejected
D7_F - D7_P	0.0000615398	Rejected
D8_F - D8_P	0.0000615398	Rejected
D8_F - D8_P	0.0000615398	Rejected
D9_F - D9_P	0.000300669	Rejected
D9_F - D9_P	0.000300669	Rejected
D10_F - D10_P	0.0000127596	Rejected
D10_F - D10_P	0.0000127596	Rejected
D11_F - D11_P	0.0000615398	Rejected
D11_F - D11_P	0.0000615398	Rejected

D12_F - D12_P	0.0000363785	Rejected

T-TEST FOR EVALUATOR IT/IS SKILLS NOW AND THREE YEARS FORWARD IN USA SAMPLE

Paired Differences							t Value	DF	Sig. (2-tailed)	Result
Evaluator IT/IS skills	Mean	Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
					Lower	Upper				
E1_P	1.24	-1.29	.46	.10	-1.50	-1.08	-12.728	20	.000	Rejected
E1_F	2.52									
E2_P	1.14	-1.76	.77	.17	-2.11	-1.41	-10.507	20	.000	Rejected
E2_F	2.90									
E3_P	1.05	-1.52	.60	.13	-1.80	-1.25	-11.608	20	.000	Rejected
E3_F	2.57									
E4_P	1.29	-1.29	.78	.17	-1.64	-.93	-7.517	20	.000	Rejected
E4_F	2.57									
E5_P	1.05	-1.52	.60	.13	-1.80	-1.25	-11.608	20	.000	Rejected
E5_F	2.57									
E6_P	1.57	-1.05	.50	.11	-1.27	-.82	-9.648	20	.000	Rejected
E6_F	2.62									
E7_P	1.52	-1.10	.44	.095	-1.29	-.90	-11.500	20	.000	Rejected
E7_F	2.62									
E8_P	.86	-1.62	.59	.13	-1.89	-1.35	-12.584	20	.000	Rejected
E8_F	2.48									
E9_P	.76	-1.71	.64	.14	-2.01	-1.42	-12.205	20	.000	Rejected
E9_F	2.48									
E10_P	.86	-1.86	.79	.17	-2.22	-1.50	-10.734	20	.000	Rejected
E10_F	2.71									
E11_P	1.00	-1.48	.60	.13	-1.75	-1.20	-11.245	20	.000	Rejected
E11_F	2.48									
E12_P	.90	-1.62	.74	.16	-1.96	-1.28	-10.026	20	.000	Rejected
E12_F	2.52									
E13_P	.86	-1.67	.48	.11	-1.89	-1.45	-15.811	20	.000	Rejected
E13_F	2.52									
E14_P	1.29	-1.67	.66	.14	-1.97	-1.37	-11.602	20	.000	Rejected
E14_F	2.95									

WILCOXON TEST STATISTICS FOR EVALUATOR IT/IS SKILLS NOW AND THREE YEARS FORWARD IN USA SAMPLE

Evaluator IT/IS	Wilcoxon signed rank test		Results
Paired sample	Z	Asymp. Sig. (2-tailed)	
E1_F - E1_P	-4.208	0.0000279385	Rejected
	.208		
E2_F - E2_P	-4.011	0.000052976	Rejected
E3_F - E3_P	-4.053	0.0000454611	Rejected
E4_F - E4_P	-3.739	0.000203324	Rejected
E5_F - E5_P	-4.053	0.0000454611	Rejected
E6_F - E6_P	-4.119	0.0000393649	Rejected

E7_F - E7_P	-4.234	0.0000230618	Rejected
E8_F - E8_P	-4.099	0.0000382978	Rejected
E9_F - E9_P	-4.110	0.0000426998	Rejected
E10_F - E10_P	-4.073	0.0000501367	Rejected
E11_F - E11_P	-4.132	0.0000389571	Rejected
E12_F - E12_P	-3.981	0.0000604375	Rejected
E13_F - E13_P	-4.179	0.0000317191	Rejected
E14_F - E14_P	-4.104	0.000043845	Rejected

SIGN TEST STATISTICS FOR EVALUATOR IT/IS SKILLS NOW AND THREE YEARS FORWARD IN USA SAMPLE

Evaluator IT/IS	Exact Sig. (2-tailed)	Results
E1_F - E1_P	0.0000127596	Rejected
E2_F - E2_P	0.0000215322	Rejected
E3_F - E3_P	0.0000215322	Rejected
E4_F - E4_P	0.000104252	Rejected
E5_F - E5_P	0.0000215322	Rejected
E6_F - E6_P	0.0000363785	Rejected
E7_F - E7_P	0.0000215322	Rejected
E8_F - E8_P	0.0000215322	Rejected
E9_F - E9_P	0.0000127596	Rejected
E10_F - E10_P	0.0000127596	Rejected
E11_F - E11_P	0.0000127596	Rejected
E12_F - E12_P	0.0000363785	Rejected
E13_F - E13_P	0.0000127596	Rejected
E14_F - E14_P	0.0000127596	Rejected

APPENDIX THIRTEEN

STATISTICS DETAILS T-TEST PAIRED SAMPLE, WILCOXON, AND SIGN TEST FOR EACH SKILL BETWEEN NOW AND FUTURE FOR UK SAMPLE

T-TEST FOR GENERAL IT/IS SKILLS NOW AND THREE YEARS FORWARD IN UK SAMPLE

		Paired Differences								
General IT/IS skills	Mean	Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper	t Value	DF	Sig. (2-tailed)	Result
G1_P	1.32	-1.34	.71	.096	-1.53	-1.15	-13.822	52	.000	Rejected
G1_F	2.66									
G2_P	1.40	-1.11	.75	.10	-1.32	-.91	-10.793	52	.000	Rejected
G2_F	2.51									
G3_P	1.25	-1.43	.67	.091	-1.62	-1.25	-15.690	52	.000	Rejected
G3_F	2.68									
G4_P	1.28	-1.51	.61	.084	-1.68	-1.34	-18.063	52	.000	Rejected
G4_F	2.79									
G5_P	.98	-1.62	.71	.098	-1.82	-1.43	-16.563	52	.000	Rejected
G5_F	2.60									
G6_P	.91	-1.72	.72	.099	-1.91	-1.52	-17.426	52	.000	Rejected
G6_F	2.62									
G7_P	.98	-1.38	.63	.086	-1.55	-1.20	-15.989	52	.000	Rejected
G7_F	2.36									

WILCOXON SIGNED-RANK TEST STATISTICS FOR GENERAL IT/IS SKILLS NOW AND THREE YEARS FORWARD IN UK SAMPLE

General IT/IS	Wilcoxon signed rank test		Results
Paired sample	Z	Asymp. Sig. (2-tailed)	Rejected
G1_F - G1_P	-6.298	.000	Rejected
G2_F - G2_P	-6.072	.000	Rejected
G3_F - G3_P	-6.275	.000	Rejected
G4_F - G4_P	-6.374	.000	Rejected
G5_F - G5_P	-6.362	.000	Rejected
G6_F - G6_P	-6.374	.000	Rejected
G7_F - G7_P	-6.286	.000	Rejected

SIGN TEST STATISTICS FOR GENERAL IT/IS SKILLS NOW AND THREE YEARS FORWARD IN UK SAMPLE

	Z	Asymp. Sig. (2-tailed)	Results
G1_F - G1_P	-6.857	.000	Rejected
G1_F - G1_P	-6.857	.000	Rejected
G2_F_ - G2_P	-6.482	.000	Rejected
G2_F_ - G2_P	-6.482	.000	Rejected
G3_F - G3_P	-6.857	.000	Rejected
G3_F - G3_P	-6.857	.000	Rejected
G4_F - G4_P	-6.930	.000	Rejected
G4_F - G4_P	-6.930	.000	Rejected

G5_F - G5_P	-7.001	.000	Rejected
G6_F - G6_P	-7.001	.000	Rejected
G7_F - G7_P	-6.857	.000	Rejected

T-TEST FOR USER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN UK SAMPLE

User IT/IS skills	Mean	Paired Differences: Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference: Lower	Upper	t Value	DF	Sig. (2-tailed)	Result
U1_P	1.91	-1.02	.87	.12	-1.26	-.78	-8.567	52	.000	Rejected
U1_F	2.92									
U2_P	1.75	-.94	.72	.099	-1.14	-.75	-9.561	52	.000	Rejected
U2_F	2.70									
U3_P	.92	-1.51	.67	.092	-1.69	-1.33	-16.436	52	.000	Rejected
U3_F	2.43									
U4_P	1.55	-1.19	.62	.085	-1.36	-1.02	-13.914	52	.000	Rejected
U4_F	2.74									
U5_P	1.58	-1.02	.75	.10	-1.22	-.81	-9.936	52	.000	Rejected
U5_F	2.60									

WILCOXON TEST STATISTICS FOR USER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN UK SAMPLE

User IT/IS Paired sample	Wilcoxon signed rank test: Z	Asymp. Sig. (2-tailed)	Result
U1_F - U1_P	-5.382	.000	Rejected
U2_F - U2_P	-5.615	.000	Rejected
U3_F - U3_P	-6.522	.000	Rejected
U4_F - U4_P	-6.219	.000	Rejected
U5_F - U5_P	-5.642	.000	Rejected

SIGN TEST STATISTICS FOR USER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN UK SAMPLE

	Z	Asymp. Sig. (2-tailed)	Result
U1_F - U1_P	-5.833	.000	Rejected
U2_F - U2_P	-6.002	.000	Rejected
U3_F - U3_P	-7.143	.000	Rejected
U4_F - U4_P	-6.710	.000	Rejected
U5_F - U5_P	-6.085	.000	Rejected

T-TEST FOR MANAGER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN UK SAMPLE

Manager IT/IS skills	Mean	Paired Differences: Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference: Lower	Upper	t Value	DF	Sig. (2-tailed)	Result

M1_P	.79	-1.21	.72	.098	-1.41	-1.01	-12.265	52	.000	Rejected
M1_F	2.00									
M2_P	1.13	-1.09	.63	.086	-1.27	-.92	-12.680	52	.000	Rejected
M2_F	2.23									
M3_P	.79	-1.42	.69	.095	-1.61	-1.22	-14.897	52	.000	Rejected
M3_F	2.21									
M4_P	.94	-1.43	.82	.11	-1.66	-1.21	-12.721	52	.000	Rejected
M4_F	2.38									
M5_P	1.28	-1.23	.70	.096	-1.42	-1.03	-12.805	52	.000	Rejected
M5_F	2.51									
M6_P	.77	-1.25	.76	.10	-1.45	-1.04	-11.973	52	.000	Rejected
M6_F	2.02									
M7_P	.98	-1.19	.81	.11	-1.41	-.97	-10.684	52	.000	Rejected
M7_F	2.17									
M8_P	.92	-1.02	.80	.11	-1.24	-.80	-9.314	52	.000	Rejected
M8_F	1.94									
M9_P	1.02	-1.02	.75	.10	-1.22	-.81	-9.936	52	.000	Rejected
M9_F	2.04									
M10_P	.75	-1.13	.76	.10	-1.34	-.92	-10.837	52	.000	Rejected
M10_F	1.89									
M11_P	.64	-1.45	.80	.11	-1.67	-1.23	-13.250	52	.000	Rejected
M11_F	2.09									
M12_P	1.00	-1.30	.72	.099	-1.50	-1.10	-13.112	52	.000	Rejected
M12_F	2.30									
M13_P	.83	-1.28	.79	.11	-1.50	-1.06	-11.769	52	.000	Rejected
M13_F	2.11									
M14_P	.79	-1.47	.67	.092	-1.66	-1.29	-16.038	52	.000	Rejected
M14_F	2.26									

WILCOXON TEST STATISTICS FOR MANAGER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN UK SAMPLE

Manager IT/IS	Wilcoxon signed rank test		Result
Paired sample	Z	Asymp. Sig. (2-tailed)	
M1_F - M1_P	-6.041	.000	Rejected
M2_F - M2_P	-6.132	.000	Rejected
M3_F - M3_P	-6.417	.000	Rejected
M4_F - M4_P	-6.269	.000	Rejected
M5_F - M5_P	-6.319	.000	Rejected
M6_F - M6_P	-6.115	.000	Rejected
M7_F - M7_P	-6.250	.000	Rejected
M8_F - M8_P	-5.664	.000	Rejected
M9_F - M9_P	-5.747	.000	Rejected
M10_F - M10_P	-5.933	.000	Rejected
M11_F - M11_P	-6.112	.000	Rejected
M12_F - M12_P	-6.154	.000	Rejected
M13_F - M13_P	-6.007	.000	Rejected
M14_F - M14_P	-6.326	.000	Rejected

SIGN TEST STATISTICS FOR MANAGER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN UK SAMPLE

	Z	Asymp. Sig. (2-tailed)	Result
M1_F - M1_P	-6.559	.000	Rejected
M2_F - M2_P	-6.559	.000	Rejected
M2_F - M2_P	-6.559	.000	Rejected

M3_F - M3_P	-7.001	.000	Rejected
M4_F - M4_P	-6.857	.000	Rejected
M5_F - M5_P	-6.784	.000	Rejected
M6_F - M6_P	-6.635	.000	Rejected
M7_F - M7_P	-6.635	.000	Rejected
M8_F - M8_P	-6.085	.000	Rejected
M9_F - M9_P	-6.166	.000	Rejected
M10_F - M10_P	-6.405	.000	Rejected
M11_F - M11_P	-6.710	.000	Rejected
M12_F - M12_P	-6.710	.000	Rejected
M13_F - M13_P	-6.559	.000	Rejected
M14_F - M14_P	-6.930	.000	Rejected

T-TEST FOR DESIGNER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN UK SAMPLE

Designer IT/IS skills	Mean	Paired Differences: Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference: Lower	Upper	t Value	DF	Sig. (2-tailed)	Result
D1_P	.87	-1.08	.70	.097	-1.27	-.88	-11.138	52	.000	Rejected
D1_F	1.94									
D2_P	.21	-.49	.58	.079	-.65	-.33	-6.202	52	.000	Rejected
D2_F	.70									
D3_P	.94	-1.15	.57	.078	-1.31	-.99	-14.745	52	.000	Rejected
D3_F	2.09									
D4_P	.72	-1.58	.53	.073	-1.73	-1.44	-21.578	52	.000	Rejected
D4_F	2.30									
D5_P	.87	-1.11	.75	.10	-1.32	-.91	-10.793	52	.000	Rejected
D5_F	1.98									
D6_P	.92	-1.17	.67	.092	-1.35	-.98	-12.676	52	.000	Rejected
D6_F	2.09									
D7_P	.98	-.94	.72	.099	-1.14	-.75	-9.561	52	.000	Rejected
D7_F	1.92									
D8_P	.91	-.92	.76	.10	-1.13	-.72	-8.906	52	.000	Rejected
D8_F	1.83									
D9_P	.49	-1.04	.68	.093	-1.22	-.85	-11.138	52	.000	Rejected
D9_F	1.53									
D10_P	.70	-.91	.66	.090	-1.09	-.72	-10.017	52	.000	Rejected
D10_F	1.60									
D11_P	.66	-.92	.65	.089	-1.10	-.75	-10.420	52	.000	Rejected
D11_F	1.58									
D12_P	.77	-.94	.66	.091	-1.13	-.76	-10.365	52	.000	Rejected
D12_F	1.72									

WILCOXON TEST STATISTICS FOR DESIGNER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN UK SAMPLE

Designer IT/IS Paired sample	Wilcoxon signed rank test: Z	Asymp. Sig. (2-tailed)	Result
D1_F - D1_P	-6.242	.000	Rejected
D2_F - D2_P	-4.747	.000	Rejected
D3_F - D3_P	-6.477	.000	Rejected
D4_F - D4_P	-6.532	.000	Rejected

D5_F - D5_P	-6.119	.000	Rejected
D6_F - D6_P	-6.159	.000	Rejected
D7_F - D7_P	-5.742	.000	Rejected
D8_F - D8_P	-5.846	.000	Rejected
D9_F - D9_P	-5.907	.000	Rejected
D10_F - D10_P	-5.816	.000	Rejected
D11_F - D11_P	-5.857	.000	Rejected
D12_F - D12_P	-5.826	.000	Rejected

SIGN TEST STATISTICS FOR DESIGNER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN UK SAMPLE

Designer IT/IS	Signed test		Result
Paired sample	Z	Asymp. Sig. (2-tailed)	
D1_F - D1_P	-6.559	.000	Rejected
D2_F - D2_P	-4.619	.000	Rejected
D3_F - D3_P	-6.857	.000	Rejected
D4_F - D4_P	-7.143	.000	Rejected
D5_F - D5_P	-6.418	.000	Rejected
D6_F - D6_P	-6.635	.000	Rejected
D7_F - D7_P	-6.085	.000	Rejected
D8_F - D8_P	-6.085	.000	Rejected
D9_F - D9_P	-6.326	.000	Rejected
D10_F - D10_P	-6.018	.000	Rejected
D11_F - D11_P	-6.166	.000	Rejected
D12_F - D12_P	-6.166	.000	Rejected

T-TEST FOR EVALUATOR IT/IS SKILLS NOW AND THREE YEARS FORWARD IN UK SAMPLE

Paired Differences							t Value	DF	Sig. (2-tailed)	Result
Evaluator IT/IS skills	Mean	Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
					Lower	Upper				
E1_P	1.13	-1.23	.67	.092	-1.41	-1.04	-13.343	52	.000	Rejected
E1_F	2.36									
E2_P	.96	-1.38	1.06	.15	-1.67	-1.09	-9.458	52	.000	Rejected
E2_F	2.34									
E3_P	1.00	-1.19	.74	.10	-1.39	-.99	-11.769	52	.000	Rejected
E3_F	2.19									
E4_P	1.09	-1.15	.95	.13	-1.41	-.89	-8.833	52	.000	Rejected
E4_F	2.25									
E5_P	1.04	-1.26	.74	.10	-1.47	-1.06	-12.475	52	.000	Rejected
E5_F	2.30									
E6_P	1.13	-1.11	.93	.13	-1.37	-.86	-8.681	52	.000	Rejected
E6_F	2.25									
E7_P	1.17	-1.15	.77	.11	-1.36	-.94	-10.889	52	.000	Rejected
E7_F	2.32									
E8_P	1.00	-1.30	.64	.088	-1.48	-1.13	-14.854	52	.000	Rejected
E8_F	2.30									
E9_P	.83	-1.42	.66	.091	-1.60	-1.23	-15.535	52	.000	Rejected
E9_F	2.25									
E10_P	.98	-1.43	.80	.11	-1.65	-1.21	-13.101	52	.000	Rejected

E10_F	2.42									
E11_P	.74	-1.57	.87	.12	-1.80	-1.33	-13.161	52	.000	Rejected
E11_F	2.30									
E12_P	.92	-1.34	.81	.11	-1.56	-1.12	-12.081	52	.000	Rejected
E12_F	2.26									
E13_P	.89	-1.49	.72	.099	-1.69	-1.29	-14.992	52	.000	Rejected
E13_F	2.38									
E14_P	.94	-1.60	.82	.11	-1.83	-1.38	-14.297	52	.000	Rejected
E14_F	2.55									

WILCOXON TEST STATISTICS FOR EVALUATOR IT/IS SKILLS NOW AND THREE YEARS FORWARD IN UK SAMPLE

Evaluator IT/IS	Wilcoxon signed rank test		Result
Paired sample	Z	Asymp. Sig. (2-tailed)	
E1_F – E1_P	-6.197	.000	Rejected
E2_F – E2_P	-5.528	.000	Rejected
E3_F – E3_P	-5.952	.000	Rejected
E4_F – E4_P	-5.596	.000	Rejected
E5_F – E5_P	-6.187	.000	Rejected
E6_F - E6_P	-5.632	.000	Rejected
E7_F - E7_P	-6.024	.000	Rejected
E8_F - E8_P	-6.231	.000	Rejected
E9_F - E9_P	-6.334	.000	Rejected
E10_F - E10_P	-6.179	.000	Rejected
E11_F - E11_P	-6.144	.000	Rejected
E12_F - E12_P	-6.062	.000	Rejected
E13_F - E13_P	-6.308	.000	Rejected
E14_F - E14_P	-6.346	.000	Rejected

SIGN TEST STATISTICS FOR EVALUATOR IT/IS SKILLS NOW AND THREE YEARS FORWARD IN UK SAMPLE

Evaluator IT/IS	Signed test		Result
Paired sample	Z	Asymp. Sig. (2-tailed)	
E1_F – E1_P	-6.710	.000	Rejected
E2_F – E2_P	-6.085	.000	Rejected
E3_F – E3_P	-6.340	.000	Rejected
E4_F – E4_P	-6.085	.000	Rejected
E5_F – E5_P	-6.710	.000	Rejected
E6_F - E6_P	-6.085	.000	Rejected
E7_F - E7_P	-6.482	.000	Rejected
E8_F - E8_P	-6.784	.000	Rejected
E9_F - E9_P	-6.930	.000	Rejected
E10_F - E10_P	-6.647	.000	Rejected
E11_F - E11_P	-6.784	.000	Rejected
E12_F - E12_P	-6.635	.000	Rejected
E13_F - E13_P	-6.930	.000	Rejected
E14_F - E14_P	-7.001	.000	Rejected

APPENDIX FOURTEEN

STATISTICS DETAILS T-TEST PAIRED SAMPLE, WILCOXON, AND SIGN TEST FOR EACH SKILL BETWEEN NOW AND FUTURE FOR EGYPT SAMPLE

T-TEST FOR GENERAL IT/IS SKILLS NOW AND THREE YEARS FORWARD IN EGYPT SAMPLE

		Paired Differences					t Value	DF	Sig. (2-tailed)	Result
General IT/IS skills	Mean	Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
					Lower	Upper				
G1_P	.88	-1.34	.60	.11	-1.56	-1.13	-12.636	31	.000	Rejected
G1_F	2.22									
G2_P	.56	-1.53	.80	.14	-1.82	-1.24	-10.793	31	.000	Rejected
G2_F	2.09									
G3_P	.81	-1.78	.55	.098	-1.98	-1.58	-18.232	31	.000	Rejected
G3_F	2.59									
G4_P	.56	-1.84	.51	.091	-2.03	-1.66	-20.256	31	.000	Rejected
G4_F	2.41									
G5_P	.44	-2.06	.50	.089	-2.24	-1.88	-23.149	31	.000	Rejected
G5_F	2.50									
G6_P	.28	-2.41	.67	.12	-2.65	-2.17	-20.462	31	.000	Rejected
G6_F	2.69									
G7_P	.56	-1.41	.71	.13	-1.66	-1.15	-11.171	31	.000	Rejected
G7_F	1.97									

WILCOXON SIGNED-RANK TEST STATISTICS FOR GENERAL IT/IS SKILLS NOW AND THREE YEARS FORWARD IN EGYPT SAMPLE

General IT/IS	Wilcoxon signed rank test		Resluts
Paired sample	Z	Asymp. Sig. (2-tailed)	
G1_F - G1_P	-5.044	.000	Rejected
G2_F - G2_P	-4.885	.000	Rejected
G3_F - G3_P	-5.126	.000	Rejected
G4_F - G4_P	-5.178	.000	Rejected
G5_F - G5_P	-5.208	.000	Rejected
G6_F - G6_P	-5.054	.000	Rejected
G7_F - G7_P	-4.919	.000	Rejected

SIGN TEST STATISTICS FOR GENERAL IT/IS SKILLS NOW AND THREE YEARS FORWARD IN EGYPT SAMPLE

General IT/IS	Signed test		Results
Paired sample	Z	Exact Sig. (2-tailed)	
G1_F - G1_P	-5.388	.000	Rejected
G2_F - G2_P	-5.295	.000	Rejected
G2_F - G2_P	-5.295	.000	Rejected
G3_F - G3_P	-5.480	.000	Rejected
G3_F - G3_P	-5.480	.000	Rejected
G4_F - G4_P	-5.480	.000	Rejected
G4_F - G4_P	-5.480	.000	Rejected

G5_F - G5_P	-5.480	.000	Rejected
G6_F - G6_P	-5.480	.000	Rejected
G7_F - G7_P	-5.295	.000	Rejected

T-TEST FOR USER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN EGYPT SAMPLE

User IT/IS skills	Mean	Paired Differences: Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference: Lower	Upper	t Value	DF	Sig. (2-tailed)	Result
U1_P	.78	-2.00	.51	.090	-2.18	-1.82	-22.271	31	.000	Rejected
U1_F	2.78									
U2_P	.56	-2.13	.55	.098	-2.32	-1.93	-21.715	31	.000	Rejected
U2_F	2.69									
U3_P	.19	-1.81	.69	.12	-2.06	-1.56	-14.801	31	.000	Rejected
U3_F	2.00									
U4_P	.50	-2.19	.74	.13	-2.45	-1.92	-16.772	31	.000	Rejected
U4_F	2.69									
U5_P	.66	-2.03	.47	.084	-2.20	-1.86	-24.235	31	.000	Rejected
U5_F	2.69									

WILCOXON TEST STATISTICS FOR USER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN EGYPT SAMPLE

User IT/IS Paired sample	Wilcoxon signed rank test: Z	Asymp. Sig. (2-tailed)	RESULTS
U1_F - U1_P	-5.208	.000	Rejected
U2_F - U2_P	-5.147	.000	Rejected
U3_F - U3_P	-5.039	.000	Rejected
U4_F - U4_P	-5.022	.000	Rejected
U5_F - U5_P	-5.245	.000	Rejected

SIGN TEST STATISTICS FOR USER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN EGYPT SAMPLE

User IT/IS Paired sample	Signed test: Z	Exact Sig. (2-tailed)	RESULTS
U1_F - U1_P	-5.480	.000	Rejected
U2_F - U2_P	-5.480	.000	Rejected
U3_F - U3_P	-5.480	.000	Rejected
U4_F - U4_P	-5.480	.000	Rejected
U5_F - U5_P	-5.480	.000	Rejected

T-TEST FOR MANAGER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN EGYPT SAMPLE

Manager IT/IS skills	Mea	Paired Differences: Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference	t Value	DF	Sig. (2-tailed)	Res

					Lower	Upper				
M1_P	.38	-1.25	.72	.13	-1.51	-.99	-9.843	31	.000	Rejected
M1_F	1.63									
M2_P	.44	-1.69	.64	.11	-1.92	-1.46	-14.812	31	.000	Rejected
M2_F	2.13									
M3_P	.34	-1.53	.76	.13	-1.81	-1.26	-11.377	31	.000	Rejected
M3_F	1.88									
M4_P	.25	-1.78	.66	.12	-2.02	-1.54	-15.287	31	.000	Rejected
M4_F	2.03									
M5_P	.41	-1.69	.82	.15	-1.98	-1.39	-11.633	31	.000	Rejected
M5_F	2.09									
M6_P	.50	-1.19	.64	.11	-1.42	-.96	-10.424	31	.000	Rejected
M6_F	1.69									
M7_P	.25	-1.56	.72	.13	-1.82	-1.30	-12.351	31	.000	Rejected
M7_F	1.81									
M8_P	.59	-1.22	.71	.12	-1.47	-.96	-9.760	31	.000	Rejected
M8_F	1.81									
M9_P	.38	-1.59	.61	.11	-1.82	-1.37	-14.663	31	.000	Rejected
M9_F	1.97									
M10_P	.28	-1.63	.55	.097	-1.82	-1.43	-16.605	31	.000	Rejected
M10_F	1.91									
M11_P	.34	-1.59	.61	.11	-1.82	-1.37	-14.663	31	.000	Rejected
M11_F	1.94									
M12_P	.31	-1.97	.65	.11	-2.20	-1.74	-17.219	31	.000	Rejected
M12_F	2.28									
M13_P	.44	-1.94	.67	.12	-2.18	-1.70	-16.383	31	.000	Rejected
M13_F	2.38									
M14_P	.47	-1.81	.59	.10	-2.03	-1.60	-17.311	31	.000	Rejected
M14_F	2.28									

WILCOXON TEST STATISTICS FOR MANAGER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN EGYPT SAMPLE

Manager IT/IS	Wilcoxon signed rank test		Results
Paired sample	Z	Asymp. Sig. (2-tailed)	
M1_F - M1_P	-4.777	.000	Rejected
M2_F - M2_P	-5.054	.000	Rejected
M3_F - M3_P	-4.890	.000	Rejected
M4_F - M4_P	-5.053	.000	Rejected
M5_F - M5_P	-4.921	.000	Rejected
M6_F - M6_P	-4.802	.000	Rejected
M7_F - M7_P	-4.909	.000	Rejected
M8_F - M8_P	-4.686	.000	Rejected
M9_F - M9_P	-5.013	.000	Rejected
M10_F - M10_P	-5.087	.000	Rejected
M11_F - M11_P	-5.062	.000	Rejected
M12_F - M12_P	-5.085	.000	Rejected
M13_F - M13_P	-5.058	.000	Rejected
M14_F - M14_P	-5.120	.000	Rejected

SIGN TEST STATISTICS FOR MANAGER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN EGYPT SAMPLE

Manager IT/IS	Signed test		Results
Paired sample	Z	Exact Sig. (2-tailed)	

M1_F - M1_P	-5.103	.000	Rejected
M2_F - M2_P	-5.480	.000	Rejected
M3_F - M3_P	-5.295	.000	Rejected
M4_F - M4_P	-5.480	.000	Rejected
M5_F - M5_P	-5.127	.000	Rejected
M6_F - M6_P	-5.103	.000	Rejected
M7_F - M7_P	-5.295	.000	Rejected
M8_F - M8_P	-5.004	.000	Rejected
M9_F - M9_P	-5.388	.000	Rejected
M10_F - M10_P	-5.480	.000	Rejected
M11_F - M11_P	-5.480	.000	Rejected
M12_F - M12_P	-5.388	.000	Rejected
M13_F - M13_P	-5.480	.000	Rejected
M14_F - M14_P	-5.388	.000	Rejected

T-TEST FOR DESIGNER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN EGYPT SAMPLE

		Paired Differences					t Value	DF	Sig. (2-tailed)	Result
					95% Confidence Interval of the Difference					
Designer IT/IS skills	Mean	Mean Difference	Std. Deviation	Std. Error Mean	Lower	Upper				
D1_P	.50	-1.41	.71	.13	-1.66	-1.15	-11.171	31	.000	Rejected
D1_F	1.91									
D2_P	.28	-.47	.57	.10	-.67	-.26	-4.676	31	.000	Rejected
D2_F	.75									
D3_P	.31	-1.47	.67	.12	-1.71	-1.23	-12.377	31	.000	Rejected
D3_F	1.78									
D4_P	.13	-1.41	.61	.11	-1.63	-1.18	-12.938	31	.000	Rejected
D4_F	1.53									
D5_P	.19	-1.75	.76	.13	-2.02	-1.48	-12.991	31	.000	Rejected
D5_F	1.94									
D6_P	.28	-1.03	.65	.11	-1.26	-.80	-9.019	31	.000	Rejected
D6_F	1.31									
D7_P	.19	-.88	.71	.12	-1.13	-.62	-7.000	31	.000	Rejected
D7_F	1.06									
D8_P	.19	-.75	.62	.11	-.97	-.53	-6.819	31	.000	Rejected
D8_F	.94									
D9_P	6.25E-02	-1.00	.67	.12	-1.24	-.76	-8.418	31	.000	Rejected
D9_F	1.06									
D10_P	.00	-.94	.67	.12	-1.18	-.70	-7.927	31	.000	Rejected
D10_F	.94									
D11_P	3.13E-02	-1.00	.62	.11	-1.22	-.78	-9.092	31	.000	Rejected
D11_F	1.03									
D12_P	.16	-.94	.67	.12	-1.18	-.70	-7.927	31	.000	Rejected
D12_F	1.09									

WILCOXON TEST STATISTICS FOR DESIGNER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN EGYPT SAMPLE

Designer IT/IS	Wilcoxon signed rank test		Results
Paired sample	Z	Asymp. Sig. (2-tailed)	

D1_F - D1_P	-4.919	.000	Rejected
D2_F - D2_P	-3.638	.000	Rejected
D3_F - D3_P	-4.916	.000	Rejected
D4_F - D4_P	-5.013	.000	Rejected
D5_F - D5_P	-4.956	.000	Rejected
D6_F - D6_P	-4.689	.000	Rejected
D7_F - D7_P	-4.315	.000	Rejected
D8_F - D8_P	-4.347	.000	Rejected
D9_F - D9_P	-4.590	.000	Rejected
D10_F - D10_P	-4.524	.000	Rejected
D11_F - D11_P	-4.725	.000	Rejected
D12_F - D12_P	-4.524	.000	Rejected

SIGN TEST STATISTICS FOR DESIGNER IT/IS SKILLS NOW AND THREE YEARS FORWARD IN EGYPT SAMPLE

Designer IT/IS	Signed test		Results
Paired sample	Z	Exact Sig. (2-tailed)	
D1_F - D1_P	-5.295	.000	Rejected
D2_F - D2_P	-5.295	.000	Rejected
D3_F - D3_P	-5.295	.000	Rejected
D4_F - D4_P	-5.388	.000	Rejected
D5_F - D5_P	-5.388	.000	Rejected
D6_F - D6_P	-4.903	.000	Rejected
D7_F - D7_P	-4.903	.000	Rejected
D8_F - D8_P	-5.388	.000	Rejected
D9_F - D9_P	-4.903	.000	Rejected
D10_F - D10_P	-4.903	.000	Rejected
D11_F - D11_P	-4.903	.000	Rejected
D12_F - D12_P	-4.903	.000	Rejected

T-TEST FOR EVALUATOR IT/IS SKILLS NOW AND THREE YEARS FORWARD IN EGYPT SAMPLE

		Paired Differences					t Value	DF	Sig. (2-tailed)	Result
Evaluator IT/IS skills	Mean	Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
					Lower	Upper				
E1_P	.59	-1.66	.90	.16	-1.98	-1.33	-10.388	31	.000	Rejected
E1_F	2.25									
E2_P	.72	-1.44	.88	.16	-1.75	-1.12	-9.266	31	.000	Rejected
E2_F	2.16									
E3_P	.13	-2.13	.61	.11	-2.34	-1.91	-19.736	31	.000	Rejected
E3_F	2.25									
E4_P	.50	-1.91	.82	.14	-2.20	-1.61	-13.190	31	.000	Rejected
E4_F	2.41									
E5_P	.47	-1.75	.92	.16	-2.08	-1.42	-10.810	31	.000	Rejected
E5_F	2.22									
E6_P	.75	-1.56	.76	.13	-1.84	-1.29	-11.640	31	.000	Rejected
E6_F	2.31									
E7_P	.41	-1.88	.71	.13	-2.13	-1.62	-15.000	31	.000	Rejected
E7_F	2.28									
E8_P	.13	-2.03	.54	.095	-2.23	-1.84	-21.363	31	.000	Rejected
E8_F	2.16									

E9_P	.41	-1.53	.72	.13	-1.79	-1.27	-12.069	31	.000	Rejected
E9_F	1.94									
E10_P	.41	-1.78	.71	.12	-2.04	-1.53	-14.264	31	.000	Rejected
E10_F	2.19									
E11_P	.41	-1.88	.71	.13	-2.13	-1.62	-15.000	31	.000	Rejected
E11_F	2.28									
E12_P	.44	-1.78	.75	.13	-2.05	-1.51	-13.423	31	.000	Rejected
E12_F	2.22									
E13_P	.41	-1.88	.83	.15	-2.18	-1.57	-12.736	31	.000	Rejected
E13_F	2.28									
E14_P	.44	-2.03	.69	.12	-2.28	-1.78	-16.536	31	.000	Rejected
E14_F	2.47									

WILCOXON TEST STATISTICS FOR EVALUATOR IT/IS SKILLS NOW AND THREE YEARS FORWARD IN EGYPT SAMPLE

Evaluator IT/IS	Wilcoxon signed rank test		Results
Paired sample	Z	Asymp. Sig. (2-tailed)	
E1_F – E1_P	-4.864	.000	Rejected
E2_F – E2_P	-4.831	.000	Rejected
E3_F – E3_P	-5.098	.000	Rejected
E4_F – E4_P	-5.005	.000	Rejected
E5_F – E5_P	-4.851	.000	Rejected
E6_F - E6_P	-4.970	.000	Rejected
E7_F - E7_P	-5.034	.000	Rejected
E8_F - E8_P	-5.174	.000	Rejected
E9_F - E9_P	-4.904	.000	Rejected
E10_F - E10_P	-5.033	.000	Rejected
E11_F - E11_P	-5.034	.000	Rejected
E12_F - E12_P	-5.021	.000	Rejected
E13_F - E13_P	-4.933	.000	Rejected
E14_F - E14_P	-5.043	.000	Rejected

SIGN TEST STATISTICS FOR EVALUATOR IT/IS SKILLS NOW AND THREE YEARS FORWARD IN EGYPT SAMPLE

Evaluator IT/IS	Signed test		Results
Paired sample	Z	Exact Sig. (2-tailed)	
E1_F – E1_P	-5.295	.000	Rejected
E2_F – E2_P	-5.199	.000	Rejected
E3_F – E3_P	-5.480	.000	Rejected
E4_F – E4_P	-5.480	.000	Rejected
E5_F – E5_P	-5.295	.000	Rejected
E6_F - E6_P	-5.388	.000	Rejected
E7_F - E7_P	-5.480	.000	Rejected
E8_F - E8_P	-5.480	.000	Rejected
E9_F - E9_P	-5.295	.000	Rejected
E10_F - E10_P	-5.480	.000	Rejected
E11_F - E11_P	-5.480	.000	Rejected
E12_F - E12_P	-5.480	.000	Rejected
E13_F - E13_P	-5.388	.000	Rejected

E14_F - E14_P	-5.480	.000	Rejected

APPENDIX FIFTEEN

STATISTICS DETAILS T-TEST FOR INDEPENDENT SAMPLES AND MANN-WHITNEY U TEST FOR EACH SKILL BETWEEN USA AND EGYPT NOW

T-TEST FOR GENERAL IT/IS SKILLS NOW IN EGYPT Vs USA

General IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	
G1_P	USA	21	1.43	.001	.980	2.958*	51	.005	.55	Rejected
	Egypt	32	.88							
G2_P	USA	21	1.95	.128	.722	6.583*	51	.000	1.39	Rejected
	Egypt	32	.56							
G3_P	USA	21	1.33	5.213	.027	4.114**	36.942	.000	.52	Rejected
	Egypt	32	.81							
G4_P	USA	21	1.43	1.843	.181	5.339*	51	.000	.87	Rejected
	Egypt	32	.56							
G5_P	USA	21	1.43	1.673	.202	6.503*	51	.000	.99	Rejected
	Egypt	32	.44							
G6_P	USA	21	1.05	2.437	.125	5.767*	51	.000	.77	Rejected
	Egypt	32	.28							
G7_P	USA	21	1.24	.064	.802	4.338	51	.000	.68	Rejected
	Egypt	32	.56							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR GENERAL IT/IS SKILLS NOW IN EGYPT Vs USA

General IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
G1_P	197.000	725.000	-2.748	.006	Rejected
G2_P	82.000	610.000	-4.828	.000	Rejected
G3_P	182.000	710.000	-3.721	.000	Rejected
G4_P	117.000	645.000	-4.330	.000	Rejected
G5_P	93.000	621.000	-4.780	.000	Rejected
G6_P	113.000	641.000	-4.562	.000	Rejected
G7_P	158.000	686.000	-3.644	.000	Rejected

T-TEST FOR USER IT/IS SKILLS NOW IN EGYPT Vs USA

USER IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	Df	Sig. (2-tailed)	Mean Differ-ence	
U1_P	USA	21	2.14	.035	.852	9.241*	51	.000	1.36	Rejected
	Egypt	32	.78							
U2_P	USA	21	2.29	.057	.813	9.759*	51	.000	1.72	Rejected
	Egypt	32	.56							
U3_P	USA	21	1.00	.549	.462	5.758*	51	.000	.81	Rejected
	Egypt	32	.19							
U4_P	USA	21	1.67	3.849	.055	8.336*	51	.000	1.17	Rejected
	Egypt	32	.50							
U5_P	USA	21	1.67	1.930	.171	6.447*	51	.000	1.01	Rejected
	Egypt	32	.66							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

Mann-Whitney U Test FOR USER IT/IS SKILLS NOW IN EGYPT Vs USA

USER IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
U1_P	32.000	560.000	-5.932	.000	Rejected
U2_P	29.000	557.000	-5.798	.000	Rejected
U3_P	115.000	643.000	-4.573	.000	Rejected
U4_P	56.000	584.000	-5.451	.000	Rejected
U5_P	87.500	615.500	-4.858	.000	Rejected

T-TEST FOR MANAGER IT/IS SKILLS NOW IN EGYPT Vs USA

MANAGER IT/IS Skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	
M1_P	USA	21	.71	.459	.501	2.046*	51	.046	.34	Rejected
	Egypt	32	.38							
M2_P	USA	21	1.33	5.668	.021	4.907**	32.414	.000	.90	Rejected
	Egypt	32	.44							
M3_P	USA	21	.71	.802	.375	2.778*	51	.008	.37	Rejected
	Egypt	32	.34							
M4_P	USA	21	1.05	1.398	.243	6.129*	51	.000	.80	Rejected
	Egypt	32	.25							
M5_P	USA	21	1.38	.484	.490	6.471*	51	.000	.97	Rejected
	Egypt	32	.41							
M6_P	USA	21	.62	.839	.364	.695*	51	.490	.12	Supported
	Egypt	32	.50							
M7_P	USA	21	.86	1.693	.199	4.045*	51	.000	.61	Rejected
	Egypt	32	.25							
M8_P	USA	21	.90	8.409	.005	1.805**	49.857	.077	.31	Supported
	Egypt	32	.59							
M9_P	USA	21	1.00	4.569	.037	4.046**	43.260	.000	.63	Rejected
	Egypt	32	.38							
M10_P	USA	21	.86	1.095	.300	4.407*	51	.000	.58	Rejected
	Egypt	32	.28							
M11_P	USA	21	.81	.988	.325	3.356*	51	.002	.47	Rejected
	Egypt	32	.34							
M12_P	USA	21	1.05	.816	.371	4.198*	51	.000	.74	Rejected
	Egypt	32	.31							
M13_P	USA	21	.90	.001	.978	2.678*	51	.010	.47	Rejected
	Egypt	32	.44							
M14_P	USA	21	.90	.163	.689	2.376*	51	.021	.44	Rejected
	Egypt	32	.47							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR MANAGER IT/IS SKILLS NOW IN EGYPT Vs USA

MANAGER IT/IS SKILLS	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
M1_P	239.000	767.000	-2.005	.045	Rejected
M2_P	125.000	653.000	-4.138	.000	Rejected
M3_P	211.500	739.500	-2.614	.009	Rejected
M4_P	104.000	632.000	-4.749	.000	Rejected

		.000			
M5_P	88.500	616.500	-4.885	.000	Rejected
M6_P	308.000	836.000	-.574	.566	Supported
M7_P	168.000	696.000	-3.493	.000	Rejected
M8_P	240.500	768.500	-1.919	.055	Supported
M9_P	156.000	684.000	-3.655	.000	Rejected
M10_P	154.000	682.000	-3.789	.000	Rejected
M11_P	190.000	718.000	-3.037	.002	Rejected
M12_P	155.500	683.500	-3.644	.000	Rejected
M13_P	214.000	742.000	-2.461	.014	Rejected
M14_P	221.500	749.500	-2.296	.022	Rejected

T-TEST FOR DESIGNER IT/IS SKILLS NOW IN EGYPT Vs USA

DESIGNER IT/IS SKILLS NOW	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	
D1_P	USA	21	.86	.888	.350	2.107*	51	.040	.36	Rejected
	Egypt	32	.50							
D2_P	USA	21	.29	.005	.945	.035*	51	.973	.01	Supported
	Egypt	32	.28							
D3_P	USA	21	1.29	.561	.457	6.822*	51	.000	.98	Rejected
	Egypt	32	.31							
D4_P	USA	21	1.10	15.569	.000	5.454**	25.079	.000	.97	Rejected
	Egypt	32	.13							
D5_P	USA	21	1.14	1.391	.244	7.181*	51	.000	.95	Rejected
	Egypt	32	.19							
D6_P	USA	21	1.10	1.512	.225	5.130*	51	.000	.82	Rejected
	Egypt	32	.28							
D7_P	USA	21	1.19	2.154	.148	6.789*	51	.000	1.00	Rejected
	Egypt	32	.19							
D8_P	USA	21	.90	4.778	.033	4.266**	28.488	.000	.71	Rejected
	Egypt	32	.19							
D9_P	USA	21	.57	49.991	.000	3.702**	24.497	.001	.51	Rejected
	Egypt	32	.06							
D10_P	USA	21	.76	69.760	.000	5.587**	20.000	.000	.76	Rejected
	Egypt	32	.00							
D11_P	USA	21	.67	69.564	.000	5.779**	23.553	.000	.64	Rejected
	Egypt	32	.03							
D12_P	USA	21	.48	17.832	.000	2.474	33.456	.019	.32	Rejected
	Egypt	32	.16							

* t-test reported **Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

** t-test reported **Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)**

Mann-Whitney U Test FOR DESIGNER IT/IS SKILLS NOW IN EGYPT Vs USA

Designer IT/IS Skills Now	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
D1_P	248.000	776.000	-1.789	.044	Rejected
D2_P	334.500	862.500	-.035	.972	Supported
D3_P	86.000	614.000	-4.977	.000	Rejected
D4_P	108.000	636.000	-4.814	.000	Rejected
D5_P	80.000	608.000	-5.210	.000	Rejected
D6_P	131.500	659.500	-4.125	.000	Rejected
D7_P	79.000	607.000	-5.221	.000	Rejected
D8_P	147.000	675.000	-3.977	.000	Rejected
D9_P	180.000	708.000	-3.795	.000	Rejected
D10_P	112.000	640.000	-5.303	.000	Rejected
D11_P	122.500	650.500	-4.975	.000	Rejected
D12_P	228.500	756.500	-2.505	.012	Rejected

T-TEST FOR EVALUATOR IT/IS SKILLS NOW IN EGYPT Vs USA

EVALUATOR IT/IS SKILLS NOW	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	
E1_P	USA	21	1.24	3.802	.057	3.708*	51	.001	.65	Rejected
	Egypt	32	.59							
E2_P	USA	21	1.14	1.704	.198	2.155*	51	.036	.42	Rejected
	Egypt	32	.72							
E3_P	USA	21	1.05	17.349	.000	4.977**	24.630	.000	.92	Rejected
	Egypt	32	.13							
E4_P	USA	21	1.29	13.756	.001	3.127**	27.677	.004	.79	Rejected
	Egypt	32	.50							
E5_P	USA	21	1.05	.606	.440	2.949*	51	.005	.58	Rejected
	Egypt	32	.47							
E6_P	USA	21	1.57	.872	.355	4.543*	51	.000	.82	Rejected
	Egypt	32	.75							
E7_P	USA	21	1.52	.617	.436	7.895*	51	.000	1.11	Rejected
	Egypt	32	.41							
E8_P	USA	21	.86	14.153	.000	4.322**	25.675	.000	.73	Rejected
	Egypt	32	.13							
E9_P	USA	21	.76	2.070	.156	2.160*	51	.035	.36	Rejected
	Egypt	32	.41							
E10_P	USA	21	.86	1.285	.262	2.681*	51	.010	.45	Rejected
	Egypt	32	.41							
E11_P	USA	21	1.00	15.705	.000	4.514**	46.154	.000	.59	Rejected
	Egypt	32	.41							
E12_P	USA	21	.90	6.602	.013	2.042**	29.446	.050	.47	Rejected
	Egypt	32	.44							

E13_P	USA	21	.86	1.285	.262	2.681*	51	.010	.45	Rejected
	Egypt	32	.41							
E14_P	USA	21	1.29	.119	.731	5.061*	51	.000	.85	Rejected
	Egypt	32	.44							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR EVALUATOR IT/IS SKILLS NOW IN EGYPT Vs USA

Evaluator IT/IS Skills Now	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
E1_P	166.000	694.000	-3.393	.001	Rejected
E2_P	228.000	756.000	-2.126	.034	Rejected
E3_P	124.000	652.000	-4.536	.000	Rejected
E4_P	192.000	720.000	-2.820	.005	Rejected
E5_P	202.000	730.000	-2.652	.008	Rejected
E6_P	144.000	672.000	-3.859	.000	Rejected
E7_P	65.000	593.000	-5.303	.000	Rejected
E8_P	146.000	674.000	-4.149	.000	Rejected
E9_P	245.000	773.000	-1.866	.062	Supported
E10_P	222.500	750.500	-2.307	.021	Rejected
E11_P	155.500	683.500	-3.773	.000	Rejected
E12_P	247.000	775.000	-1.796	.073	Supported
E13_P	222.500	750.500	-2.307	.021	Rejected
E14_P	126.000	654.000	-4.138	.000	Rejected

APPENDIX SIXTEEN

STATISTICS DETAILS T-TEST FOR INDEPENDENT SAMPLES AND MANN-WHITNEY U TEST FOR EACH SKILL BETWEEN UK AND EGYPT NOW

T-TEST FOR GENERAL IT/IS SKILLS NOW IN EGYPT Vs UK

General IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Differ-ence	
G1_P	UK	53	1.32	.848	.360	2.765*	83	.007	.45	Rejected
	Egypt	32	.88							
G2_P	UK	53	1.40	3.722	.057	4.434*	83	.000	.83	Rejected
	Egypt	32	.56							
G3_P	UK	53	1.25	4.113	.046	4.344**	78.066	.000	.43	Rejected
	Egypt	32	.81							
G4_P	UK	53	1.28	.943	.334	5.298*	83	.000	.72	Rejected
	Egypt	32	.56							
G5_P	UK	53	.98	.088	.767	3.747*	83	.000	.54	Rejected
	Egypt	32	.44							
G6_P	UK	53	.91	.234	.630	4.891*	83	.000	.62	Rejected
	Egypt	32	.28							
G7_P	UK	53	.98	.301	.585	3.067*	83	.003	.42	Rejected
	Egypt	32	.56							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR GENERAL IT/IS SKILLS NOW IN EGYPT Vs UK

General IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
G1_P	577.000	1105.000	-2.651	.008	Rejected
G2_P	423.500	951.500	-4.079	.000	Rejected
G3_P	526.000	1054.000	-3.753	.000	Rejected
G4_P	385.000	913.000	-4.665	.000	Rejected
G5_P	504.000	1032 000	-3 407	.001	Rejected
G6_P	410.500	938 500	-4 406	.000	Rejected
G7_P	570.000	1098 000	-2.838	.005	Rejected

T-TEST FOR USER IT/IS SKILLS NOW IN EGYPT Vs UK

USER IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Differ-ence	
U1_P	UK	53	1.91	9.414	.003	7.667**	82.805	.000	1.12	Rejected
	Egypt	32	.78							
U2_P	UK	53	1.75	.776	.381	7.702*	83	.000	1.19	Rejected
	Egypt	32	.56							
U3_P	UK	53	.92	4.315	.041	6.340**	82.966	.000	.74	Rejected
	Egypt	32	.19							
U4_P	UK	53	1.55	2.959	.089	7.895*	83	.000	1.05	Rejected
	Egypt	32	.50							
U5_P	UK	53	1.58	6.097	.016	5.911**	80.536	.000	.93	Rejected
	Egypt	32	.66							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

Mann-Whitney U Test FOR USER IT/IS SKILLS NOW IN EGYPT Vs UK

USER IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
U1_P	266.000	794.000	-5.623	.000	Rejected
U2_P	220.000	748.000	-6.025	.000	Rejected
U3_P	353.000	881.000	-4.945	.000	Rejected
U4_P	224.000	752.000	-6.177	.000	Rejected
U5_P	355.000	883.000	-4.816	.000	Rejected

T-TEST FOR MANAGER IT/IS SKILLS NOW IN EGYPT Vs UK

MANAGER IT/IS Skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Differ-Ence	
M1_P	UK	53	.79	1.022	.315	2.904*	83	.005	.42	Rejected
	Egypt	32	.38							
M2_P	UK	53	1.13	1.605	.209	4.714*	83	.000	.69	Rejected
	Egypt	32	.44							
M3_P	UK	53	.79	.002	.967	3.732*	83	.000	.45	Rejected
	Egypt	32	.34							
M4_P	UK	53	.94	.037	.847	5.663*	83	.000	.69	Rejected
	Egypt	32	.25							

M5_P	UK	53	1.28	5.735	.019	5.857**	81.584	.000	.88	Rejected
	Egypt	32	.41							
M6_P	UK	53	.77	1.329	.252	1.823*	83	.072	.27	Supported
	Egypt	32	.50							
M7_P	UK	53	.98	.097	.756	5.346*	83	.000	.73	Rejected
	Egypt	32	.25							
M8_P	UK	53	.92	.617	.434	2.043*	83	.044	.33	Rejected
	Egypt	32	.59							
M9_P	UK	53	1.02	.266	.607	4.598*	83	.000	.64	Rejected
	Egypt	32	.38							
M10_P	UK	53	.75	5.762	.019	3.845**	81.878	.000	.47	Rejected
	Egypt	32	.28							
M11_P	UK	53	.64	4.138	.045	2.464**	77.816	.016	.30	Rejected
	Egypt	32	.34							
M12_P	UK	53	1.00	.575	.450	5.207*	83	.000	.69	Rejected
	Egypt	32	.31							
M13_P	UK	53	.83	.956	.331	2.615*	83	.011	.39	Rejected
	Egypt	32	.44							
M14_P	UK	53	.79	.059	.808	2.237*	83	.028	.32	Rejected
	Egypt	32	.47							

* t-test reported **Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

** t-test reported **Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)**

<u>Mann-Whitney U Test **FOR MANAGER IT/IS SKILLS NOW IN EGYPT Vs UK**</u>

MANAGER IT/IS SKILLS	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
M1_P	568.500	1096.500	-2.802	.005	Rejected
M2_P	421.000	949.000	-4.173	.000	Rejected
M3_P	509.500	1037.500	-3.486	.000	Rejected
M4_P	356.000	884.000	-4.962	.000	Rejected
M5_P	360.500	888.500	-4.686	.000	Rejected
M6_P	682.000	1210.000	-1.656	.098	Supported
M7_P	356.000	884.000	-4.961	.000	Rejected
M8_P	637.500	1165.500	-2.060	.039	Rejected
M9_P	422.500	950.500	-4.214	.000	Rejected
M10_P	527.000	1055.000	-3.255	.001	Rejected
M10_P	527.000	1055.000	-3.255	.001	Rejected
M11_P	637.500	1165.500	-2.164	.031	Rejected
M11_P	637.500	1165.500	-2.164	.031	Rejected
M12_P	375.000	903.000	-4.717	.000	Rejected
M12_P	375.000	903.000	-4.717	.000	Rejected
M13_P	600.500	1128.500	-2.460	.014	Rejected
M13_P	600.500	1128.500	-2.460	.014	Rejected
M14_P	622.000	1150.000	-2.264	.024	Rejected

			-2.264		

T-TEST FOR DESIGNER IT/IS SKILLS NOW IN EGYPT Vs UK

DESIGNER IT/IS SKILLS NOW	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Differ-Ence	
D1_P	UK	53	.87	.100	.752	2.644*	83	.010	.37	Rejected
	Egypt	32	.50							
D2_P	UK	53	.21	2.228	.139	-.770*	83	.444	-.07	Supported
	Egypt	32	.28							
D3_P	UK	53	.94	1.421	.237	4.422*	83	.000	.63	Rejected
	Egypt	32	.31							
D4_P	UK	53	.72	26.557	.000	5.453**	81.097	.000	.59	.Rejected
	Egypt	32	.13							
D5_P	UK	53	.87	5.154	.026	5.985**	82.984	.000	.68	Rejected
	Egypt	32	.19							
D6_P	UK	53	.92	.954	.332	4.766*	83	.000	.64	Rejected
	Egypt	32	.28							
D7_P	UK	53	.98	1.673	.199	5.911*	83	.000	.79	Rejected
	Egypt	32	.19							
D8_P	UK	53	.91	1.598	.210	6.041*	83	.000	.72	Rejected
	Egypt	32	.19							
D9_P	UK	53	.49	168.349	.000	5.231**	80.150	.000	.43	Rejected
	Egypt	32	.06							
D10_P	UK	53	.70	130.781	.000	10.099**	52.000	.000	.70	Rejected
	Egypt	32	.00							
D11_P	UK	53	.66	88.860	.000	7.663**	67.845	.000	.63	Rejected
	Egypt	32	.03							
D12_P	UK	53	.77	7.064	.009	6.237**	81.720	.000	.62	Rejected
	Egypt	32	.16							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR DESIGNER IT/IS SKILLS NOW IN EGYPT Vs UK

Designer IT/IS Skills Now	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result

D1_P	608.000	1136.000	-2.423	.015	Rejected
D2_P	785.500	2216.500	-.772	.440	Supported
D3_P	445.000	973.000	-3.991	.000	Rejected
D4_P	430.000	958.000	-4.337	.000	Rejected
D5_P	375.000	903.000	-4.764	.000	Rejected
D6_P	417.500	945.500	-4.295	.000	Rejected
D7_P	317.500	845.500	-5.260	.000	Rejected
D8_P	330.000	858.000	-5.234	.000	Rejected
D9_P	485.000	1013.000	-4.044	.000	Rejected
D10_P	272.000	800.000	-6.079	.000	Rejected
D11_P	345.500	873.500	-5.332	.000	Rejected
D12_P	365.000	893.000	-4.976	.000	Rejected

T-TEST FOR EVALUATOR IT/IS SKILLS NOW IN EGYPT Vs UK

EVALUATOR IT/IS SKILLS NOW	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Differ-Ence	
E1_P	UK	53	1.13	1.484	.227	3.662*	83	.000	.54	Rejected
	Egypt	32	.59							
E2_P	UK	53	.96	.333	.565	1.320*	83	.191	.24	Supported
	Egypt	32	.72							
E3_P	UK	53	1.00	8.042	.006	7.685**	79.513	.000	.88	Rejected
	Egypt	32	.13							
E4_P	UK	53	1.09	1.674	.199	3.472*	83	.001	.59	Rejected
	Egypt	32	.50							
E5_P	UK	53	1.04	.270	.605	3.762*	83	.000	.57	Rejected
	Egypt	32	.47							
E6_P	UK	53	1.13	.262	.610	2.397*	83	.019	.38	Rejected
	Egypt	32	.75							
E7_P	UK	53	1.17	.070	.793	5.751*	83	.000	.76	Rejected
	Egypt	32	.41							
E8_P	UK	53	1.00	.278	.599	8.512*	83	.000	.88	Rejected
	Egypt	32	.13							
E9_P	UK	53	.83	.422	.518	3.437*	83	.001	.42	Rejected
	Egypt	32	.41							
E10_P	UK	53	.98	.188	.665	4.222*	83	.000	.57	Rejected
	Egypt	32	.41							
E11_P	UK	53	.74	.094	.760	2.629*	83	.010	.33	Rejected
	Egypt	32	.41							
E12_P	UK	53	.92	.172	.680	3.151*	83	.002	.49	Rejected
	Egypt	32	.44							
E13_P	UK	53	.89	1.197	.277	3.908*	83	.000	.48	Rejected
	Egypt	32	.41							
E14_P	UK	53	.94	.057	.811	3.495*	83	.001	.51	Rejected
	Egypt	32	.44							

*** t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR EVALUATOR IT/IS SKILLS NOW IN EGYPT Vs UK

Evaluator IT/IS Skills Now	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
E1_P	499.500	1027.500	-3.452	.001	Rejected
E2_P	726.000	1254.000	-1.180	.238	Supported
E3_P	288.000	816.000	-5.556	.000	Rejected
E4_P	519.500	1047.500	-3.204	.001	Rejected
E5_P	486.500	1014.500	-3.545	.000	Rejected
E6_P	620.500	1148.500	-2.279	.023	Rejected
E7_P	352.500	880.500	-4.917	.000	Rejected
E8_P	204.000	732.000	-6.530	.000	Rejected
E9_P	536.000	1064.000	-3.220	.001	Rejected
E10_P	465.000	993.000	-3.836	.000	Rejected
E11_P	606.500	1134.500	-2.482	.013	Rejected
E12_P	547.000	1075.000	-2.981	.003	Rejected
E13_P	497.500	1025.500	-3.620	.000	Rejected
E14_P	516.500	1044.500	-3.291	.001	Rejected

APPENDIX SEVENTEEN

STATISTICS DETAILS T-TEST FOR INDEPENDENT SAMPLES AND MANN-WHITNEY U TEST FOR EACH SKILL BETWEEN USA AND UK NOW

T-TEST FOR GENERAL IT/IS SKILLS NOW IN USA Vs UK

General IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Differ-Ence	
G1_P	USA	21	1.43	.981	.325	.602*	72	.549	.11	Supported
	UK	53	1.32							
G2_P	USA	21	1.95	1.145	.288	2.370*	72	.020	.56	Rejected
	UK	53	1.40							
G3_P	USA	21	1.33	.069	.793	.674*	72	.502	.08	Supported
	UK	53	1.25							
G4_P	USA	21	1.43	.012	.914	.980*	72	.033	.15	Rejected
	UK	53	1.28							
G5_P	USA	21	1.43	.053	.818	2.521*	72	.014	.45	Rejected
	UK	53	.98							
G6_P	USA	21	1.05	2.384	.127	.925*	72	.358	.14	Supported
	UK	53	.91							
G7_P	USA	21	1.24	.294	.589	1.524*	72	.013	.26	Rejected
	UK	53	.98							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR GENERAL IT/IS SKILLS NOW IN USA Vs UK

General IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
G1_P	514.500	1945.500	-.553	.580	Supported
G2_P	368.500	1799.500	-2.369	.018	Rejected
G3_P	514.500	1945.500	-.617	.537	Supported
G4_P	483.000	1914.000	-1.027	.030	Rejected
G5_P	371.000	1802.000	-2.417	.016	Rejected
G6_P	489.000	1920.000	-.957	.339	Supported
G7_P	444.500	1875.500	-1.505	.013	Rejected

T-TEST FOR USER IT/IS SKILLS NOW IN USA Vs UK

USER IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances F	Levene's Test for Equality of Variances Sig.	t-test for Equality of Means t	df	Sig. (2-tailed)	Mean Differ-Ence	Result
U1_P	USA	21	2.14	5.294	.024	1.378**	54.861	.017	.24	Supported
	UK	53	1.91							
U2_P	USA	21	2.29	.809	.371	2.908*	72	.005	.53	Rejected
	UK	53	1.75							
U3_P	USA	21	1.00	.782	.380	.441*	72	.050	.08	Rejected
	UK	53	.92							
U4_P	USA	21	1.67	4.919	.030	.872**	48.284	.038	.12	Rejected
	UK	53	1.55							
U5_P	USA	21	1.67	9.843	.002	.522**	62.375	.603	.09	Supported
	UK	53	1.58							

* t-test reported **Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

Mann-Whitney U Test FOR USER IT/IS SKILLS NOW IN USA Vs UK

USER IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
U1_P	473.500	1904.500	-1.068	.286	Supported
U2_P	340.000	1771.000	-2.791	.005	Rejected
U3_P	522.500	1953.500	-.457	.048	Rejected
U4_P	476.000	1907.000	-1.087	.277	Rejected
U5_P	500.500	1931.500	-.728	.467	Supported

T-TEST FOR MANAGER IT/IS SKILLS NOW IN USA Vs UK

MANAGER IT/IS Skills	Country	N	Mean	Levene's Test for Equality of Variances F	Levene's Test for Equality of Variances Sig.	t-test for Equality of Means t	df	Sig. (2-tailed)	Mean Differ-ence	Result
M1_P	USA	21	.71	.064	.801	-.448*	72	.656	-.08	Supported
	UK	53	.79							
M2_P	USA	21	1.33	.188	.666	1.064*	72	.291	.20	Supported
	UK	53	1.13							
M3_P	USA	21	.71	.258	.613	-.561*	72	.576	-.08	Supported
	UK	53	.79							

M4_P	USA	21	1.05	1.097	.299	.703*	72	.484	.10	Supported
	UK	53	.94							
M5_P	USA	21	1.38	5.997	.017	.627**	59.486	.533	.09	Supported
	UK	53	1.28							
M6_P	USA	21	.62	.066	.798	-.845*	72	.401	-.15	Supported
	UK	53	.77							
M7_P	USA	21	.86	.374	.543	-.704*	72	.483	-.12	Supported
	UK	53	.98							
M8_P	USA	21	.90	3.406	.069	-.112*	72	.911	-.02	Supported
	UK	53	.92							
M9_P	USA	21	1.00	1.620	.207	-.115*	72	.908	-.02	Supported
	UK	53	1.02							
M10_P	USA	21	.86	7.150	.009	.733**	51.800	.467	.10	Supported
	UK	53	.75							
M11_P	USA	21	.81	5.408	.023	1.194**	44.491	.239	.17	Supported
	UK	53	.64							
M12_P	USA	21	1.05	1.754	.190	.282*	72	.779	.05	Supported
	UK	53	1.00							
M13_P	USA	21	.90	.514	.476	.402*	72	.689	.07	Supported
	UK	53	.83							
M14_P	USA	21	.90	.042	.838	.648*	72	.519	.11	Supported
	UK	53	.79							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR MANAGER IT/IS SKILLS NOW IN USA Vs UK

MANAGER IT/IS SKILLS	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
M1_P	526.000	757.000	-.403	.687	Supported
M2_P	472.500	1903.500	-1.087	.277	Supported
M3_P	525.000	756.000	-.456	.649	Supported
M4_P	507.000	1938.000	-.718	.473	Supported
M5_P	529.000	1960.000	-.358	.720	Supported
M6_P	494.500	725.500	-.810	.418	Supported
M7_P	513.000	744.000	-.604	.546	Supported
M8_P	553.500	784.500	-.040	.968	Supported
M9_P	547.500	778.500	-.124	.902	Supported
M9_P	547.500	778.500	-.124	.902	Supported
M10_P	495.500	1926.500	-.827	.408	Supported
M10_P	495.500	1926.500	-.827	.408	Supported
M11_P	464.500	1895.500	-1.253	.210	Supported
M11_P	464.500	1895.500	-1.253	.210	Supported
M12_P	535.000	1966.000	-.291	.771	Supported

			.291		
M13_P	523.000	1954.000	-.436	.663	Supported
M14_P	509.000	1940.000	-.630	.528	Supported

T-TEST FOR DESIGNER IT/IS SKILLS NOW IN USA Vs UK

DESIGNER IT/IS SKILLS NOW	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	
D1_P	USA	21	.86	.184	.669	-.060*	72	.952	-.01	Supported
	UK	53	.87							
D2_P	USA	21	.29	1.803	.184	.713*	72	.478	.08	Supported
	UK	53	.21							
D3_P	USA	21	1.29	.273	.603	1.958*	72	.054	.34	Supported
	UK	53	.94							
D4_P	USA	21	1.10	.135	.714	2.117*	72	.038	.38	Rejected
	UK	53	.72							
D5_P	USA	21	1.14	.605	.439	1.690*	72	.095	.27	Supported
	UK	53	.87							
D6_P	USA	21	1.10	.058	.810	.970*	72	.335	.17	Supported
	UK	53	.92							
D7_P	USA	21	1.19	.024	.878	1.253*	72	.214	.21	Supported
	UK	53	.98							
D8_P	USA	21	.90	.896	.347	-.006*	72	.996	-.01	Supported
	UK	53	.91							
D9_P	USA	21	.57	2.300	.134	.589*	72	.557	.08	Supported
	UK	53	.49							
D10_P	USA	21	.76	.793	.376	.458*	72	.648	.06	Supported
	UK	53	.70							
D11_P	USA	21	.67	.973	.327	.046*	72	.964	.01	Supported
	UK	53	.66							
D12_P	USA	21	.48	.785	.379	-2.160*	72	.034	-.30	Rejected
	UK	53	.77							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR DESIGNER IT/IS SKILLS NOW IN USA Vs UK

Designer IT/IS Skills Now	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
D1_P	550.000	781.000	-.086	.932	**Supported**
D2_P	513.000	1944.000	-.716	.474	**Supported**
D3_P	412.500	1843.500	-1.899	.058	**Supported**
D4_P	404.500	1835.500	-1.982	.047	**Rejected**
D5_P	433.000	1864.000	-1.685	.092	**Supported**
D6_P	483.500	1914.500	-.968	.333	**Supported**
D7_P	465.000	1896.000	-1.238	.216	**Supported**
D8_P	553.000	784.000	-.048	.962	**Supported**
D9_P	525.000	1956.000	-.433	.665	**Supported**
D10_P	534.500	1965.500	-.313	.754	**Supported**
D11_P	546.000	1977.000	-.148	.883	**Supported**
D12_P	407.500	638.500	-2.088	.037	**Rejected**

T-TEST FOR EVALUATOR IT/IS SKILLS NOW IN USA Vs UK

EVALUATOR IT/IS SKILLS NOW	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	
E1_P	USA	21	1.24	.305	.583	.661*	72	.511	.11	Supported
	UK	53	1.13							
E2_P	USA	21	1.14	2.379	.127	.853*	72	.396	.18	Supported
	UK	53	.96							
E3_P	USA	21	1.05	1.273	.263	.251*	72	.802	.05	Supported
	UK	53	1.00							
E4_P	USA	21	1.29	2.949	.090	.808*	72	.422	.19	Supported
	UK	53	1.09							
E5_P	USA	21	1.05	1.038	.312	.052*	72	.959	.01	Supported
	UK	53	1.04							
E6_P	USA	21	1.57	.075	.785	2.309*	72	.024	.44	Rejected
	UK	53	1.13							
E7_P	USA	21	1.52	.001	.978	2.254*	72	.027	.35	Rejected
	UK	53	1.17							
E8_P	USA	21	.86	7.295	.009	-.821**	28.442	.418	-.14	Supported
	UK	53	1.00							
E9_P	USA	21	.76	2.179	.144	-.430*	72	.668	-.07	Supported
	UK	53	.83							
E10_P	USA	21	.86	1.078	.303	-.704*	72	.483	-.12	Supported
	UK	53	.98							
E11_P	USA	21	1.00	12.486	.001	2.078**	48.538	.043	.26	Rejected
	UK	53	.74							
E12_P	USA	21	.90	2.785	.100	-.094*	72	.925	-.02	Supported
	UK	53	.92							
E13_P	USA	21	.86	2.502	.118	-.185*	72	.854	.03	Supported
	UK	53	.89							
E14_P	USA	21	1.29	.166	.685	1.958*	72	.054	.34	Supported
	UK	53	.94							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR EVALUATOR IT/IS SKILLS NOW IN USA Vs UK

Evaluator IT/IS Skills Now	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
E1_P	514.000	1945.000	-.582	.560	Supported
E2_P	475.500	1906.500	-1.033	.301	Supported
E3_P	536.500	1967.500	-.259	.796	Supported
E4_P	502.500	1933.500	-.681	.496	Supported
E5_P	551.000	1982.000	-.071	.943	Supported
E6_P	389.000	1820.000	-2.207	.027	Rejected
E7_P	398.000	1829.000	-2.134	.033	Rejected
E8_P	487.500	718.500	-.989	.323	Supported
E9_P	517.500	748.500	-.536	.592	Supported
E10_P	502.000	733.000	-.723	.470	Supported
E11_P	423.500	1854.500	-1.897	.058	Supported
E12_P	533.500	764.500	-.295	.768	Supported
E13_P	537.000	768.000	-.269	.788	Supported
E14_P	411.000	1842.000	-1.919	.055	Supported

APPENDIX EIGHTEEN

STATISTICS DETAILS T-TEST FOR INDEPENDENT SAMPLES AND MANN-WHITNEY U TEST FOR EACH SKILL BETWEEN DEVELOPED COUNTRIES(USA & UK) AND DEVELOPING COUNTRY (EGYPT) NOW

T-TEST FOR GENERAL IT/IS SKILLS NOW IN DEVELOPING COUNTRY Vs DEVELOPED COUNTRY

General IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	
G1_P	developed	74	1.35	.586	.446	3.235*	104	.002	.48	Rejected
	developing	32	.88							
G2_P	Developed	74	1.55	5.977	.016	6.163**	81.222	.000	.99	Rejected
	developing	32	.56							
G3_P	developed	74	1.27	5.906	.017	5.008**	74.181	.000	.46	Rejected
	developing	32	.81							
G4_P	developed	74	1.32	1.167	.283	6.112*	104	.000	.76	Rejected
	developing	32	.56							
G5_P	developed	74	1.11	.620	.433	4.818*	104	.000	.67	Rejected
	developing	32	.44							
G6_P	developed	74	.95	.062	.803	5.642*	104	.000	.66	Rejected
	developing	32	.28							
G7_P	developed	74	1.05	.147	.703	3.762*	104	.000	.49	Rejected
	developing	32	.56							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR GENERAL IT/IS SKILLS NOW IN DEVELOPING COUNTRY Vs DEVELOPED COUNTRY

General IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
G1_P	774.000	1302.000	-3.060	.002	Rejected
G2_P	505.500	1033.500	-4.889	.000	Rejected

G3_P	708.000	1236.000	-4.153	.000	Rejected
G4_P	502.000	1030.000	-5.230	.000	Rejected
G5_P	597.000	1125.000	-4.369	.000	Rejected
G6_P	523.500	1051.500	-5.090	.000	Rejected
G7_P	728.000	1256.000	-3.519	.000	Rejected

T-TEST FOR USER IT/IS SKILLS NOW IN DEVELOPING COUNTRY Vs DEVELOPED COUNTRY

USER IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	
U1_P	developed	74	1.97	3.524	.063	7.860*	104	.000	1.19	Rejected
	developing	32	.78							
U2_P	Developed	74	1.91	.086	.770	8.958*	104	.000	1.34	Rejected
	developing	32	.56							
U3_P	developed	74	.95	3.118	.080	6.038*	104	.000	.76	Rejected
	developing	32	.19							
U4_P	developed	74	1.58	1.568	.213	8.935*	104	.000	1.08	Rejected
	developing	32	.50							
U5_P	developed	74	1.61	2.964	.088	6.311*	104	.000	.95	Rejected
	developing	32	.66							

* t-test reported **Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

Mann-Whitney U Test FOR USER IT/IS SKILLS NOW IN DEVELOPING COUNTRY Vs DEVELOPED COUNTRY

USER IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
U1_P	298.000	826.000	-6.432	.000	Rejected
U2_P	249.000	777.000	-6.744	.000	Rejected
U3_P	468.000	996.000	-5.398	.000	Rejected
U4_P	280.000	808.000	-6.751	.000	Rejected
U5_P	442.500	970.500	-5.472	.000	Rejected

T-TEST FOR MANAGER IT/IS SKILLS NOW IN DEVELOPING COUNTRY Vs DEVELOPED COUNTRY

MANAGER IT/IS Skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Differ-ence	
M1_P	developed	74	.77	.990	.322	2.919*	104	.004	.40	Rejected
	developing	32	.38							
M2_P	developed	74	1.19	2.948	.089	5.272*	104	.000	.75	Rejected
	developing	32	.44							
M3_P	developed	74	.77	.059	.808	3.864*	104	.000	.43	Rejected
	developing	32	.34							
M4_P	developed	74	.97	.152	.697	6.368*	104	.000	.72	Rejected
	developing	32	.25							
M5_P	developed	74	1.31	3.009	.086	6.193*	104	.000	.90	Rejected
	developing	32	.41							
M6_P	developed	74	.73	1.507	.222	1.622*	104	.108	.23	Supported
	developing	32	.50							
M7_P	Developed	74	.95	.388	.535	5.318*	104	.000	.70	Rejected
	developing	32	.25							
M8_P	developed	74	.92	2.292	.133	2.234*	104	.028	.33	Supported
	developing	32	.59							
M9_P	Developed	74	1.01	1.046	.309	4.961*	104	.000	.64	Rejected
	developing	32	.38							
M10_P	developed	74	.78	2.364	.127	4.094*	104	.000	.50	Rejected
	developing	32	.28							
M11_P	Developed	74	.69	1.790	.184	2.895*	104	.005	.35	Rejected
	developing	32	.34							
M12_P	developed	74	1.01	.060	.807	5.352*	104	.000	.70	Rejected
	developing	32	.31							
M13_P	Developed	74	.85	.511	.476	2.902*	104	.005	.41	Rejected
	developing	32	.44							
M14_P	developed	74	.82	.082	.775	2.564*	104	.012	.36	Rejected
	developing	32	.47							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR MANAGER IT/IS SKILLS NOW IN DEVELOPING COUNTRY Vs DEVELOPED COUNTRY

MANAGER IT/IS SKILLS	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
M1_P	807.500	1335.500	-2.863	.004	Rejected

M2_P	546.000	1074.000	-4.701	.000	Rejected
M3_P	721.000	1249.000	-3.664	.000	Rejected
M4_P	460.000	988.000	-5.597	.000	Rejected
M5_P	449.000	977.000	-5.382	.000	Rejected
M6_P	990.000	1518.000	-1.471	.141	Supported
M7_P	524.000	1052.000	-5.049	.000	Rejected
M8_P	878.000	1406.000	-2.296	.022	Supported
M9_P	578.500	1106.500	-4.599	.000	Rejected
M10_P	681.000	1209.000	-3.868	.000	Rejected
M11_P	827.500	1355.500	-2.772	.006	Rejected
M12_P	530.500	1058.500	-4.911	.000	Rejected
M13_P	814.500	1342.500	-2.777	.005	Rejected
M14_P	843.500	1371.500	-2.577	.010	Rejected

T-TEST FOR DESIGNER IT/IS SKILLS NOW IN DEVELOPING COUNTRY Vs DEVELOPED COUNTRY

DESIGNER IT/IS SKILLS NOW	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	
D1_P	developed	74	.86	.248	.620	2.693*	104	.008	.36	Rejected
	developing	32	.50							
D2_P	developed	74	.23	1.165	.283	-.561*	104	.576	-.05	Supported
	developing	32	.28							
D3_P	developed	74	1 04	.516	.474	5.431*	104	.000	.73	Rejected
	developing	32	.31							
D4_P	developed	74	.82	21.793	.000	6.882**	103.062	.000	.70	Rejected
	developing	32	13							
D5_P	developed	74	.95	2.215	.140	6.210*	104	.000	.76	Rejected
	developing	32	19							
D6_P	developed	74	.97	.595	.442	5.245*	104	.000	.69	Rejected
	developing	32	.23							
D7_P	developed	74	1 04	1 783	.185	6.682*	104	000	.85	Rejected
	developing	32	19							
D8_P	developed	74	.91	2.636	.104	6.004*	104	000	.72	Rejected
	developing	32	19							
D9_P	developed	74	.51	151.518	.000	5.983**	103 410	000	.45	Rejected
	developing	32	06							
D10_P	developed	74	72	98.917	.000	11.476**	73 000	000	72	Rejected
	developing	32	.00							
D11_P	developed	74	.66	100.543	.000	9 124**	99.800	.000	.63	Rejected
	developing	32	.03							
D12_P	developed	74	.69	17.427	.000	5.851**	85.261	.000	.53	Rejected
	developing	32	16							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR DESIGNER IT/IS SKILLS NOW IN DEVELOPING COUNTRY Vs DEVELOPED COUNTRY

Designer IT/IS Skills Now	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
D1_P	856.000	1384.000	-2.499	.012	Rejected
D2_P	1123.000	3898.000	-.563	.573	Supported
D3_P	531.000	1059.000	-4.876	.000	Rejected
D4_P	538.000	1066.000	-4.921	.000	Rejected
D5_P	455.000	983.000	-5.518	.000	Rejected
D6_P	549.000	1077.000	-4.768	.000	Rejected
D7_P	396.500	924.500	-5.878	.000	Rejected
D8_P	477.000	1005.000	-5.386	.000	Rejected
D9_P	665.000	1193.000	-4.265	.000	Rejected
D10_P	384.000	912.000	-6.293	.000	Rejected
D11_P	468.000	996.000	-5.673	.000	Rejected
D12_P	593.500	1121.500	-4.631	.000	Rejected

T-TEST FOR EVALUATOR IT/IS SKILLS NOW IN DEVELOPING COUNTRY Vs DEVELOPED COUNTRY

EVALUATOR IT/IS SKILLS NOW	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	
E1_P	UK+USA	74	1.16	2.360	.128	4.239*	104	.000	.57	Rejected
	Egypt	32	.59							
E2_P	UK+USA	74	1.01	.021	.885	1.756*	104	.082	.29	Supported
	Egypt	32	.72							
E3_P	UK+USA	74	1.01	11.539	.001	8.571**	103.546	.000	.89	Rejected
	Egypt	32	.13							
E4_P	UK+USA	74	1.15	4.469	.037	4.430**	91.104	.000	.65	Rejected
	Egypt	32	.50							
E5_P	UK+USA	74	1.04	.018	.894	3.865*	104	.000	.57	Rejected
	Egypt	32	.47							
E6_P	UK+USA	74	1.26	1.154	.285	3.320*	104	.001	.51	Rejected
	Egypt	32	.75							
E7_P	UK+USA	74	1.27	.739	.392	6.911*	104	.000	.86	Rejected
	Egypt	32	.41							

E8_P	UK+USA	74	.96	2.830	.096	7.550*	104_	.000	.83	Rejected
	Egypt	32	.13							
E9_P	UK+USA	74	.81	.000	.996	3.293*	104	.001	.40	Rejected
	Egypt	32	.41							
E10_P	UK+USA	74	.95	.002	.969	4.038*	104	.000	.54	Rejected
	Egypt	32	.41							
E11_P	UK+USA	74	.81	.481	.489	3.498*	104	.001	.40	Rejected
	Egypt	32	.41							
E12_P	UK+USA	74	.92	1.180	.280	3.063*	104	.003	.48	Rejected
	Egypt	32	.44							
E13_P	UK+USA	74	.88	.174	.677	3.813*	104	.000	.47	Rejected
	Egypt	32	.41							
E14_P	UK+USA	74	1.04	.092	.762	4.345*	104	.000	.60	Rejected
	Egypt	32	.44							

* t-test reported **Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

** t-test reported **Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)**

Mann-Whitney U Test FOR EVALUATOR IT/IS SKILLS NOW IN DEVELOPING COUNTRY Vs DEVELOPED COUNTRY

Evaluator IT/IS Skills Now	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
E1_P	665.500	1193.500	-3.941	.000	Rejected
E2_P	954.000	1482.000	-1.689	.091	Supported
E3_P	412.000	940.000	-5.741	.000	Rejected
E4_P	711.500	1239.500	-3.459	.001	Rejected
E5_P	688.500	1216.500	-3.665	.000	Rejected
E6_P	764.500	1292.500	-3.178	.001	Rejected
E7_P	417.500	945.500	-5.743	.000	Rejected
E8_P	350.000	878.000	-6.370	.000	Rejected
E9_P	781.000	1309.000	-3.128	.002	Rejected
E10_P	687.500	1215.500	-3.759	.000	Rejected
E11_P	762.000	1290.000	-3.332	.001	Rejected
E12_P	794.000	1322.000	-2.905	.004	Rejected
E13_P	720.000	1248.000	-3.594	.000	Rejected
E14_P	642.500	1170.500	-4.052	.000	Rejected

APPENDIX NINETEEN

STATISTICS DETAILS T-TEST FOR INDEPENDENT SAMPLES AND MANN-WHITNEY U TEST FOR EACH SKILL BETWEEN USA AND EGYPT FUTURE

T-TEST FOR GENERAL IT/IS SKILLS AT FUTURE IN EGYPT Vs USA

General IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	
G1_F	USA	21	2.62	.005	.946	2.150*	51	.036	.40	Rejected
	Egypt	32	2.22							
G2_F	USA	21	2.67	2.698	.107	3.309*	51	.002	.57	Rejected
	Egypt	32	2.09							
G3_F	USA	21	2.62	.223	.639	.135*	51	.893	.03	Supported
	Egypt	32	2.59							
G4_F	USA	21	2.76	7.468	.009	2.589**	49.375	.013	.36	Rejected
	Egypt	32	2.41							
G5_F	USA	21	2.81	3.941	.053	1.896*	51	.044	.31	Rejected
	Egypt	32	2.50							
G6_F	USA	21	2.76	.514	.477	.494*	51	.624	.07	Supported
	Egypt	32	2.69							
G7_F	USA	21	2.33	3.058	.086	1.907*	51	.042	.36	Rejected
	Egypt	32	1.97							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR GENERAL IT/IS SKILLS AT FUTURE IN EGYPT Vs USA

General IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
G1_F	220.500	748.500	-2.321	.020	Rejected
G2_F	160.000	688.000	-3.525	.000	Rejected

G3_F	312.000	840.000	-.541	.588	Supported
G4_F	224.500	752.500	-2.345	.019	Rejected
G5_F	224.500	752.500	-2.480	.013	Rejected
G6_F	308.000	836.000	-.680	.497	Supported
G7_F	239.500	767.500	-1.922	.040	Rejected

T-TEST FOR USER IT/IS SKILLS AT FUTURE IN EGYPT Vs USA

USER IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	
U1_F	USA	21	2.86	1.996	.164	.681*	51	.499	.08	Supported
	Egypt	32	2.78							
U2_F	USA	21	2.86	9.690	.003	1.485**	49.766	.044	.17	Rejected
	Egypt	32	2.69							
U3_F	USA	21	2.48	.014	.907	2.410*	51	.020	.48	Rejected
	Egypt	32	2.00							
U4_F	USA	21	2.76	1.437	.236	.579*	51	.565	.07	Supported
	Egypt	32	2.69							
U5_F	USA	21	2.81	4.310	.043	1.008**	47.405	.018	.12	Rejected
	Egypt	32	2.69							

* t-test reported **Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

** t-test reported **Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)**

Mann-Whitney U Test FOR USER IT/IS SKILLS AT FUTURE IN EGYPT Vs USA

USER IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
U1_F	310.500	838.500	-.684	.494	Supported
U2_F	279.000	807.000	-1.391	.046	Rejected
U3_F	221.000	749.000	-2.258	.024	Rejected
U4_F	311.000	839.000	-.583	.560	Supported
U5_F	295.000	823.000	-.976	.039	Rejected

T-TEST FOR MANAGER IT/IS SKILLS AT FUTURE IN EGYPT Vs USA

MANAGER IT/IS Skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	
M1_F	USA	21	1.57	.155	.695	-.356*	51	.723	-.06	Supported
	Egypt	32	1.63							
M2_F	USA	21	2.43	11.763	.001	2.022**	32.909	.041	.30	Rejected
	Egypt	32	2.13							
M3_F	USA	21	2.00	2.519	.119	.686*	51	.049	.13	Rejected
	Egypt	32	1.88							
M4_F	USA	21	2.19	.543	.465	1.074*	51	.288	.16	Supported
	Egypt	32	2.03							
M5_F	USA	21	2.33	1.158	.287	1.461*	51	.015	.24	Rejected
	Egypt	32	2.09							
M6_F	USA	21	1.90	1.324	.255	1.353*	51	.018	.22	Rejected
	Egypt	32	1.69							
M7_F	USA	21	1.86	1.107	.298	.234*	51	.816	.05	Supported
	Egypt	32	1.81							
M8_F	USA	21	1.95	1.215	.275	.894*	51	.037	.14	Rejected
	Egypt	32	1.81							
M9_F	USA	21	2.10	2.378	.129	.980*	51	.033	.13	Rejected
	Egypt	32	1.97							
M10_F	USA	21	1.95	1.656	.204	.317*	51	.752	.04	Supported
	Egypt	32	1.91							
M11_F	USA	21	1.90	.058	.811	-.268*	51	.790	-.04	Supported
	Egypt	32	1.94							
M12_F	USA	21	2.24	.204	.654	-.313*	51	.755	-.04	Supported
	Egypt	32	2.28							
M13_F	USA	21	2.19	.008	.931	-1.222*	51	.022	-.18	Rejected
	Egypt	32	2.38							
M14_F	USA	21	2.43	3.519	.066	1.099*	51	.027	.15	Rejected
	Egypt	32	2.28							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR MANAGER IT/IS SKILLS AT FUTURE IN EGYPT Vs USA

MANAGER IT/IS SKILLS	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
M1_F	322.500	553.500	-.284	.776	Supported
M2_F	236.500	764.500	-2.220	.026	Rejected
M3_F	307.500	835.500	-.608	.043	Rejected
M4_F	290.000	818.000	-1.059	.029	Rejected
M5_F	268.000	796.000	-1.442	.014	Rejected
M6_F	262.000	790.000	-1.642	.010	Rejected
M7_F	318.500	846.500	-.360	.719	Supported
M8_F	283.000	811.000	-1.248	.021	Rejected
M9_F	297.500	825.500	-.990	.032	Rejected
M10_F	309.000	837.000	-.694	.488	Supported
M11_F	326.000	557.000	-.267	.789	Supported
M12_F	326.000	557.000	-.228	.820	Supported
M13_F	286.000	517.000	-1.072	.028	Rejected
M14_F	286.500	814.500	-1.097	.027	Rejected

T-TEST FOR DESIGNER IT/IS SKILLS AT FUTURE IN EGYPT Vs USA

DESIGNER IT/IS SKILLS NOW	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	
D1_F	USA	21	2.00	.015	.904	.551*	51	.584	.09	Supported
	Egypt	32	1.91							
D2_F	USA	21	.57	5.309	.025	-1.320**	38.567	.195	-.18	Supported
	Egypt	32	.75							
D3_F	USA	21	2.76	3.719	.059	5.999*	51	.000	.98	Rejected
	Egypt	32	1.78							
D4_F	USA	21	2.71	3.249	.077	6.685*	51	.000	1.18	Rejected
	Egypt	32	1.53							
D5_F	USA	21	2.67	1.476	.230	3.743*	51	.000	.73	Rejected
	Egypt	32	1.94							
D6_F	USA	21	2.67	3.554	.065	6.562*	51	.000	1.35	Rejected
	Egypt	32	1.31							
D7_F	USA	21	2.38	.314	.578	7.346*	51	.000	1.32	Rejected
	Egypt	32	1.06							

D8_F	USA	21	1.95	.013	.909	5.402*	51 -	.000	1.01	Rejected
	Egypt	32	.94							
D9_F	USA	21	1.48	.077	.783	2.188*	51	.033	.41	Rejected
	Egypt	32	1.06							
D10_F	USA	21	2.14	.028	.869	6.470*	51	.000	1.21	Rejected
	Egypt	32	.94							
D11_F	USA	21	1.81	.097	.756	4.403*	51	.000	.78	Rejected
	Egypt	32	1.03							
D12_F	USA	21	1.57	.579	.450	2.598*	51	.012	.48	Rejected
	Egypt	32	1.09							

* t-test reported **Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

** t-test reported **Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)**

Mann-Whitney U Test FOR DESIGNER IT/IS SKILLS AT FUTURE IN EGYPT Vs USA

Designer IT/IS Skills Now	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
D1_F	310.500	838.500	-.545	.586	Supported
D2_F	276.000	507.000	-1.349	.177	Supported
D3_F	94.500	622.500	-4.719	.000	Rejected
D4_F	75.500	603.500	-5.009	.000	Rejected
D5_F	164.500	692.500	-3.375	.001	Rejected
D6_F	72.500	600.500	-5.006	.000	Rejected
D7_F	61.000	589.000	-5.266	.000	Rejected
D8_F	111.000	639.000	-4.373	.000	Rejected
D9_F	226.500	754.500	-2.202	.028	Rejected
D10_F	81.000	609.000	-4.904	.000	Rejected
D11_F	144.500	672.500	-3.799	.000	Rejected
D12_F	217.500	745.500	-2.360	.018	Rejected

T-TEST FOR EVALUATOR IT/IS SKILLS AT FUTURE IN EGYPT Vs USA

EVALUATOR IT/IS SKILLS NOW	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	

E1_F	USA	21	2.52	1.655	.204	1.914*	51 –	.061	.27	Supportec
	Egypt	32	2.25							
E2_F	USA	21	2.90	7.053	.011	6.193**	49.054	.000	.75	Rejected
	Egypt	32	2.16							
E3_F	USA	21	2.57	1.238	.271	2.255*	51	.028	.32	Rejected
	Egypt	32	2.25							
E4_F	USA	21	2.57	.482	.491	1.090*	51	.281	.17	Supportec
	Egypt	32	2.41							
E5_F	USA	21	2.57	.000	.985	2.200*	51	.032	.35	Rejected
	Egypt	32	2.22							
E6_F	USA	21	2.62	.000	.986	2.096*	51	.041	.31	Rejected
	Egypt	32	2.31							
E7_F	USA	21	2.62	.142	.708	2.345*	51	.023	.34	Rejected
	Egypt	32	2.28							
E8_F	USA	21	2.48	2.812	.100	2.218*	51	.031	.32	Rejected
	Egypt	32	2.16							
E9_F	USA	21	2.48	5.333	.025	3.771**	42.464	.000	.54	Rejected
	Egypt	32	1.94							
E10_F	USA	21	2.71	.001	.982	3.693*	51	.001	.53	Rejected
	Egypt	32	2.19							
E11_F	USA	21	2.48	.788	.379	1.339*	51	.187	.19	Supportec
	Egypt	32	2.28							
E12_F	USA	21	2.52	.692	.410	2.023*	51	.048	.31	Rejected
	Egypt	32	2.22							
E13_F	USA	21	2.52	.328	.569	1.466*	51	.149	.24	Supportec
	Egypt	32	2.28							
E14_F	USA	21	2.95	132.34	.000	4.765**	45.368	.000	.48	Rejected
	Egypt	32	2.47							

* t-test reported **Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

** t-test reported **Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)**

Mann-Whitney U Test FOR EVALUATOR IT/IS SKILLS AT FUTURE IN EGYPT Vs USA

Evaluator IT/IS Skills Now	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
E1_F	249.500	777.500	-1.846	.065	Supported
E2_F	113.000	641.000	-4.574	.000	Rejected
E3_F	234.000	762.000	-2.159	.031	Rejected
E4_F	286.500	814.500	-1.030	.303	Supported
E5_F	235.500	763.500	-2.068	.039	Rejected

E6_F	239.500	767.500	-2.013	.044	Rejected
E7_F	229.000	757.000	-2.240	.025	Rejected
E8_F	238.500	766.500	-2.114	.034	Rejected
E9_F	180.000	708.000	-3.399	.001	Rejected
E10_F	174.000	702.000	-3.355	.001	Rejected
E11_F	275.500	803.500	-1.291	.197	Supported
E12_F	244.500	772.500	-1.926	.054	Supported
E13_F	271.000	799.000	-1.333	.182	Supported
E14_F	173.500	701.500	-3.602	.000	Rejected

APPENDIX TWENTY

STATISTICS DETAILS T-TEST FOR INDEPENDENT SAMPLES AND MANN-WHITNEY U TEST FOR EACH SKILL BETWEEN UK AND EGYPT FUTURE

T-TEST FOR GENERAL IT/IS SKILLS AT FUTURE IN EGYPT Vs UK

General IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	
G1_F	UK	53	2.66	1.388	.242	3.436*	83	.001	.44	Rejected
	Egypt	32	2.22							
G2_F	UK	53	2.51	8.752	.004	3.474**	66.579	.001	.42	Rejected
	Egypt	32	2.09							
G3_F	UK	53	2.68	.409	.524	.622*	83	.535	.08	Supported
	Egypt	32	2.59							
G4_F	UK	53	2.79	14.803	.000	3.392**	51.074	.001	.39	Rejected
	Egypt	32	2.41							
G5_F	UK	53	2.60	.220	.641	.818*	83	.041	.10	Rejected
	Egypt	32	2.50							
G6_F	UK	53	2.62	2.056	.155	-.444*	83	.658	-.07	Supported
	Egypt	32	2.69							
G7_F	UK	53	2.36	6.849	.011	2.553**	72.153	.013	.39	Rejected
	Egypt	32	1.97							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR GENERAL IT/IS SKILLS AT FUTURE IN EGYPT Vs UK

General IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
G1_F	540.000	1068.000	-3.179	.001	Rejected
G2_F	534.500	1062.500	-3.247	.001	Rejected
G3_F	773.500	1301.500	-.858	.391	Supported

G4_F	541.500	1069.500	-3.375	.001	Rejected
G5_F	760.000	1288.000	-.931	.035	Rejected
G6_F	842.500	1370.500	-.065	.948	Supported
G7_F	588.000	1116.000	-2.553	.011	Rejected

T-TEST FOR USER IT/IS SKILLS AT FUTURE IN EGYPT Vs UK

USER IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	
U1_F	UK	53	2.92	15.408	.000	1.731**	46.293	.090	.14	Supported
	Egypt	32	2.78							
U2_F	UK	53	2.70	.004	.949	.096*	83	.923	.01	Supported
	Egypt	32	2.69							
U3_F	UK	53	2.43	.428	.515	2.693*	83	.009	.43	Rejected
	Egypt	32	2.00							
U4_F	UK	53	2.74	.328	.568	.449*	83	.654	.05	Supported
	Egypt	32	2.69							
U5_F	UK	53	2.60	3.721	.057	-.607*	83	.546	-.09	Supported
	Egypt	32	2.69							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR USER IT/IS SKILLS AT FUTURE IN EGYPT Vs UK

USER IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
U1_F	726.500	1254.500	-1.895	.058	Supported
U2_F	828.000	1356.000	-.229	.819	Supported
U3_F	583.500	1111.500	-2.599	.009	Rejected
U4_F	796.000	1324.000	-.612	.541	Supported
U5_F	843.000	2274.000	-.057	.955	Supported

T-TEST FOR MANAGER IT/IS SKILLS AT FUTURE IN EGYPT Vs UK

MANAGER IT/IS Skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Differ-Ence	
M1_F	UK	53	2.00	.224	.637	2.369*	83	.020	.38	Rejected
	Egypt	32	1.63							
M2_F	UK	53	2.23	11.594	.001	.764**	81.790	.447	.10	Supported
	Egypt	32	2.13							
M3_F	UK	53	2.21	.055	.816	2.314*	83	.023	.33	Rejected
	Egypt	32	1.88							
M4_F	UK	53	2.38	10.382	.002	2.759**	70.776	.007	.35	Rejected
	Egypt	32	2.03							
M5_F	UK	53	2.51	3.673	.059	3.320*	83	.001	.42	Rejected
	Egypt	32	2.09							
M6_F	UK	53	2.02	3.924	.051	1.804*	83	.045	.33	Rejected
	Egypt	32	1.69							
M7_F	UK	53	2.17	.377	.541	2.833*	83	.006	.36	Rejected
	Egypt	32	1.81							
M8_F	UK	53	1.94	2.041	.157	.771*	83	.043	.13	Rejected
	Egypt	32	1.81							
M9_F	UK	53	2.04	4.911	.029	.561**	82.359	.577	.07	Supported
	Egypt	32	1.97							
M10_F	UK	53	1.89	2.410	.124	-.125*	83	.901	-.02	Supported
	Egypt	32	1.91							
M11_F	UK	53	2.09	2.523	.116	1.348*	83	.011	.16	Rejected
	Egypt	32	1.94							
M12_F	UK	53	2.30	.831	.365	.190*	83	.850	.02	Supported
	Egypt	32	2.28							
M13_F	UK	53	2.11	.193	.662	-2.057*	83	.043	-.26	Rejected
	Egypt	32	2.38							
M14_F	UK	53	2.26	3.709	.058	-.134*	83	.893	-.02	Supported
	Egypt	32	2.28							

* t-test reported **Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

** t-test reported **Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)**

Mann-Whitney U Test FOR MANAGER IT/IS SKILLS AT FUTURE IN EGYPT Vs UK

MANAGER IT/IS SKILLS	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
M1_F	566.000	1094.000	-2.910	.004	Rejected
M2_F	711.000	1239.000	-1.442	.149	Supported
M3_F	641.500	1169.500	-2.140	.032	Rejected

M4_F	593.000	1121.000	-2.653	.008	Rejected
M5_F	548.000	1076.000	-3.078	.002	Rejected
M6_F	612.500	1140.500	-2.299	.022	Rejected
M7_F	597.500	1125.500	-2.708	.007	Rejected
M8_F	718.000	1246.000	-1.340	.018	Rejected
M9_F	757.000	1285.000	-1.044	.297	Supported
M10_F	823.000	1351.000	-.270	.787	Supported
M11_F	731.000	1259.000	-1.362	.017	Rejected
M12_F	826.000	1354.000	-.247	.805	Supported
M13_F	668.000	2099.000	-1.909	.046	Rejected
M14_F	840.000	1368.000	-.085	.933	Supported

T-TEST FOR DESIGNER IT/IS SKILLS AT FUTURE IN EGYPT Vs UK

DESIGNER IT/IS SKILLS NOW	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	T	df	Sig. (2-tailed)	Mean Differ-Ence	
D1_F	UK	53	1.94	.098	.755	.254*	83	.800	.03	Supported
	Egypt	32	1.91							
D2_F	UK	53	.70	4.841	.031	-.439*	83	.662	-.05	Supported
	Egypt	32	.75							
D3_F	UK	53	2.09	1.271	.263	1.839*	83	.049	.31	Rejected
	Egypt	32	1.78							
D4_F	UK	53	2.30	.041	.839	5.146*	83	.000	.77	Rejected
	Egypt	32	1.53							
D5_F	UK	53	1.98	.108	.743	.231*	83	.818	.04	Supported
	Egypt	32	1.94							
D6_F	UK	53	2.09	.473	.494	4.438*	83	.000	.78	Rejected
	Egypt	32	1.31							
D7_F	UK	53	1.92	2.237	.139	5.086*	83	.000	.86	Rejected
	Egypt	32	1.06							
D8_F	UK	53	1.83	.441	.508	5.945*	83	.000	.89	Rejected
	Egypt	32	.94							
D9_F	UK	53	1.53	.072	.789	3.113*	83	.003	.47	Rejected
	Egypt	32	1.06							
D10_F	UK	53	1.60	1.946	.167	4.485*	83	.000	.67	Rejected
	Egypt	32	.94							
D11_F	UK	53	1.58	1.380	.243	4.270*	83	.000	.55	Rejected
	Egypt	32	1.03							
D12_F	UK	53	1.72	.982	.325	4.384*	83	.000	.62	Rejected
	Egypt	32	1.09							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR DESIGNER IT/IS SKILLS AT FUTURE IN EGYPT Vs UK

Designer IT/IS Skills Now	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
D1_F	803.000	1331.000	-.481	.631	Supported
D2_F	792.000	2223.000	-.608	.543	Supported
D3_F	650.500	1178.500	-1.919	.045	Rejected
D4_F	388.000	916.000	-4.484	.000	Rejected
D5_F	812.000	1340.000	-.349	.727	Supported
D6_F	443.000	971.000	-3.880	.000	Rejected
D7_F	389.000	917.000	-4.420	.000	Rejected
D8_F	339.000	867.000	-4.965	.000	Rejected
D9_F	546.500	1074.500	-2.997	.003	Rejected
D10_F	448.000	976.000	-3.963	.000	Rejected
D11_F	481.000	1009.000	-3.714	.000	Rejected
D12_F	475.000	1003.000	-3.735	.000	Rejected

T-TEST FOR EVALUATOR IT/IS SKILLS AT FUTURE IN EGYPT Vs UK

EVALUATOR IT/IS SKILLS NOW	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	T	df	Sig. (2-tailed)	Mean Differ-Ence	
E1_F	UK	53	2.36	9.514	.003	.819**	80.481	.415	.11	Supported
	Egypt	32	2.25							
E2_F	UK	53	2.34	8.938	.004	1.088**	82.959	.280	.18	Supported
	Egypt	32	2.16							
E3_F	UK	53	2.19	2.921	.091	-.404*	83	.687	.06	Supported
	Egypt	32	2.25							
E4_F	UK	53	2.25	1.883	.174	-.950*	83	.345	-.16	Supported
	Egypt	32	2.41							
E5_F	UK	53	2.30	1.499	.224	.575*	83	.567	.08	Supported
	Egypt	32	2.22							
E6_F	UK	53	2.25	3.081	.083	-.429*	83	.669	-.06	Supported
	Egypt	32	2.31							

E7_F	UK	53	2.32	4.568	.036	.302**	77.703	.763	.04	Supported
	Egypt	32	2.28							
E8_F	UK	53	2.30	3.346	.071	1.058*	83	.293	.15	Supported
	Egypt	32	2.16							
E9_F	UK	53	2.25	4.413	.039	2.632**	70.154	.010	.31	Rejected
	Egypt	32	1.94							
E10_F	UK	53	2.42	5.120	.026	1.665**	79.262	.100	.23	Supported
	Egypt	32	2.19							
E11_F	UK	53	2.30	1.179	.281	.154*	83	.878	.02	Supported
	Egypt	32	2.28							
E12_F	UK	53	2.26	4.121	.046	.323**	79.043	.748	.04	Supported
	Egypt	32	2.22							
E13_F	UK	53	2.38	.731	.395	.754*	83	.453	.1	Supported
	Egypt	32	2.28							
E14_F	UK	53	2.55	.741	.392	.592*	83	.556	.08	Supported
	Egypt	32	2.47							

* t-test reported **Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

** t-test reported **Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)**

Mann-Whitney U Test FOR EVALUATOR IT/IS SKILLS AT FUTURE IN EGYPT Vs UK

Test Statistics

Evaluator IT/IS Skills Now	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
E1_F	737.500	1265.500	-1.114	.265	Supported
E2_F	624.000	1152.000	-2.234	.025	Rejected
E3_F	847.000	1375.000	-.010	.992	Supported
E4_F	804.000	2235.000	-.445	.657	Supported
E5_F	780.500	1308.500	-.682	.495	Supported
E6_F	846.500	1374.500	-.015	.988	Supported
E7_F	796.000	1324.000	-.530	.596	Supported
E8_F	707.500	1235.500	-1.511	.131	Supported
E9_F	622.500	1150.500	-2.498	.012	Rejected
E10_F	640.000	1168.000	-2.134	.033	Rejected
E11_F	810.000	1338.000	-.401	.689	Supported
E12_F	785.000	1313.000	-.638	.524	Supported
E13_F	792.000	1320.000	-.582	.560	Supported
E14_F	750.500	1278.500	-1.018	.309	Supported

APPENDIX TWENTY ONE

STATISTICS DETAILS T-TEST FOR INDEPENDENT SAMPLES AND MANN-WHITNEY U TEST FOR EACH SKILL BETWEEN USA AND UK FUTURE

T-TEST FOR GENERAL IT/IS SKILLS AT FUTURE IN USA Vs UK

General IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	
G1_F	USA	21	2.62	1.392	.242	-.285*	72	.777	.04	Supported
	UK	53	2.66							
G2_F	USA	21	2.67	.089	.767	1.016*	72	.313	.16	Supported
	UK	53	2.51							
G3_F	USA	21	2.62	.914	.342	-.359*	72	.721	-.06	Supported
	UK	53	2.68							
G4_F	USA	21	2.76	.308	.580	-.284*	72	.777	-.03	Supported
	UK	53	2.79							
G5_F	USA	21	2.81	3.756	.057	1.384*	72	.170	.21	Supported
	UK	53	2.60							
G6_F	USA	21	2.76	3.073	.084	.807*	72	.422	.14	Supported
	UK	53	2.62							
G7_F	USA	21	2.33	.049	.826	-.133*	72	.895	-.03	Supported
	UK	53	2.36							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR GENERAL IT/IS SKILLS AT FUTURE IN USA Vs UK

General IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
G1_F	551.000	1982.000	-.082	.935	Supported
G2_F	435.500	1866.500	-1.690	.091	Supported
G3_F	551.000	782.000	-.088	.930	Supported
G4_F	539.500	770.500	-.286	.775	Supported
G5_F	427.000	1858.000	-1.971	.051	Supported
G6_F	518.500	1949.500	-.620	.535	Supported
G7_F	543.000	774.000	-.178	.859	Supported

T-TEST FOR USER IT/IS SKILLS AT FUTURE IN USA Vs UK

USER IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	
U1_F	USA	21	2.86	3.021	.086	-.886*	72	.379	-.06	Supported
	UK	53	2.92							
U2_F	USA	21	2.86	8.412	.005	1.319**	61.520	.191	.16	Supported
	UK	53	2.70							
U3_F	USA	21	2.48	.967	.329	.245*	72	.807	.05	Supported
	UK	53	2.43							
U4_F	USA	21	2.76	.284	.596	.214*	72	.831	.02	Supported
	UK	53	2.74							
U5_F	USA	21	2.81	8.295	.005	1.594**	61.520	.116	.21	Supported
	UK	53	2.60							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR USER IT/IS SKILLS AT FUTURE IN USA Vs UK

USER IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
U1_F	519.000	750.000	-.887	.375	Supported
U2_F	477.000	1908.000	-1.280	.201	Supported
U3_F	551.500	1982.500	-.067	.946	Supported
U4_F	550.000	1981.000	-.105	.917	Supported
U5_F	493.000	1924.000	-.997	.319	Supported

T-TEST FOR MANAGER IT/IS SKILLS AT FUTURE IN USA Vs UK

MANAGER IT/IS Skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Differ-ence	
M1_F	USA	21	1.57	.070	.793	-2.314*	72	.024	-.43	Rejected
	UK	53	2.00							
M2_F	USA	21	2.43	.359	.551	1.046*	72	.299	.20	Supported
	UK	53	2.23							
M3_F	USA	21	2.00	3.701	.058	-1.374*	72	.174	-.21	Supported
	UK	53	2.21							
M4_F	USA	21	2.19	5.104	.027	-1.350**	42.525	.184	-.19	Supported
	UK	53	2.38							
M5_F	USA	21	2.33	.052	.820	-1.238*	72	.220	-.18	Supported
	UK	53	2.51							
M6_F	USA	21	1.90	5.106	.027	-.604**	55.530	.548	-.11	Supported
	UK	53	2.02							
M7_F	USA	21	1.86	2.837	.096	-1.943*	72	.056	-.31	Supported
	UK	53	2.17							
M8_F	USA	21	1.95	3.792	.055	.044*	72	.965	.01	Supported
	UK	53	1.94							
M9_F	USA	21	2.10	.424	.517	.326*	72	.746	.06	Supported
	UK	53	2.04							
M10_F	USA	21	1.95	5.650	.020	.431**	56.827	.668	.06	Supported
	UK	53	1.89							
M11_F	USA	21	1.90	1.305	.257	-1.383*	72	.171	-.19	Supported
	UK	53	2.09							
M12_F	USA	21	2.24	.039	.845	-.482*	72	.631	-.06	Supported
	UK	53	2.30							
M13_F	USA	21	2.19	.068	.795	.493*	72	.623	.08	Supported
	UK	53	2.11							
M14_F	USA	21	2.43	.274	.603	1.073*	72	.287	.16	Supported
	UK	53	2.26							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR MANAGER IT/IS SKILLS AT FUTURE IN USA Vs UK

MANAGER IT/IS SKILLS	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
M1_F	348.000	579.000	-2.857	.004	Rejected
M2_F	493.500	1924.500	-.839	.402	Supported
M3_F	457.500	688.500	-1.393	.164	Supported
M4_F	456.500	687.500	-1.373	.170	Supported
M5_F	468.500	699.500	-1.203	.229	Supported
M6_F	483.500	714.500	-.950	.342	Supported
M7_F	438.000	669.000	-1.663	.096	Supported
M8_F	537.000	768.000	-.270	.787	Supported
M9_F	555.000	1986.000	-.022	.983	Supported
M10_F	540.000	1971.000	-.245	.806	Supported
M11_F	464.500	695.500	-1.393	.163	Supported
M12_F	526.500	757.500	-.436	.663	Supported
M13_F	521.500	1952.500	-.487	.626	Supported
M14_F	487.500	1918.500	-.939	.348	Supported

T-TEST FOR DESIGNER IT/IS SKILLS AT FUTURE IN USA Vs UK

DESIGNER IT/IS SKILLS NOW	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	
D1_F	USA	21	2.00	.139	.711	.325*	72	.746	.06	Supportec
	UK	53	1.94							
D2_F	USA	21	.57	.031	.860	-.883*	72	.380	-.13	Supportec
	UK	53	.70							
D3_F	USA	21	2.76	6.722	.012	4.542**	65.410	.000	.67	Rejected
	UK	53	2.09							
D4_F	USA	21	2.71	2.935	.091	2.501*	72	.015	.41	Rejected
	UK	53	2.30							
D5_F	USA	21	2.67	2.065	.155	3.415*	72	.001	.69	Rejected
	UK	53	1.98							
D6_F	USA	21	2.67	1.690	.198	3.088*	72	.003	.57	Rejected
	UK	53	2.09							
D7_F	USA	21	2.38	.797	.375	2.356*	72	.021	.46	Rejected
	UK	53	1.92							
D8_F	USA	21	1.95	.518	.474	.706*	72	.482	.12	Supportec
	UK	53	1.83							
D9_F	USA	21	1.48	1.111	.295	-.347*	72	.730	-.05	Supportec
	UK	53	1.53							
D10_F	USA	21	2.14	1.200	.277	3.173*	72	.002	.54	Rejected
	UK	53	1.60							
D11_F	USA	21	1.81	.556	.458	1.572*	72	.020	.22	Rejected
	UK	53	1.58							
D12_F	USA	21	1.57	.002	.965	-1.024*	72	.309	-.15	Supportec
	UK	53	1.72							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR DESIGNER IT/IS SKILLS AT FUTURE IN USA Vs UK

Designer IT/IS Skills Now	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
D1_F	544.000	1975.000	-.175	.861	Supported
D2_F	499.500	730.500	-.789	.430	Supported
D3_F	299.500	1730.500	-3.349	.001	Rejected
D4_F	364.000	1795.000	-2.575	.010	Rejected
D5_F	304.500	1735.500	-3.251	.001	Rejected
D6_F	326.500	1757.500	-2.980	.003	Rejected
D7_F	382.000	1813.000	-2.244	.025	Rejected
D8_F	502.500	1933.500	-.719	.472	Supported
D9_F	523.000	754.000	-.456	.648	Supported
D10_F	331.500	1762.500	-2.962	.003	Rejected
D11_F	451.500	1882.500	-1.447	.014	Rejected
D12_F	489.000	720.000	-.940	.347	Supported

T-TEST FOR EVALUATOR IT/IS SKILLS AT FUTURE IN USA Vs UK

EVALUATOR IT/IS SKILLS NOW	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Differ-Ence	
E1_F	USA	21	2.52	3.546	.064	.970*	72	.335	.16	Supported
	UK	53	2.36							
E2_F	USA	21	2.90	20.063	.000	3.775**	69.467	.000	.56	Rejected
	UK	53	2.34							
E3_F	USA	21	2.57	.745	.391	2.121*	72	.057	.38	Supported
	UK	53	2.19							
E4_F	USA	21	2.57	1.948	.167	1.638*	72	.106	.32	Supported
	UK	53	2.25							
E5_F	USA	21	2.57	1.595	.211	1.667*	72	.100	.27	Supported
	UK	53	2.30							
E6_F	USA	21	2.62	2.302	.134	2.029*	72	.046	.37	Rejected
	UK	53	2.25							

E7_F	USA	21	2.62	2.783	.100	1.839*	72 –	.070	.30	Supported
	UK	53	2.32							
E8_F	USA	21	2.48	.100	.752	1.076*	72	.285	.18	Supported
	UK	53	2.30							
E9_F	USA	21	2.48	.419	.519	1.656*	72	.102	.23	Supported
	UK	53	2.25							
E10_F	USA	21	2.71	4.323	.041	2.118**	56.601	.039	.29	Rejected
	UK	53	2.42							
E11_F	USA	21	2.48	.131	.718	1.116*	72	.268	.18	Supported
	UK	53	2.30							
E12_F	USA	21	2.52	1.592	.211	1.475*	72	.144	.26	Supported
	UK	53	2.26							
E13_F	USA	21	2.52	.021	.886	1.086*	72	.281	.14	Supported
	UK	53	2.38							
E14_F	USA	21	2.95	37.149	.000	4.065**	71.130	.000	.40	Rejected
	UK	53	2.55							

* t-test reported **Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

** t-test reported **Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)**

Mann-Whitney U Test FOR EVALUATOR IT/IS SKILLS AT FUTURE IN USA Vs UK

Evaluator IT/IS Skills Now	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
E1_F	503.000	1934.000	-.714	.475	Supported
E2_F	371.500	1802.500	-2.692	.007	Rejected
E3_F	406.500	1837.500	-1.997	.056	Supported
E4_F	453.000	1884.000	-1.383	.167	Supported
E5_F	442.500	1873.500	-1.523	.128	Supported
E6_F	415.000	1846.000	-1.881	.060	Supported
E7_F	429.500	1860.500	-1.699	.089	Supported
E8_F	490.500	1921.500	-.913	.361	Supported
E9_F	443.000	1874.000	-1.591	.112	Supported
E10_F	433.500	1864.500	-1.695	.090	Supported
E11_F	485.000	1916.000	-.981	.327	Supported
E12_F	461.000	1892.000	-1.269	.204	Supported
E13_F	480.500	1911.500	-1.053	.292	Supported
E14_F	361.500	1792.500	-2.938	.003	Rejected

APPENDIX TWENTY TWO

STATISTICS DETAILS T-TEST FOR INDEPENDENT SAMPLES AND MANN-WHITNEY U TEST FOR EACH SKILL BETWEEN DEVELOPED COUNTRIES (USA &UK) AND DEVELOING COUNTRY (EGYPT) FUTURE

T-TEST FOR GENERAL IT/IS SKILLS AT FUTURE IN DEVELOPING COUNTRY Vs DEVELOPED COUNTRY

General IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Differ-Ence	
G1_F	USA+UK	74	2.65	.665	.417	3.438*	104	.001	.43	Rejected
	Egypt	32	2.22							
G2_F	USA+UK	74	2.55	9.990	.002	3.939**	66.207	.000	.46	Rejected
	Egypt	32	2.09							
G3_F	USA+UK	74	2.66	.080	.777	.507*	104	.613	.07	Supported
	Egypt	32	2.59							
G4_F	USA+UK	74	2.78	14.796	.000	3.429**	46.327	.001	.38	Rejected
	Egypt	32	2.41							
G5_F	USA+UK	74	2.66	.635	.427	1.330*	104	.047	.16	Rejected
	Egypt	32	2.50							
G6_F	USA+UK	74	2.66	.790	.376	-.190*	104	.850	-.03	Supported
	Egypt	32	2.69							
G7_F	USA+UK	74	2.35	7.855	.006	2.687**	66.018	.009	.38	Rejected
	Egypt	32	1.97							

* t-test reported Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)

** t-test reported Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)

Mann-Whitney U Test FOR GENERAL IT/IS SKILLS AT FUTURE IN DEVELOPING COUNTRY Vs DEVELOPED COUNTRY

General IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
G1_F	760.500	1288.500	-3.349	.001	Rejected
G2_F	694.500	1222.500	-3.777	.000	Rejected

G3_F	1085.500	1613.500	-.868	.385	Supported
G4_F	766.000	1294.000	-3.550	.000	Rejected
G5_F	984.500	1512.500	-1.656	.048	Rejected
G6_F	1150.500	1678.500	-.307	.759	Supported
G7_F	827.500	1355.500	-2.658	.008	Rejected

T-TEST FOR USER IT/IS SKILLS AT FUTURE IN DEVELOPING COUNTRY Vs DEVELOPED COUNTRY

USER IT/IS skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	
U1_F	USA+UK	74	2.91	11.454	.001	1.518**	44.738	.013	.12	Rejected
	Egypt	32	2.78							
U2_F	USA+UK	74	2.74	.663	.417	.560*	104	.576	.05	Supported
	Egypt	32	2.69							
U3_F	USA+UK	74	2.45	.227	.635	3.031*	104	.003	.45	Rejected
	Egypt	32	2.00							
U4_F	USA+UK	74	2.74	.663	.417	.560*	104	.046	.05	Rejected
	Egypt	32	2.69							
U5_F	USA+UK	74	2.66	1.125	.291	-.205*	104	.838	-.03	Supported
	Egypt	32	2.69							

* t-test reported **Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

** t-test reported **Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)**

Mann-Whitney U Test FOR USER IT/IS SKILLS AT FUTURE IN DEVELOPING COUNTRY Vs DEVELOPED COUNTRY

USER IT/IS skills	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
U1_F	1037.000	1565.000	-1.725	.045	Rejected
U2_F	1107.000	1635.000	-.693	.488	Supported
U3_F	804.500	1332.500	-2.850	.004	Rejected
U4_F	1107.000	1635.000	-.693	.048	Rejected
U5_F	1148.000	1676.000	-.318	.750	Supported

T-TEST FOR MANAGER IT/IS SKILLS AT FUTURE IN DEVELOPING COUNTRY Vs DEVELOPED COUNTRY

MANAGER IT/IS Skills	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	
M1_F	USA+UK	74	1.88	.002	.968	1.738*	104	.085	.25	Supported
	Egypt	32	1.63							
M2_F	USA+UK	74	2.28	14.163	.000	1.385**	96.900	.169	.16	Supported
	Egypt	32	2.13							
M3_F	USA+UK	74	2.15	.490	.486	2.063*	104	.042	.27	Rejected
	Egypt	32	1.88							
M4_F	USA+UK	74	2.32	9.270	.003	2.520**	62.806	.014	.29	Rejected
	Egypt	32	2.03							
M5_F	USA+UK	74	2.46	5.124	.026	2.991**	55.841	.004	.37	Rejected
	Egypt	32	2.09							
M6_F	USA+UK	74	1.99	1.008	.318	1.803*	104	.074	.30	Supported
	Egypt	32	1.69							
M7_F	USA+UK	74	2.08	.137	.712	2.037*	104	.044	.27	Rejected
	Egypt	32	1.81							
M8_F	USA+UK	74	1.95	.579	.449	.870*	104	.049	.13	Rejected
	Egypt	32	1.81							
M9_F	USA+UK	74	2.05	4.747	.032	.804**	94.307	.024	.08	Rejected
	Egypt	32	1.97							
M10_F	USA+UK	74	1.91	.662	.418	-.006*	104	.995	0	Supported
	Egypt	32	1.91							
M11_F	USA+UK	74	2.04	.769	.383	.960*	104	.339	.10	Supported
	Egypt	32	1.94							
M12_F	USA+UK	74	2.28	.693	.407	.024*	104	.981	0	Supported
	Egypt	32	2.28							
M13_F	USA+UK	74	2.14	.113	.738	-1.978*	104	.041	-.24	Rejected
	Egypt	32	2.38							
M14_F	USA+UK	74	2.31	4.589	.035	.278**	75.849	.782	.03	Supported
	Egypt	32	2.28							

* t-test reported **Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

** t-test reported **Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)**

Mann-Whitney U Test FOR MANAGER IT/IS SKILLS AT FUTURE IN DEVELOPING COUNTRY Vs DEVELOPED COUNTRY

MANAGER IT/IS SKILLS	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
M1_F	915.500	1443.500	-2.101	.036	Rejected
M2_F	947.500	1475.500	-1.866	.062	Supported
M3_F	949.000	1477.000	-1.875	.061	Supported
M4_F	883.000	1411.000	-2.410	.016	Rejected
M5_F	816.000	1344.000	-2.872	.004	Rejected
M6_F	874.500	1402.500	-2.341	.019	Rejected
M7_F	916.000	1444.000	-2.150	.032	Rejected
M8_F	1001.000	1529.000	-1.475	.014	Rejected
M9_F	1054.500	1582.500	-1.126	.026	Rejected
M10_F	1132.000	1660.000	-.447	.655	Supported
M11_F	1077.000	1605.000	-.965	.334	Supported
M12_F	1172.000	1700.000	-.102	.919	Supported
M13_F	954.000	3729.000	-1.849	.047	Rejected
M14_F	1126.500	1654.500	-.461	.645	Supported

T-TEST FOR DESIGNER IT/IS SKILLS AT FUTURE IN DEVELOPING COUNTRY Vs DEVELOPED COUNTRY

DESIGNER IT/IS SKILLS NOW	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	
D1_F	USA+UK	74	1.96	.038	.845	.388*	104	.698	.05	Supported
	Egypt	32	1.91							
D2_F	USA+UK	74	.66	6.750	.011	-.869**	73.664	.388	-.09	Supported
	Egypt	32	.75							
D3_F	USA+UK	74	2.28	2.991	.087	3.167*	104	.002	.50	Rejected
	Egypt	32	1.78							
D4_F	USA+UK	74	2.42	.003	.960	6.310*	104	.000	.89	Rejected
	Egypt	32	1.53							
D5_F	USA+UK	74	2.18	.543	.463	1.366*	104	.175	.24	Supported
	Egypt	32	1.94							
D6_F	USA+UK	74	2.26	.064	.801	5.734*	104	.000	.94	Rejected
	Egypt	32	1.31							
D7_F	USA+UK	74	2.05	1.320	.253	6.294*	104	.000	.99	Rejected
	Egypt	32	1.06							
D8_F	USA+UK	74	1.86	.241	.624	6.553*	104	.000	.93	Rejected
	Egypt	32	.94							
D9_F	USA+UK	74	1.51	.014	.904	3.340*	104	.001	.45	Rejected
	Egypt	32	1.06							
D10_F	USA+UK	74	1.76	1.609	.208	5.613*	104	.000	.82	Rejected
	Egypt	32	.94							

D11_F	USA+UK	74	1.65	1.516	.221	4.971*	104	.000	.62	Rejected
	Egypt	32	1.03							
D12_F	USA+UK	74	1.68	1.170	.282	4.495*	104	.000	.59	Rejected
	Egypt	32	1.09							

* t-test reported **Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

** t-test reported **Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)**

Mann-Whitney U Test FOR DESIGNER IT/IS SKILLS AT FUTURE IN DEVELOPING COUNTRY Vs DEVELOPED COUNTRY

Designer IT/IS Skills Now	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
D1_F	1113.500	1641.500	-.569	.569	Supported
D2_F	1068.000	3843.000	-.949	.343	Supported
D3_F	745.000	1273.000	-3.233	.001	Rejected
D4_F	463.500	991.500	-5.314	.000	Rejected
D5_F	976.500	1504.500	-1.529	.126	Supported
D6_F	515.500	1043.500	-4.851	.000	Rejected
D7_F	450.000	978.000	-5.337	.000	Rejected
D8_F	450.000	978.000	-5.438	.000	Rejected
D9_F	773.000	1301.000	-3.127	.002	Rejected
D10_F	529.000	1057.000	-4.860	.000	Rejected
D11_F	625.500	1153.500	-4.275	.000	Rejected
D12_F	692.500	1220.500	-3.769	.000	Rejected

T-TEST FOR EVALUATOR IT/IS SKILLS AT FUTURE IN DEVELOPING COUNTRY Vs DEVELOPED COUNTRY

EVALUATOR IT/IS SKILLS NOW	Country	N	Mean	Levene's Test for Equality of Variances		t-test for Equality of Means				Result
				F	Sig.	t	df	Sig. (2-tailed)	Mean Differ-Ence	
E1_F	USA+UK	74	2.41	8.685	.004	1.315**	75.699	.192	.16	Supported
	Egypt	32	2.25							
E2_F	USA+UK	74	2.50	5.494	.021	2.028*	104	.045	.34	Rejected
	Egypt	32	2.16							
E3_F	USA+UK	74	2.30	4.584	.035	.386**	81.609	.700	.05	Supported
	Egypt	32	2.25							

E4_F	USA+UK	74	2.34	1.597	.209	-.448*	104	.655	-.07	Rejected
	Egypt	32	2.41							
E5_F	USA+UK	74	2.38	1.756	.188	1.203*	104	.032	.16	Supported
	Egypt	32	2.22							
E6_F	USA+UK	74	2.35	3.625	.060	.271*	104	.787	.04	Supported
	Egypt	32	2.31							
E7_F	USA+UK	74	2.41	5.485	.021	1.047**	71.399	.299	.12	Supported
	Egypt	32	2.28							
E8_F	USA+UK	74	2.35	4.661	.033	1.671**	71.289	.039	.20	Rejected
	Egypt	32	2.16							
E9_F	USA+UK	74	2.31	8.837	.004	3.410**	63.626	.001	.37	Rejected
	Egypt	32	1.94							
E10_F	USA+UK	74	2.50	4.933	.029	2.555**	72.743	.013	.31	Rejected
	Egypt	32	2.19							
E11_F	USA+UK	74	2.35	1.626	.205	.568*	104	.571	.07	Supported
	Egypt	32	2.28							
E12_F	USA+UK	74	2.34	4.410	.038	.943**	72.621	.049	.12	Rejected
	Egypt	32	2.22							
E13_F	USA+UK	74	2.42	.689	.408	1.164*	104	.247	.14	Supported
	Egypt	32	2.28							
E14_F	USA+UK	74	2.66	.159	.691	1.635*	104	.005	.19	Rejected
	Egypt	32	2.47							

* t-test reported **Equal variances assumed because Levene's Test for Equality of Variances Not Significance (F>0.05)**

** t-test reported **Equal variances Not assumed because Levene's Test for Equality of Variances Significance (F<0.05)**

Mann-Whitney U Test FOR EVALUATOR IT/IS SKILLS AT FUTURE IN DEVELOPING COUNTRY Vs DEVELOPED COUNTRY

Evaluator IT/IS Skills Now	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Result
E1_F	987.000	1515.000	-1.516	.130	Supported
E2_F	737.000	1265.000	-3.461	.001	Rejected
E3_F	1081.000	1609.000	-.801	.423	Supported
E4_F	1178.500	1706.500	-.042	.966	Supported
E5_F	1016.000	1544.000	-1.290	.017	Rejected
E6_F	1086.000	1614.000	-.754	.451	Supported
E7_F	1025.000	1553.000	-1.229	.219	Supported
E8_F	946.000	1474.000	-1.921	.045	Rejected
E9_F	802.500	1330.500	-3.131	.002	Rejected
E10_F	814.000	1342.000	-2.876	.004	Rejected
E11_F	1085.500	1613.500	-.785	.433	Supported
E12_F	1029.500	1557.500	-1.190	.024	Rejected
E13_F	1063.000	1591.000	-.952	.341	Supported
E14_F	924.000	1452.000	-2.131	.033	Rejected

APPENDIX TWENTY THREE

RESPONSES TO THE QUESTION POSTED TO ISWORLD REGARDING THE DEFINITION OF INFORMATION TECHNOLOGY

****

From .... At this point in the evolution of technology, I would submit that everyone performing tasks that are more than manual labour are (or soon will be) an IT worker as you have defined. Manual labour currently represents about 10% to 15% of the workforce, includes a large percentage of youth, and is decreasing in size.

We use labels to differentiate. With your definition of an IT worker, what are we differentiating?

When analysing how technology is integrated into organisations, there are two important types of people to consider:

1) Champion -- the person who wants to be on the bleeding-edge of technology; the person to whom others look for advice on how new technologies work; those who look at the technology as an end-in-itself.

2) Sponsor -- the top management person who looks at the technology as a way to either/or reduce costs, increase revenue, increase productivity; the person who provides legitimacy changing policies and procedures needed fully implement new technologies; the person who provides financing the new technology's implementation, the person who looks at the technology as a means-to-an-end.

The definition you wish to develop needs to be developed from the perspective of the Sponsor, not the Champion. Proposals implemented based on Champion objectives tend to not be productive and short-lived.

****

Just briefly, we in the .... are abandoning the term IT in favour of Information and Communication Services (ICS). I remember the debates we had at the beginning of the Eighties about using the term Information Technology and it appears we are still having debates on what it means. I think the problem is it was devised specifically to refer to hardware (micros were just beginning to democratise "computing" so a more consumer-oriented term was required). The term was subsequently blown out to describe a profession, creating the sorts of definition problems we now have. We feel it's time to abandon it (especially as a broad term) and get more specific and descriptive about what the professions do.

****

I think IT simply means the underlying technology vis-a-vis the hardware/software platforms and data communication networks that supports Information Systems, while IS encompasses information, people, controlling mechanisms and procedures as well as the IT, which operating together as a whole produces value to the organisation. A good analogy would be a manufacturing system where the manufacturing technology is the plant and machinery used in the manufacturing process, while the raw materials, finished goods, workers, quality assurance mechanisms, etc. comprise the entire manufacturing system.

****

In your definition, there is no distinction between workers and IT workers. If we consider that information is integrated into all kinds of technologies and that all workers use technologies, then there would be no difference between IT workers and workers.

My definition of the IT worker is the worker who continuously produces data from his tools and uses it as an information for the advancement of his tasks. In this definition, there is a mix of the meaning of information which emphasis the use of data as an information, and the idea that there are technologies included in all workers tools.

Hence, the difference between a worker using computers to fullfeel his tasks and the worker who uses no more than screwdrivers is that:

- The first one is retrieving or producing data from his computer and maybe using it for further calculus...He is an IT worker.

- The second one maybe using the write screwdriver at the write place. If the worker is accustomed to that, he won't produce data and therefore he won't be an IT worker. Now if he is too slow and top manager decides to introduce automatic screwdrivers that recognise automaticquelly the different types of screws and screws them quiquly. This change transformes our worker into an IT worker for a while because, not only there was a new information introduced in the chaine transforming the path of relationship with hir peers, but also, the worker will have to learn how to use the new tool and therefore get informations from the use of the new tool.

- Finally, once the worker will start mastering the use of the new tool, He will not be an IT worker anymore, he won't learn anything from the use of it.

****

I once had the same problem and I think that the disagreement lies in the side from which the definition is phrased. The demand side or the supply side. From the demand side you will not consider someone working with IT to facilitate the work (s)he does as an IT-worker. But seen from the supply side you will consider someone using IT as an IT-worker. Maybe it will help to discriminate between IT as professional activity or not.

****

Information management involves providing the right information to the right people within and without the organization, at the right time and location, for the right price. Information technology is any technology which processes and communicates data. It includes computers, voice, data and image communications, multi-media storage as well as traditional pen, paper and fax machines.

****

Probably, IT is first - a technology, which definition includes knowledge ("know how") about how to transform "raw material" into a new product as well as instruments, equipment, to facilitate such transformation; and second - it deals with information, or process data, facilitating data utilisation, as well as storage or distribution.

****

At my firm, we define information technology as any technical infrastructure or application that permits human beings to: (a) capture data, (b) transform captured data into information or (c) share information to produce knowledge.

****

I've struggled with the topic of definitions in the area of IS/IT management on a number of occasions over the years. Here follows my attempt to respond to your question. However, before I start let me say that if I have understood you correctly then I find myself in agreement with your definition of 'information technology'.

I would define IT as follows: "Information Technology is defined as any technology utilised for the collection, processing, dissemination or presentation of information in support of purposeful activity."

By contrast my definition for an Information System is as follows:

'An Information System is a set of related components (people, process, data, and information technology) which gathers, stores, processes, disseminates and presents information in support of purposeful activity'

In this sense Information Technology (IT) can be seen to range from pencils and paper to microchips. In everyday accepted use IT tends to be thought of as 'computers, telephones and televisions' etc. I find the broader definition I have given more helpful when considering the managerial and organisational issues around information. In my World the Cardex file and the Relational Database are both examples of IT. By contrast an Information System represents an application of Information Technology in support of a particular purpose.

The definition of 'IT Worker' is problematic. Rather than using it as a general term to describe 'a person who uses IT in their work' I feel a more constrained definition is helpful. I would define an IT worker as follows:

'An IT Worker is a person skilled and knowledgeable about IT whose work involves the creation, support and operation of IT based systems (Information Systems) in support of organisational activity.' Based on this I view the 'IT Worker' as someone who supplies IT based systems for use by other people. If I work as a programmer, PC help desk operator, network support specialist then I would consider myself an IT Worker.

My definition becomes obscure when we consider a person who creates their own information systems as part of their work. Consider the market analyst who creates a market analysis information system which sifts retail EPOS data to determine customer buyer preferences. They are part 'IT Worker' (the supplier of the system) and part 'User' of the resultant information system. Perhaps this kind of activity provides a partial description of those kind of activities we associate with the increasingly common term 'Knowledge Worker'.

And that leads us to the requirement for yet another definition!!

I hope the above notes are useful. I use these definitions when introducing students and executives to the area of IS/IT management. The *distinctions may seem subtle. Nevertheless they provide an important start point for understanding the challenges of* IS/IT management and role of IT within organisations.

****

Every one works with some kind of information technology whether it be a toaster or a car but the issue you are probably looking at has it grounding in working on an Information System which can be defined as :

IS := (A, K, Q, I, R)

where

A:= Acquisition - the ways and means of *capturing data and information*

K := Knowledge - the models that are used to reduce data into information and information into knowledge (it becomes recusive after a while because knowledge is data for another process)

Q := The set of possible queries to ask the system

I := The inference rules that translate the query into a set of processes

R := the set of possible replies

****

We define IT simply as 'computers and telecommunications'. More long-winded as 'electronic means by which to accept, store, process, output and transmit information'.

****

Technology (the application of science) which supports the effective provision of information (data + meaning) to the appropriate people, at the appropriate time, in a usable manner.

****

IT (information technology) is a term that encompasses all forms of technology used to create, store, exchange, and use information in its various forms (business data, voice conversations, still images, motion pictures, multimedia presentations, and other forms, including those not yet conceived). It's a convenient term for including both telephony and computer technology in the same word. It is the technology that is driving what has often been called "the information revolution."

****

IT is an immensely broad field ranging from telecommunications to business process re-engineering. Below is the generic IT definition that I use:- technology = applied problem solving information technology = applied problem solving in areas of information capture, generation, storage, retrieval, presentation and transmission. As to the periennial question does IT = IS, IT < IS or IS > IT? I use IT = enterprise-wide IS.

****

George Huber's definition of IT: "Devices that transmit, manipulate, analyse and exploit information, in which a digital computer processes information integral to the users' communication or task, that have either made their appearance since 1970 or exist in a form that aids in communication before 1971. (Huber, G. P. (1990). "A Theory of the Effects of Advanced Information Technologies on Organizational Design, Intelligence, and Decision Making". Academy of Management Review 15(1), pp. 47-71.)

****

Information technology is a generic term for computing and communications (both local and tele-), made necessary because of their ongoing convergence.

Ambitious Interpretation (Direction 1):
Information technology is a generic term for computing, communications and robotics, made necessary because of their ongoing convergence.

Ambitious Interpretation (Direction 2):
Information technology is a generic term for computing, communications and content, made necessary because of their ongoing convergence.

Ambitious Interpretation (Combined):
Information technology is a generic term for computing, communications, robotics and content, made necessary because of their ongoing convergence.

Whichever scope is selected, it's then vital to distinguish the IS discipline quite clearly from IT: Information Systems is the study of information production, flows and use within organisations.

****

It is unfortunately not as simple as you would wish it to be -- for example try defining information', then try defining 'technology', and you'll begin to see what I mean. To help you get started though, let me help with the term 'technology': this may refer to artifacts hardware, such as a video camera), software (such as a payroll application), communications standards (such as the Internet Protocol - IP), an idea (such as the object-oriented paradigm) or indeed even a practice, such as regression testing. The last view of technology (as 'technique' - systematic knowledge of the practical arts) represents the historical roots of the meaning of technology.

****

Well, I believe that define IT is like define "time concept", everybody knows what is but nobody can explain it!.

In my courses I prefer use the pair IS/IT and I try to explain like: " a system composed by people, procedures, CBIS and hard-based technology oriented to create, distribute and support knowledge-workers".

****

I will quote my definition from a short paper titled, "The Role of IT in the Global Economy," published in May, 1998.

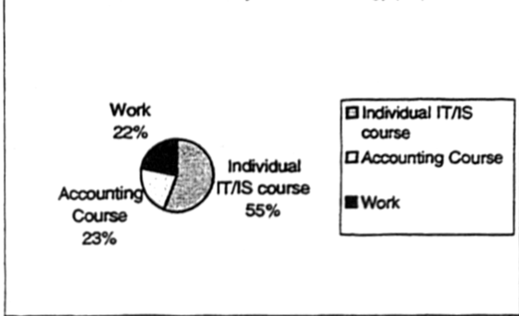
"IT is the synthesis of computer and TC hardware, Computer and TC software, Computer databases, organizational processes and managerial actions that affect the creation, use, maintenance, and retirement of information in support of organizational activities."

APPENDIX TWENTY FOUR

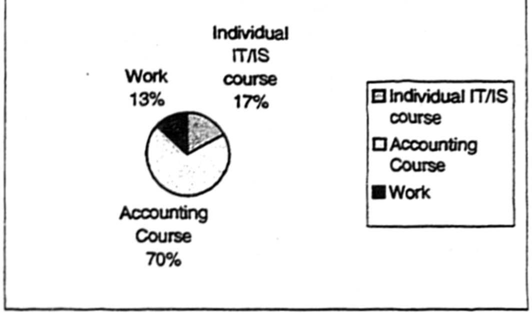
USA RESULTS ABOUT HOW SHOULD IT/IS SKILLS/KNOWLEDGE DELIVERED

A- GENERAL INFORMATION TECHNOLOGY KNOWLEDGE (USA)

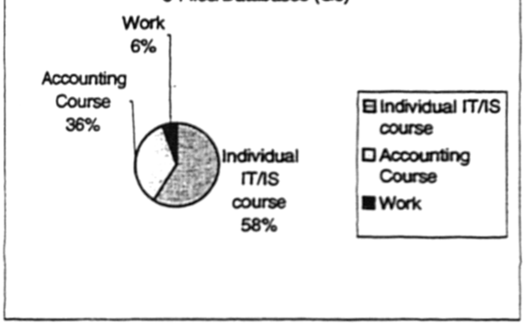
1-Information Systems Technology (G1)



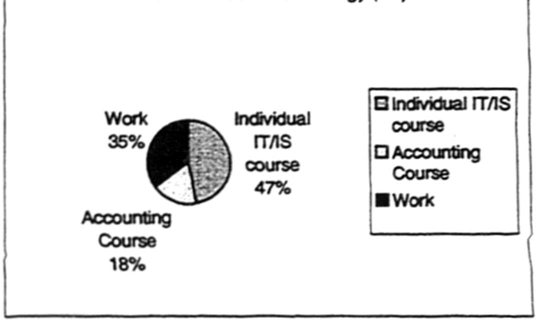
2-Computer-Based Accounting Systems (G2)



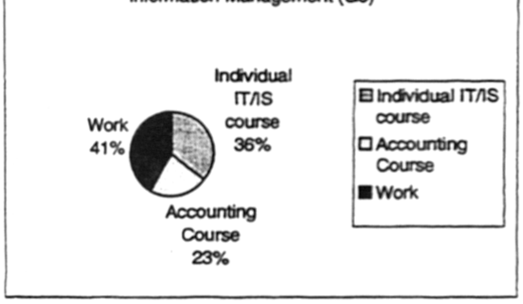
3-Files/Databases (G3)



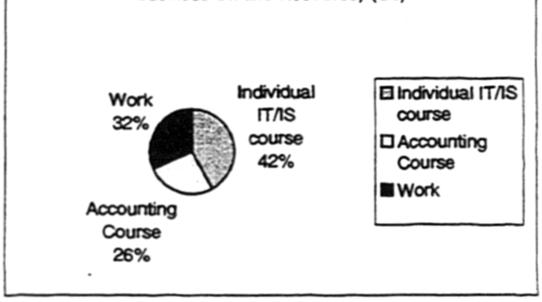
4-Communication Technology (G4)



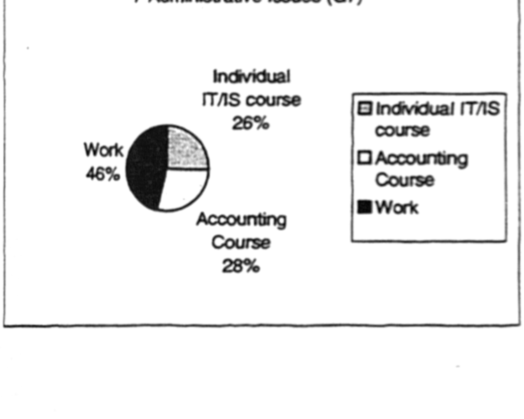
5-Role of information within business and Information Management (G5)

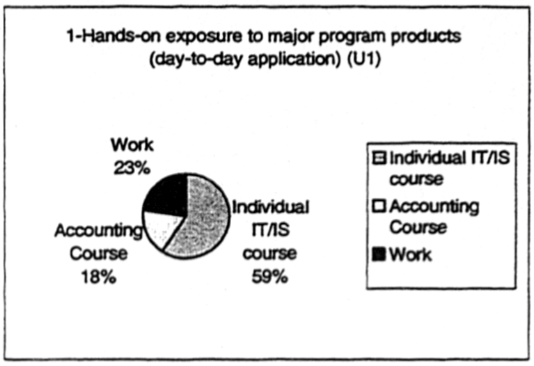


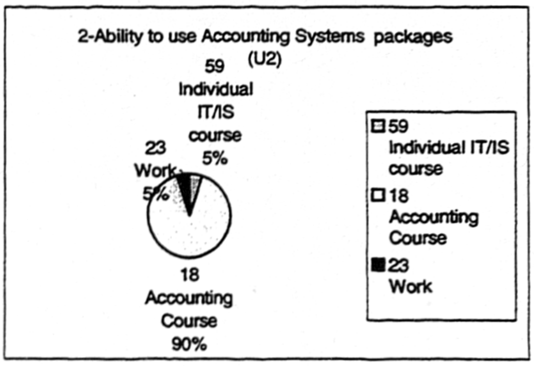
6-Electronic Commerce (Telecommunication in Business On-line Resource) (G6)

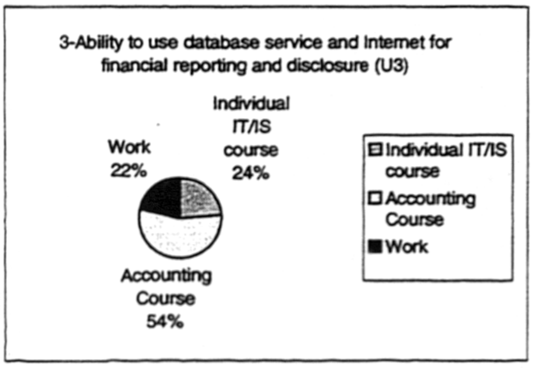


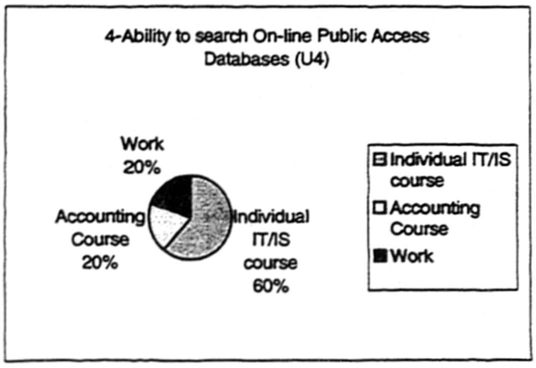
7-Administrative Issues (G7)

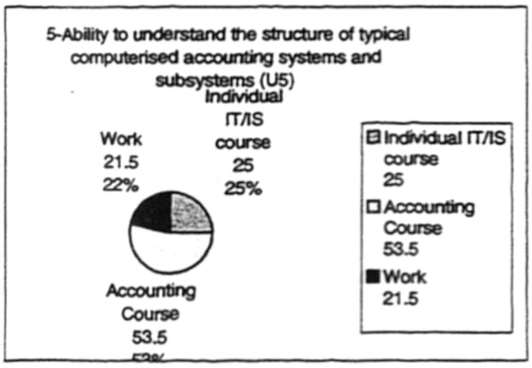



1-Hands-on exposure to major program products (day-to-day application) (U1)
Work 23%
Accounting Course 18%
Individual IT/IS course 59%
Individual IT/IS course
Accounting Course
Work


2-Ability to use Accounting Systems packages (U2)
59 Individual IT/IS course 5%
23 Work 5%
18 Accounting Course 90%
59 Individual IT/IS course
18 Accounting Course
23 Work

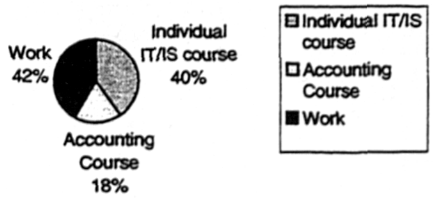

3-Ability to use database service and Internet for financial reporting and disclosure (U3)
Individual IT/IS course 24%
Work 22%
Accounting Course 54%
Individual IT/IS course
Accounting Course
Work


4-Ability to search On-line Public Access Databases (U4)
Work 20%
Accounting Course 20%
Individual IT/IS course 60%
Individual IT/IS course
Accounting Course
Work

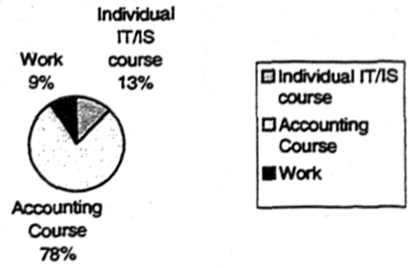

5-Ability to understand the structure of typical computerised accounting systems and subsystems (U5)
Individual IT/IS course 25 25%
Work 21.5 22%
Accounting Course 53.5
Individual IT/IS course 25
Accounting Course 53.5
Work 21.5

C- IT/IS SKILLS/KNOWLEDGE AS MANAGER (USA)

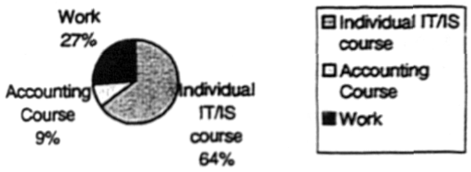
1-Data Resource Structures and Administration (M1)



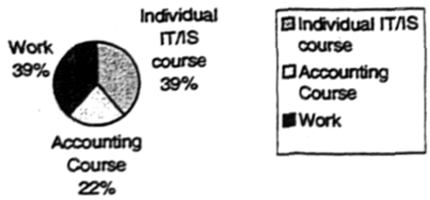
2-Management of Accounting Information Systems (M2)



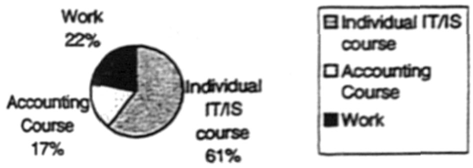
3-Global Information Management (M3)



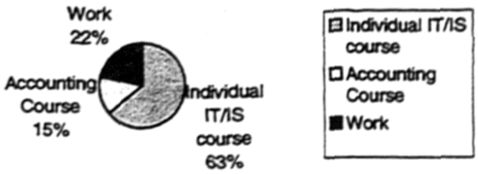
4-Executive Information Systems Management (M4)



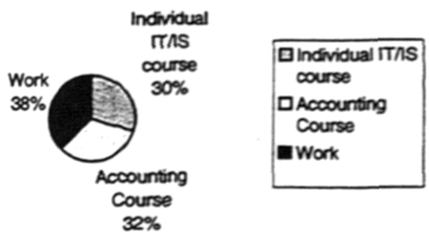
5-Ability to use financial database for planning and control purposes (M5)



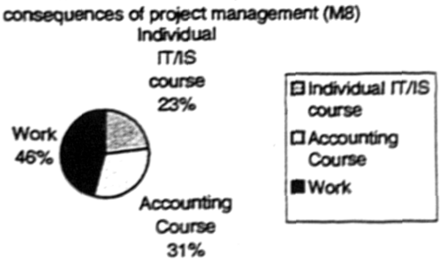
6-Ability for selection and acquisition of hardware/software (M6)



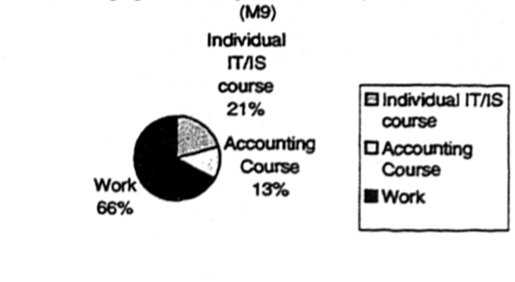
7-Ability for reinforcement of investment analysis using software (M7)



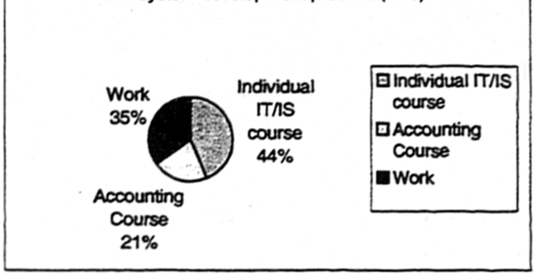
8-Ability to participate as part of system development team worth an appreciation of information and methods, behavioural consequences of project management (M8)



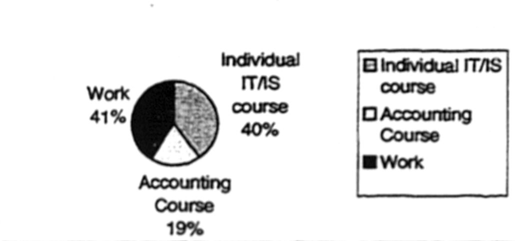
9-Understanding of the methods of operating and managing business systems once implemented (M9)



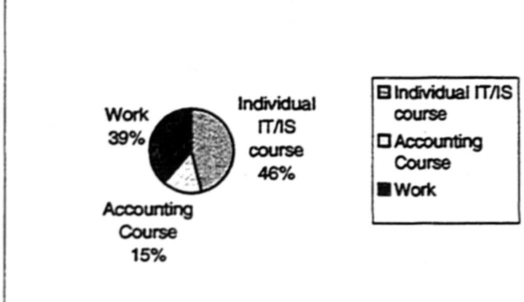
10-Understanding of the system development life cycle, its phases, and management principles for the system development process (M10)



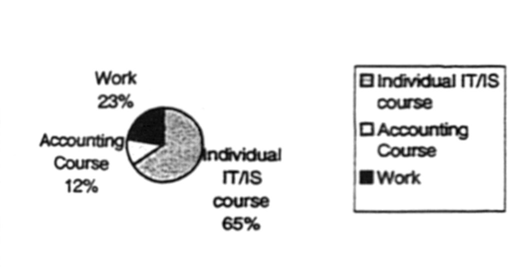
11-Appreciation of the social, economic, and legal implications of computer technology, including effects of automation on work, institutions, and freedoms (M11)



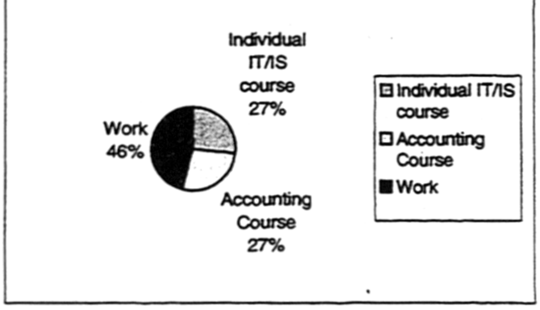
12-Decision Support Systems (M12)



13-Strategic considerations in IT/IS development (M13)

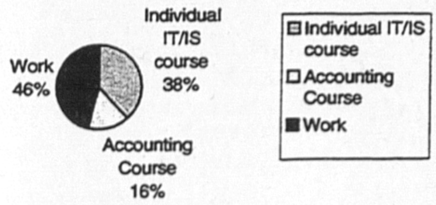


14-Administrative issues (M14)

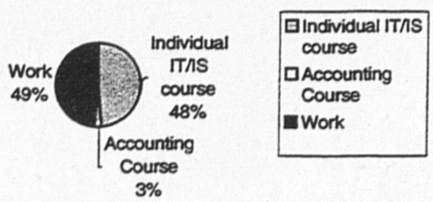


D- IT/IS SKILLS/KNOWLEDGE AS DESIGNER (USA)

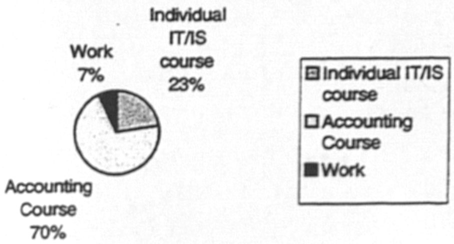
1-Information Systems (IS) Design and Implementation (D1)



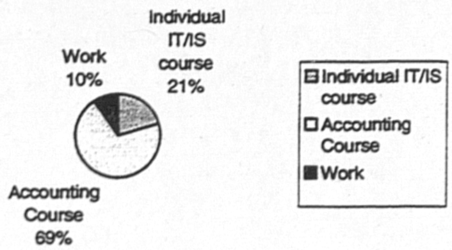
2-Ability to write simple file-processing and report-writing routines in several common programming languages e.g. COBOL, C, C++ (D2)



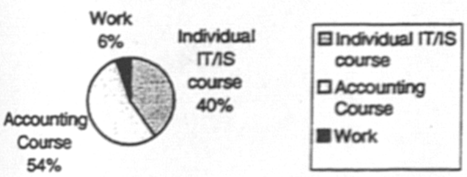
3-Knowledge of financial accounting, managerial accounting, auditing and ability to use state-of-the-art system analysis and design techniques (D3)



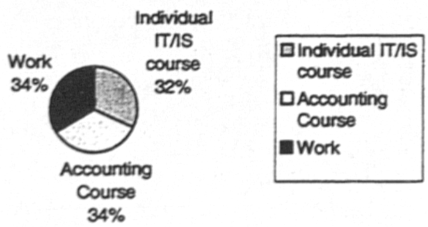
4-Ability to design and apply computer-assisted auditing techniques for a variety of audit purposes (D4).



5-Ability to design and use decision support aids and financial modelling tools (D5)

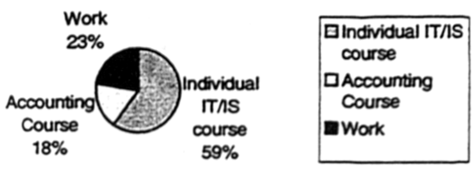


6-Ability to design financial databases for planning and control purposes (D6)

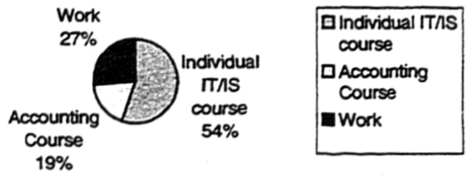


D- IT/IS SKILLS/KNOWLEDGE AS DESIGNER (USA)

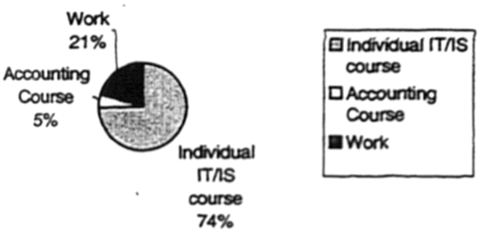
7-Ability to participate as part of a system development team with an appreciation of information system development theories (D7)



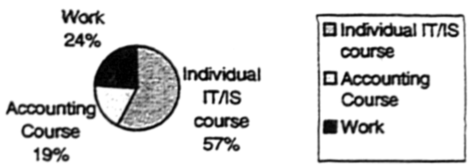
8-Knowledge of and ability to use state-of-the-art system analysis and design techniques (D8)



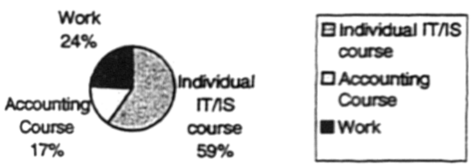
9-Algorithm Concepts and Information Management (D9)



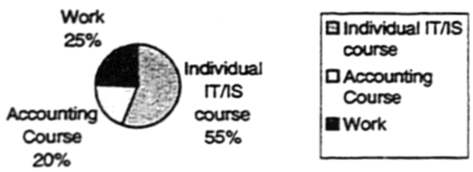
10-Knowledge in the role of information in organisation design and behaviour (D10)



11-System design techniques (D11)

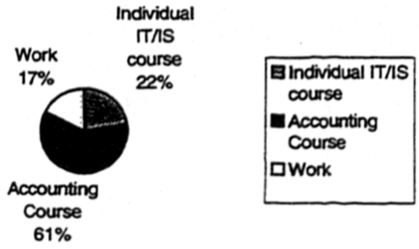


12-System acquisition/development life cycle phases, tasks and practices and maintaining control over system development processes D12)

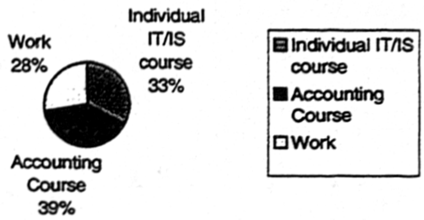


E- IT/IS SKILLS/KNOWLEDGE AS EVALUATOR

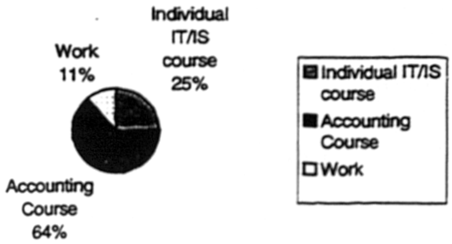
1-Internal control in computer-based systems (E1)



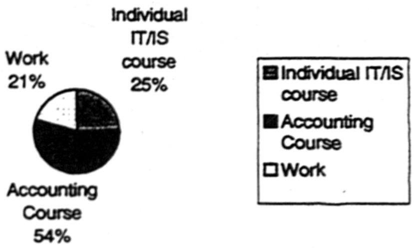
2-Understanding of characteristics of EDP systems, their major components , and methods of operation (E2)



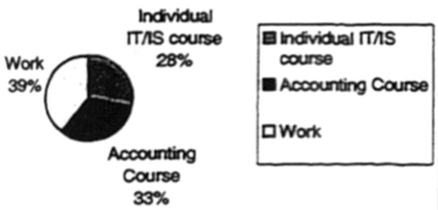
3-Ability to design and apply computer-assisted audit techniques for a variety of audit purposes E3)



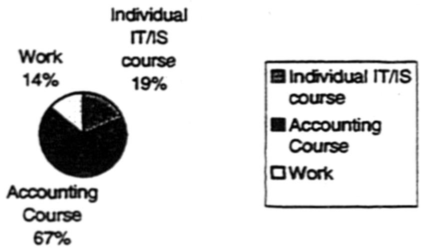
4-Ability to specify, identifies, and documents financial and operational controls in computer-based systems (E4).



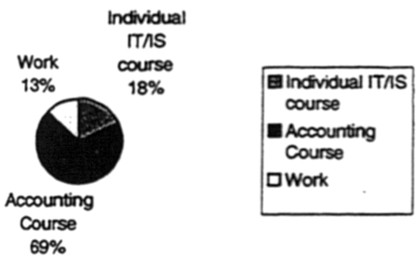
5-Ability to evaluate effectiveness and efficiency of management and operations in computer-based system (E5)



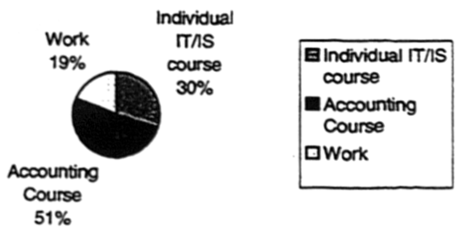
6-Auditing of Accounting Information Systems (E6)



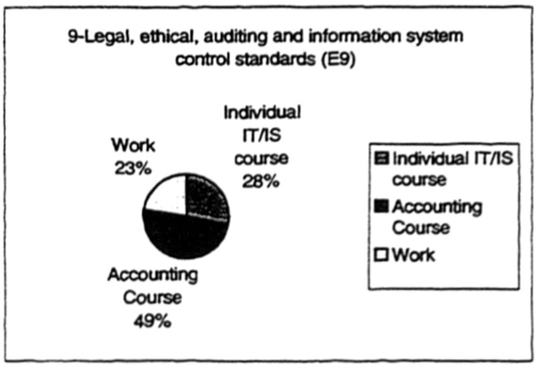
7-Accounting systems internal control (E7)

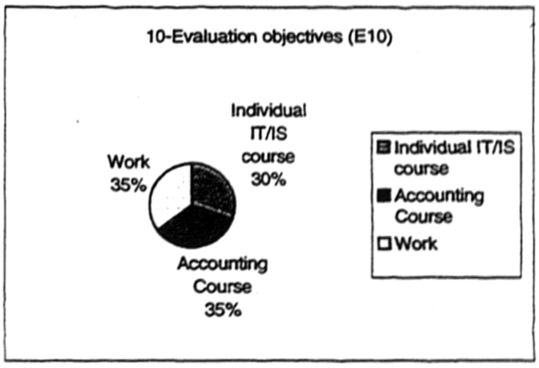


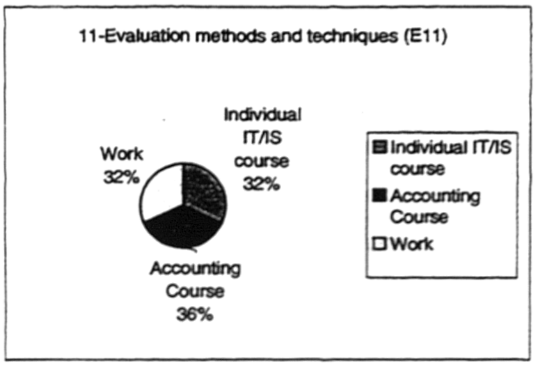
8-Evaluation of Decision Support Systems (E8)

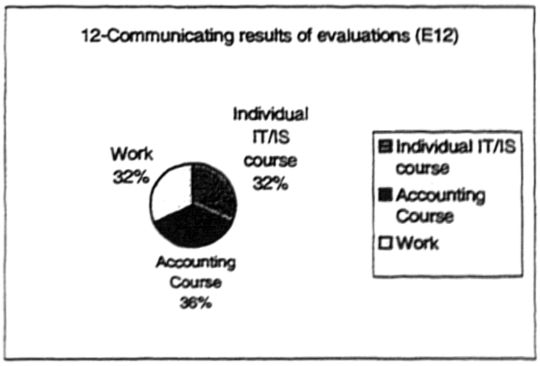


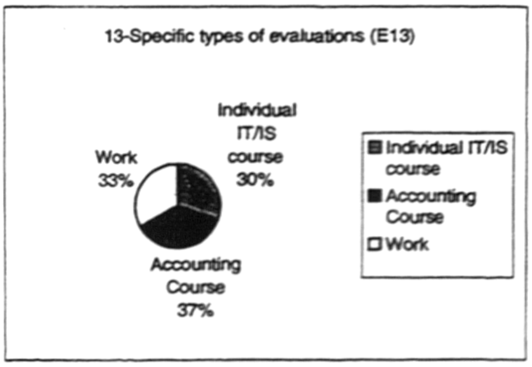
E- IT/IS SKILLS/KNOWLEDGE AS EVALUATOR (USA)

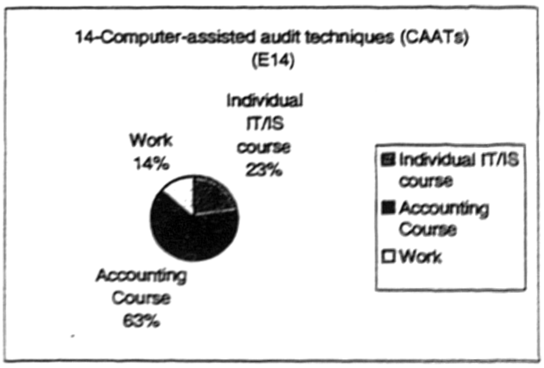








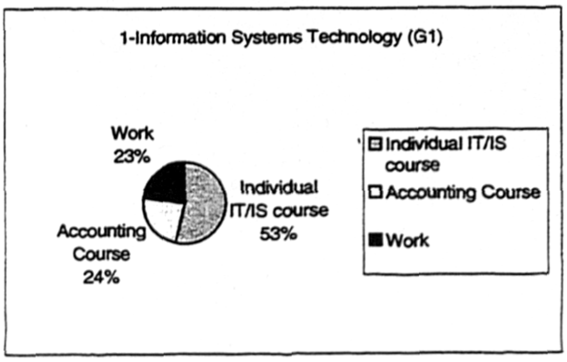


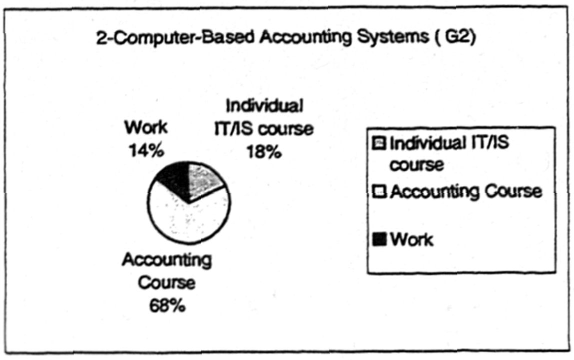


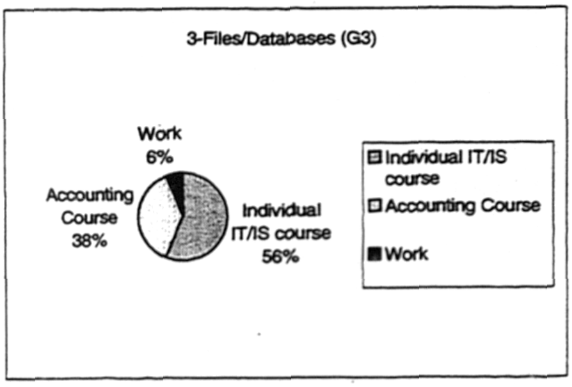
APPENDIX TWENTY FIVE

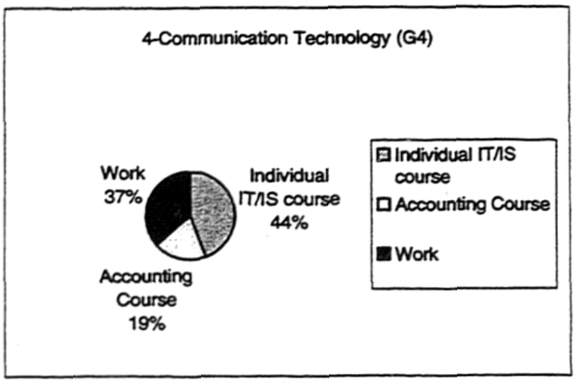
UK RESULTS ABOUT HOW SHOULD IT/IS SKILLS/KNOWLEDGE DELIVERED

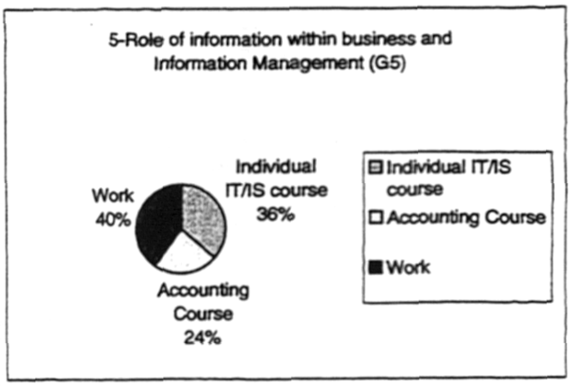
A- GENERAL INFORMATION TECHNOLOGY KNOWLEDGE (UK)

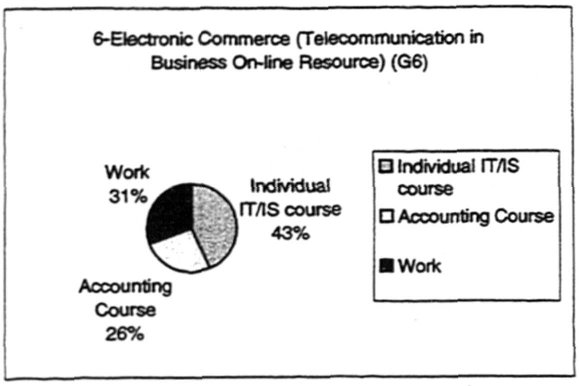


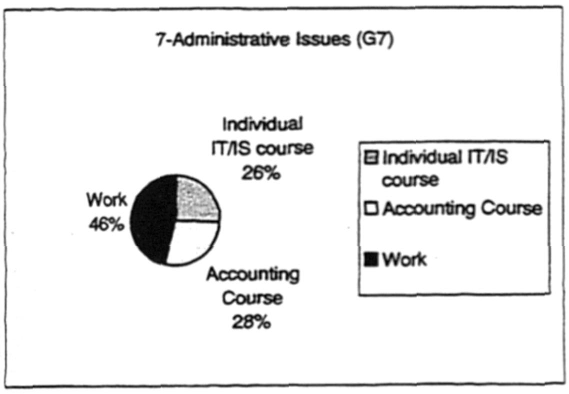




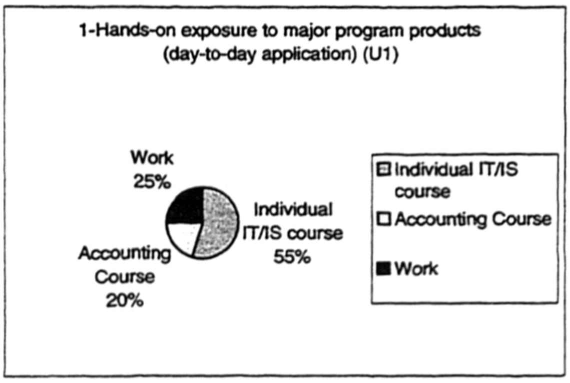


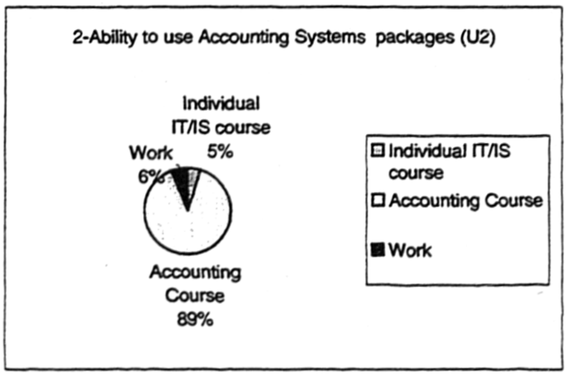


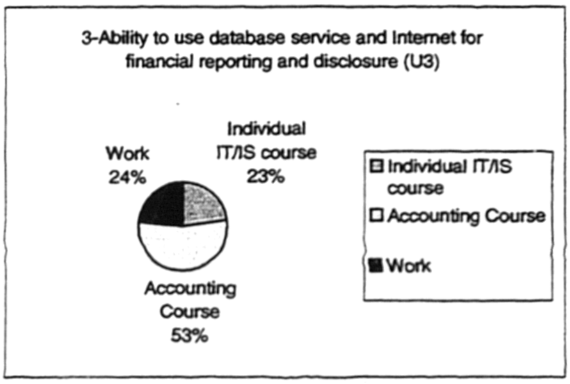


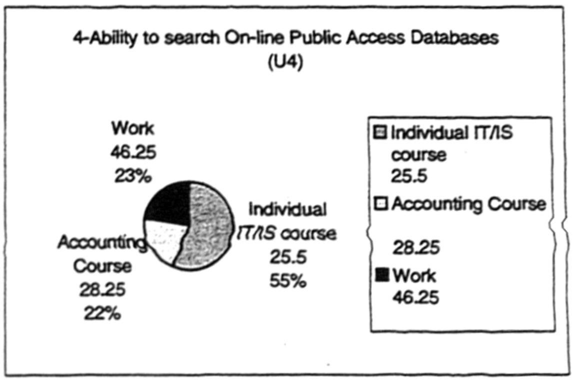


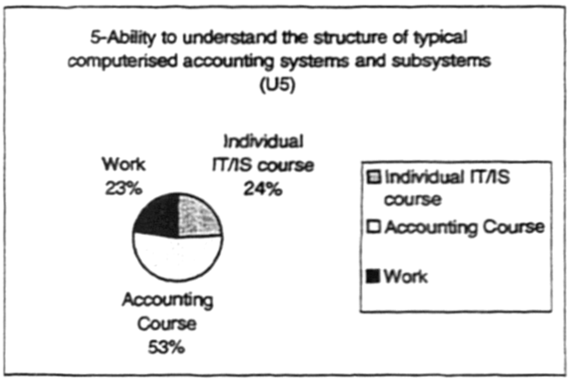
B- IT/IS SKILLS/KNOWLEDGE AS USER (UK)





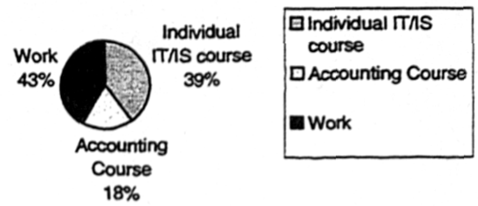




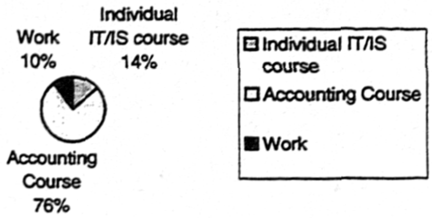


C- IT/IS SKILLS/KNOWLEDGE AS MANAGER (UK)

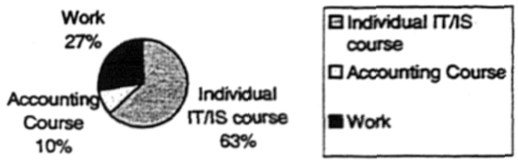
1-Data Resource Structures and Administration (M1)



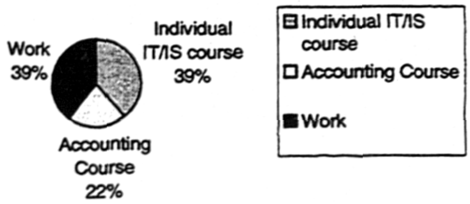
2-Management of Accounting Information Systems (M2)



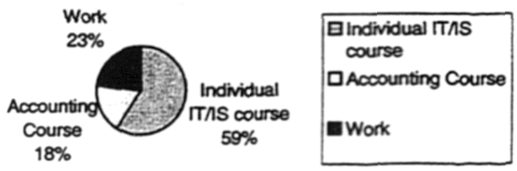
3-Global Information Management (M3)



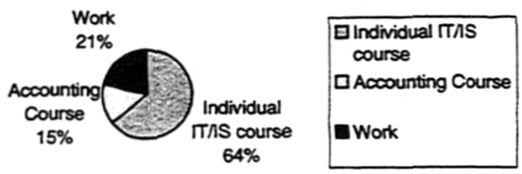
4-Executive Information Systems Management (M4)



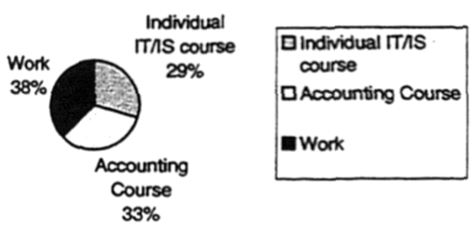
5-Ability to use financial database for planning and control purposes (M5)



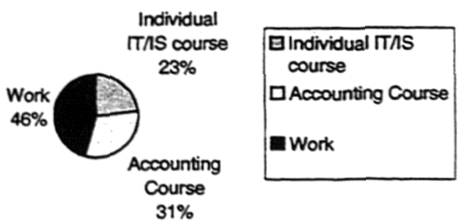
6-Ability for selection and acquisition of hardware/software (M6)



7-Ability for reinforcement of investment analysis using software (M7)

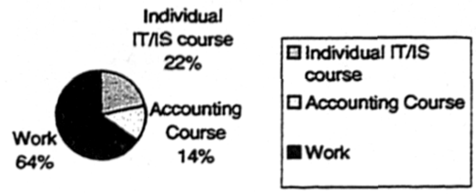


8-Ability to participate as part of system development team worth an appreciation of information and methods, behavioural consequences of project management (M8)

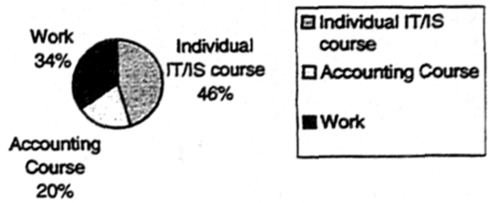


C- IT/IS SKILLS/KNOWLEDGE AS MANAGER (UK)

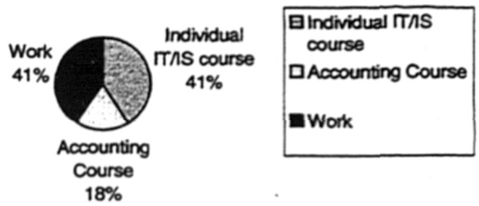
9-Understanding of the methods of operating and managing business systems once implemented (M9)



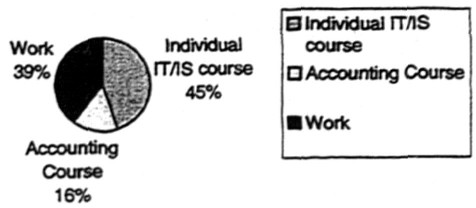
10-Understanding of the system development life cycle, its phases, and management principles for the system development process (M10)



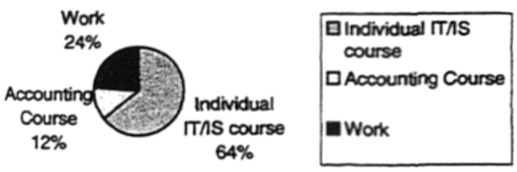
11-Appreciation of the social, economic, and legal implications of computer technology, including effects of automation on work, institutions, and freedoms (M11)



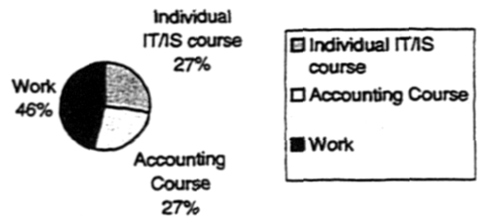
12-Decision Support Systems (M12)



13-Strategic considerations in IT/IS development (M13)

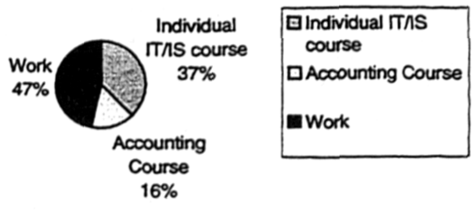


14-Administrative issues (M14)

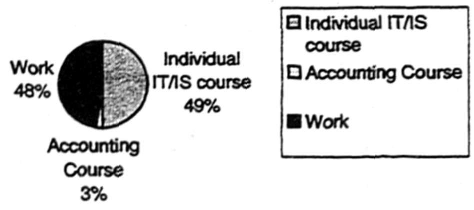


D- IT/IS SKILLS/KNOWLEDGE AS DESIGNER (UK)

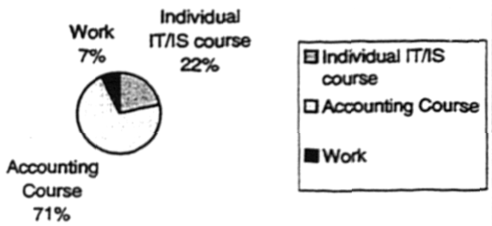
1-Information Systems (IS) Design and Implementation (D1)



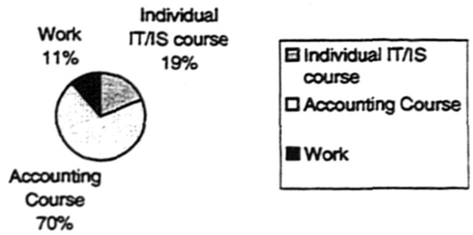
2-Ability to write simple file-processing and report-writing routines in several common programming languages e.g. COBOL, C, C++ (D2)



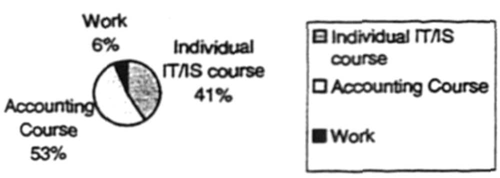
3-Knowledge of financial accounting, managerial accounting, auditing and ability to use state-of-the-art system analysis and design techniques (D3)



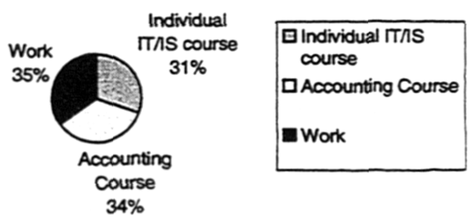
4-Ability to design and apply computer-assisted auditing techniques for a variety of audit purposes (D4).



5-Ability to design and use decision support aids and financial modelling tools (D5)

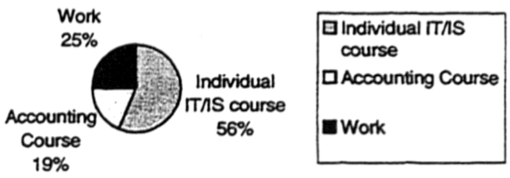


6-Ability to design financial databases for planning and control purposes (D6)

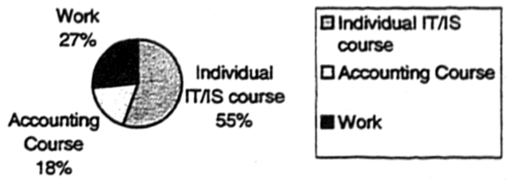


D- IT/IS SKILLS/KNOWLEDGE AS DESIGNER (UK)

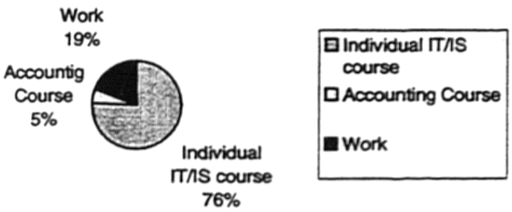
7-Ability to participate as part of a system development team with an appreciation of information system development theories (D7)



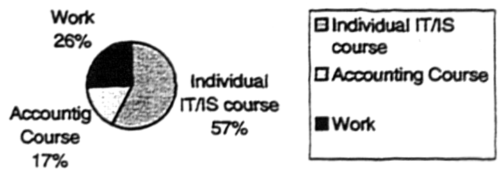
8-Knowledge of and ability to use state-of-the-art system analysis and design techniques (D8)



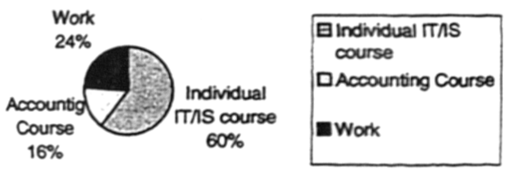
9-Algorithm Concepts and Information Management (D9)



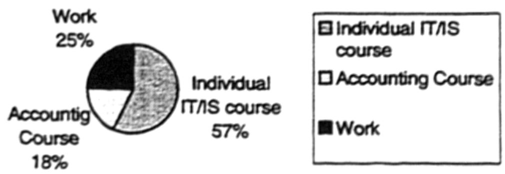
10-Knowledge in the role of information in organisation design and behaviour (D10)



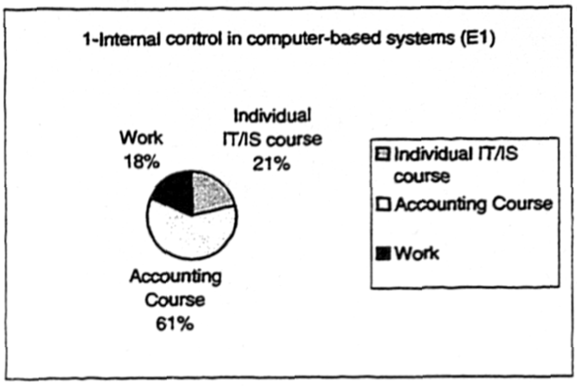
11-System design techniques (D11)

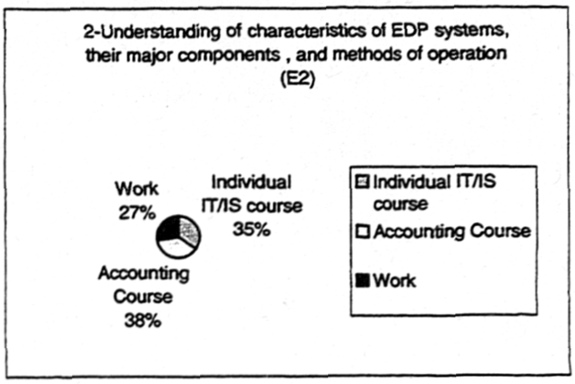


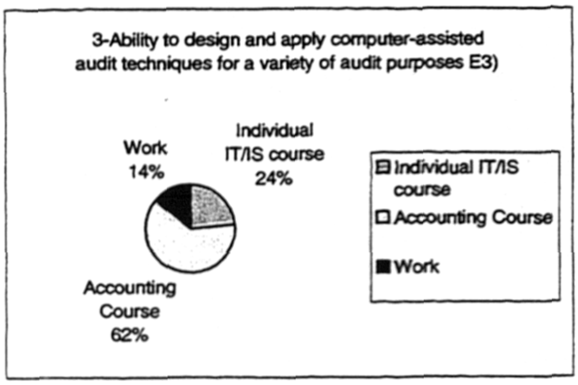
12-System acquisition/development life cycle phases, tasks and practices and maintaining control over system development processes D12)

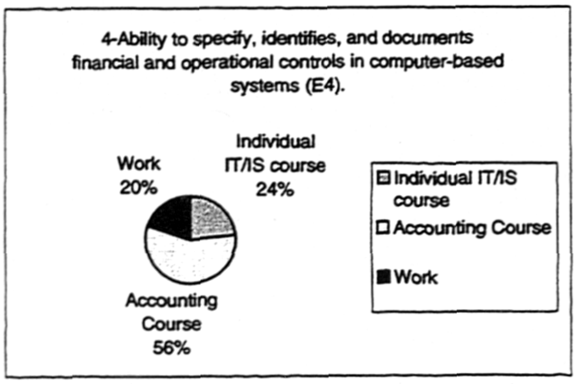


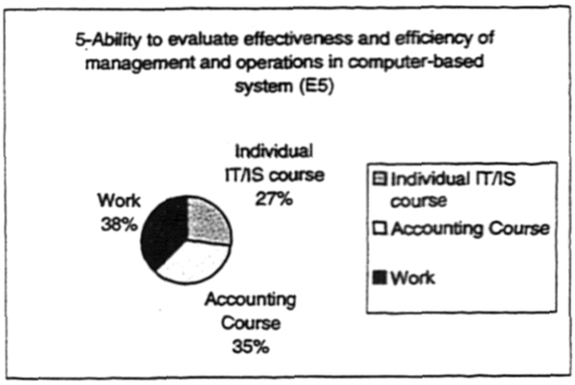
E- IT/IS SKILLS/KNOWLEDGE AS EVALUATOR (UK)

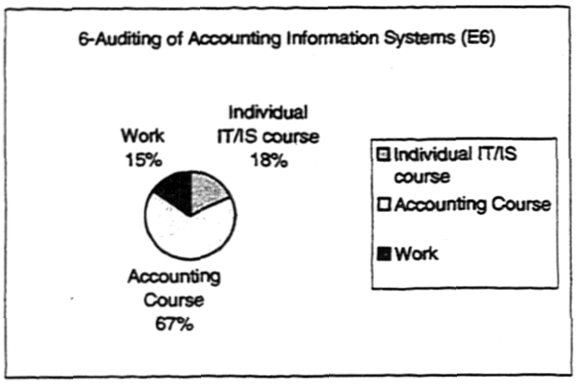


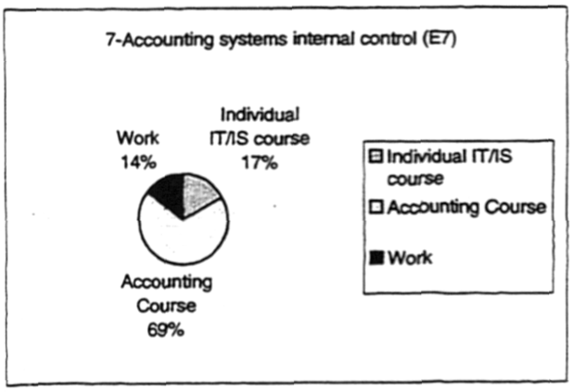


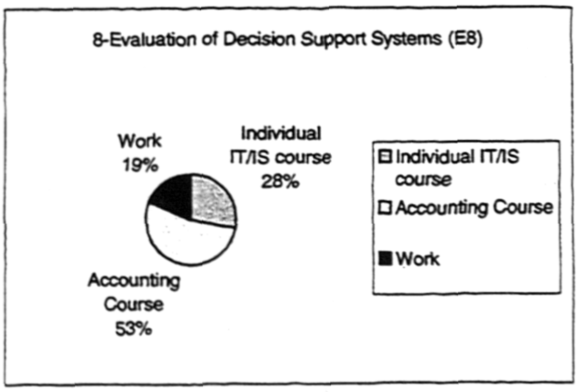






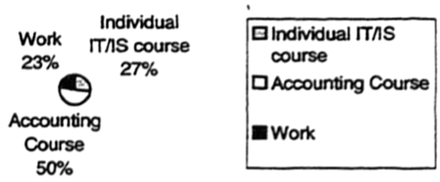




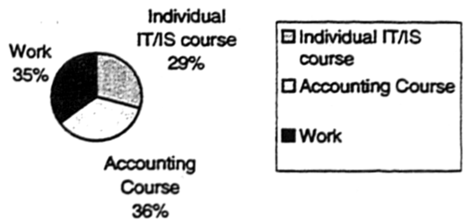


E- IT/IS SKILLS/KNOWLEDGE AS EVALUATOR (UK)

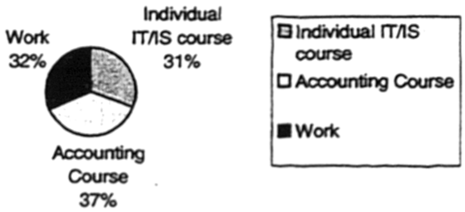
9-Legal, ethical, auditing and information system control standards (E9)



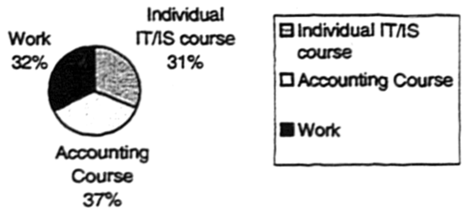
10-Evaluation objectives (E10)



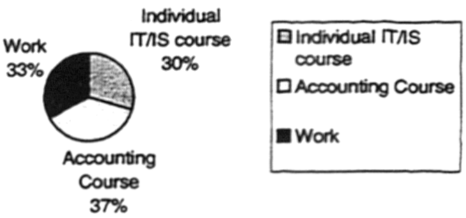
11-Evaluation methods and techniques (E11)



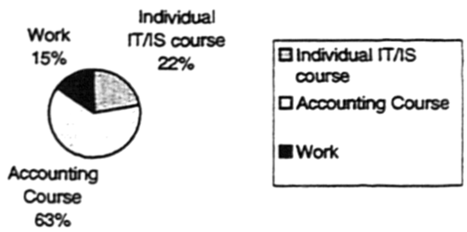
12-Communicating results of evaluations (E12)



13-Specific types of evaluations (E13)

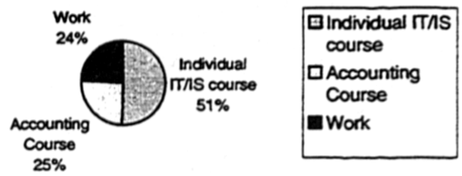


14-Computer-assisted audit techniques (CAATs) (E14)

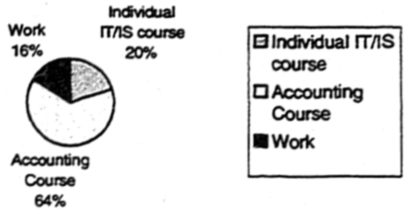


APPENDIX TWENTY SIX

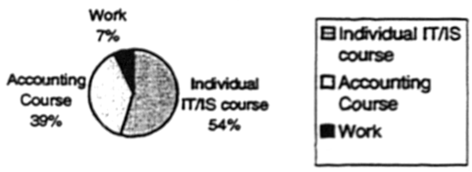
1-Information Systems Technology (G1)



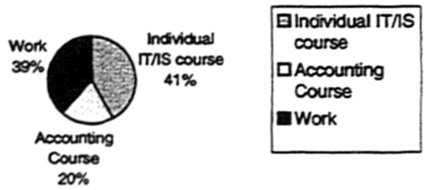
2-Computer-Based Accounting Systems (G2)



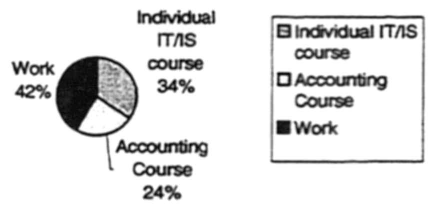
3-Files/Databases (G3)



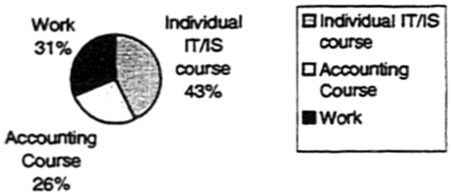
4-Communication Technology (G4)



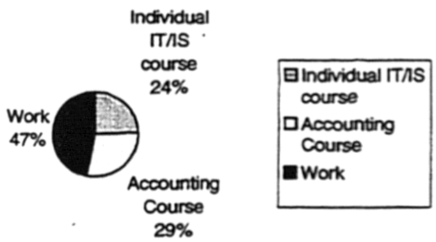
5-Role of information within business and Information Management (G5)

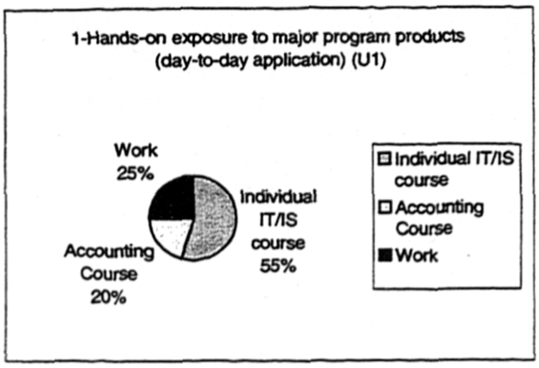


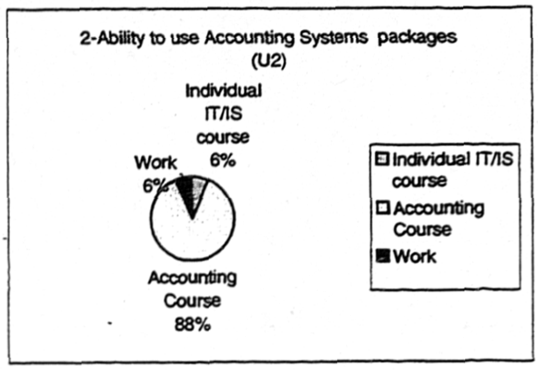
6-Electronic Commerce (Telecommunication in Business On-line Resource) (G6)

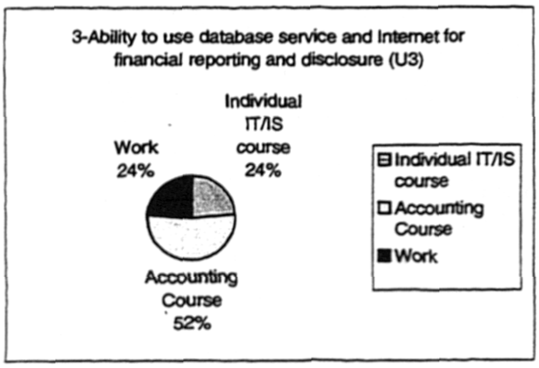


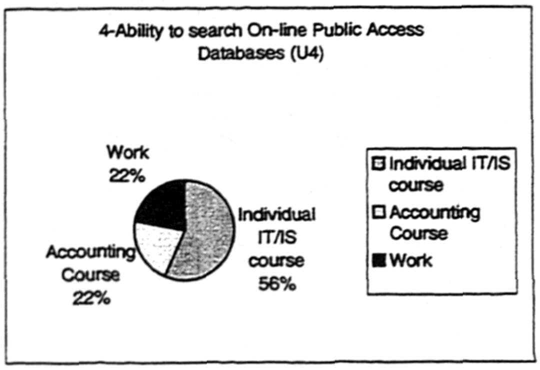
7-Administrative Issues (G7)

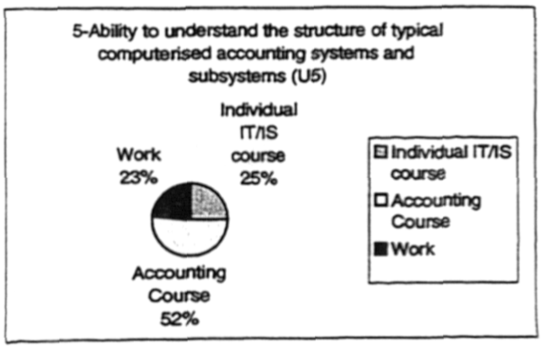



1-Hands-on exposure to major program products (day-to-day application) (U1)
Work 25%
Individual IT/IS course 55%
Accounting Course 20%
Individual IT/IS course
Accounting Course
Work

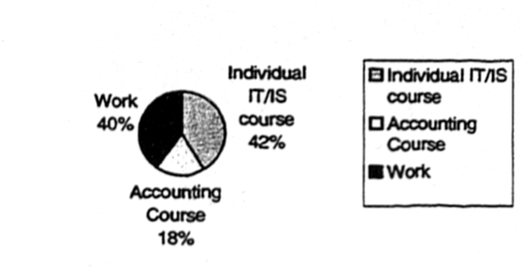

2-Ability to use Accounting Systems packages (U2)
Individual IT/IS course 6%
Work 6%
Accounting Course 88%
Individual IT/IS course
Accounting Course
Work


3-Ability to use database service and Internet for financial reporting and disclosure (U3)
Individual IT/IS course 24%
Work 24%
Accounting Course 52%
Individual IT/IS course
Accounting Course
Work

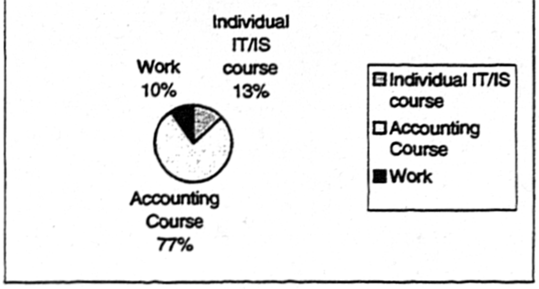

4-Ability to search On-line Public Access Databases (U4)
Work 22%
Individual IT/IS course 56%
Accounting Course 22%
Individual IT/IS course
Accounting Course
Work


5-Ability to understand the structure of typical computerised accounting systems and subsystems (U5)
Individual IT/IS course 25%
Work 23%
Accounting Course 52%
Individual IT/IS course
Accounting Course
Work

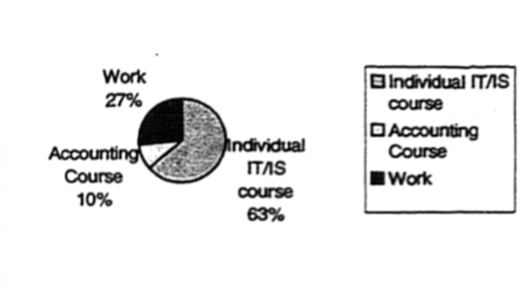
1-Data Resource Structures and Administration (M1)



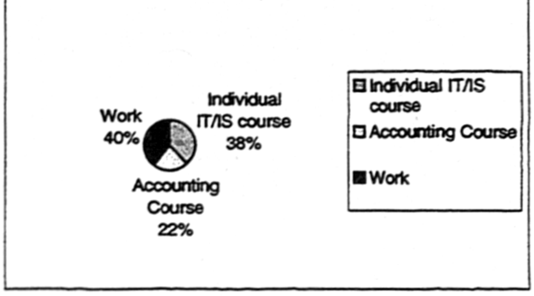
2-Management of Accounting Information Systems (M2)



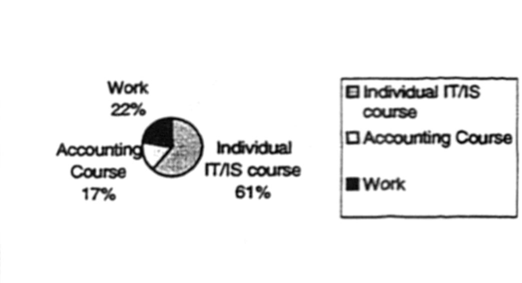
3-Global Information Management (M3)



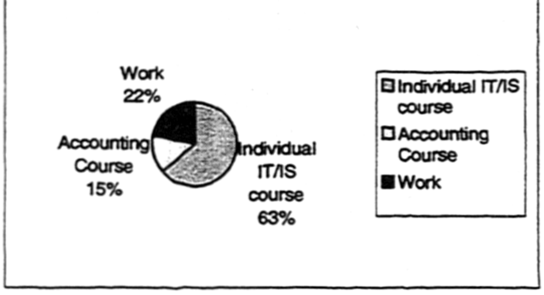
4-Executive Information Systems Management (M4)



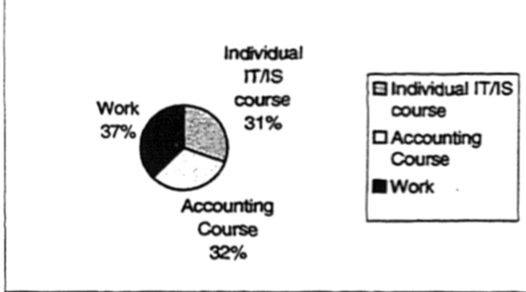
5-Ability to use financial database for planning anc control purposes (M5)



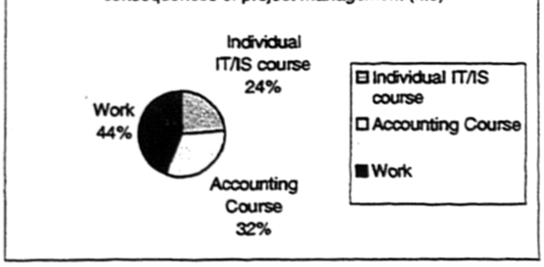
6-Ability for selection and acquisition of hardware/software (M6)



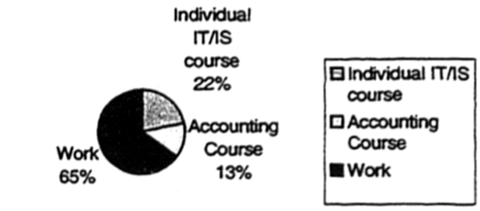
7-Ability for reinforcement of investment analysis using software (M7)



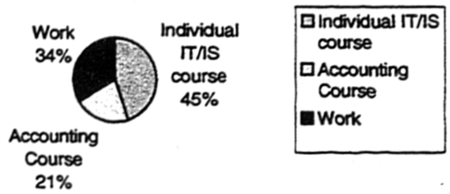
8-Ability to participate as part of system development team worth an appreciation of information and methods, behavioural consequences of project management (M8)



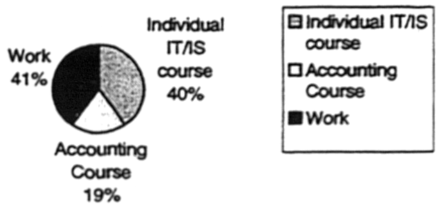
9-Understanding of the methods of operating and managing business systems once implemented (M9)



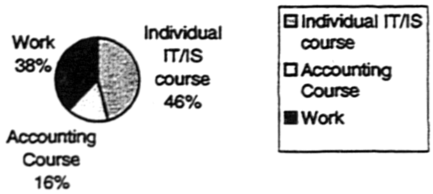
10-Understanding of the system development life cycle, its phases, and management principles for the system development process (M10)



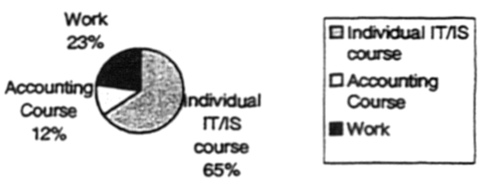
11-Appreciation of the social, economic, and legal implications of computer technology, including effects of automation on work, institutions, and freedoms (M11)



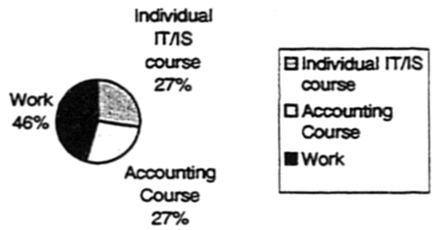
12-Decision Support Systems (M12)

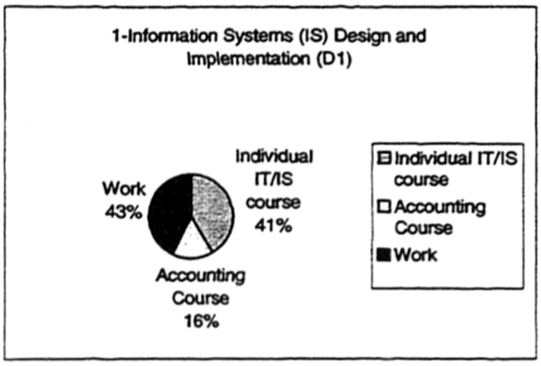


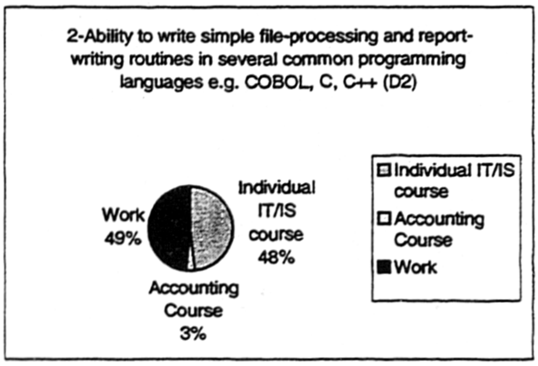
13-Strategic considerations in IT/IS development (M13)

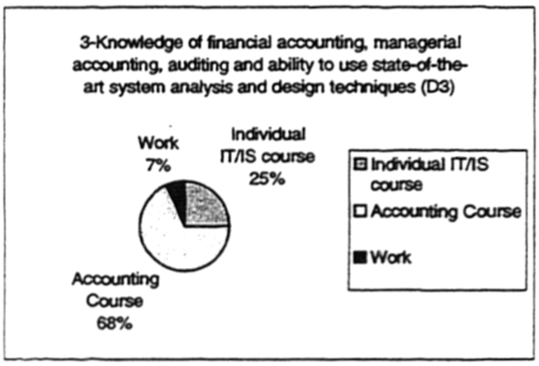


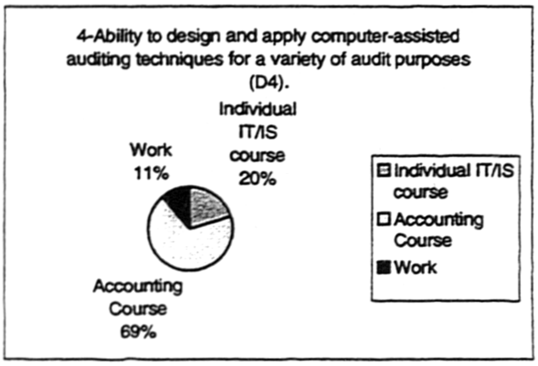
14-Administrative issues (M14)

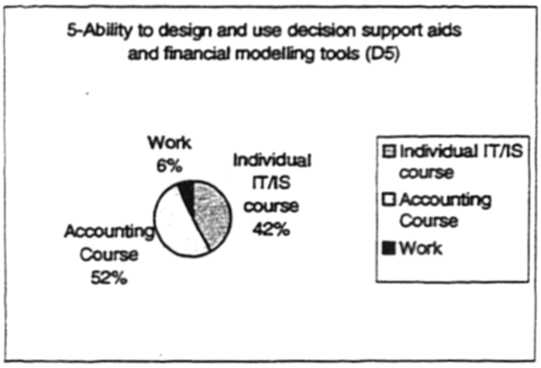


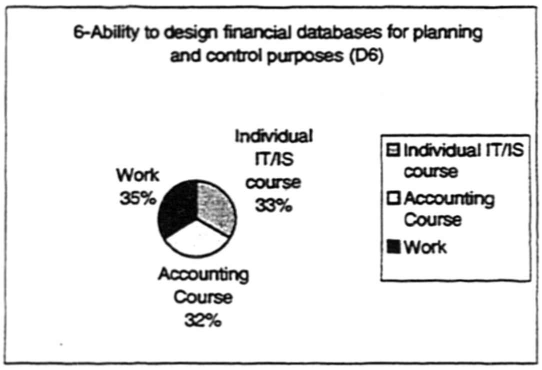

1-Information Systems (IS) Design and Implementation (D1)
Work 43%
Individual IT/IS course 41%
Accounting Course 16%
Individual IT/IS course
Accounting Course
Work


2-Ability to write simple file-processing and report-writing routines in several common programming languages e.g. COBOL, C, C++ (D2)
Work 49%
Individual IT/IS course 48%
Accounting Course 3%
Individual IT/IS course
Accounting Course
Work

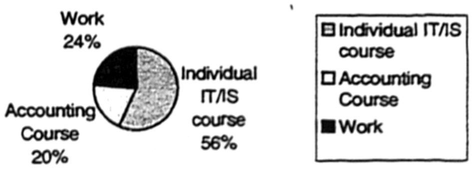

3-Knowledge of financial accounting, managerial accounting, auditing and ability to use state-of-the-art system analysis and design techniques (D3)
Work 7%
Individual IT/IS course 25%
Accounting Course 68%
Individual IT/IS course
Accounting Course
Work


4-Ability to design and apply computer-assisted auditing techniques for a variety of audit purposes (D4).
Work 11%
Individual IT/IS course 20%
Accounting Course 69%
Individual IT/IS course
Accounting Course
Work

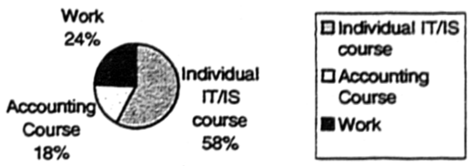

5-Ability to design and use decision support aids and financial modelling tools (D5)
Work 6%
Individual IT/IS course 42%
Accounting Course 52%
Individual IT/IS course
Accounting Course
Work


6-Ability to design financial databases for planning and control purposes (D6)
Work 35%
Individual IT/IS course 33%
Accounting Course 32%
Individual IT/IS course
Accounting Course
Work

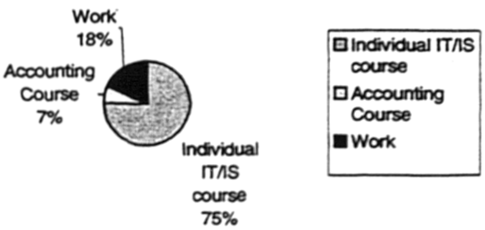
7-Ability to participate as part of a system development team with an appreciation of information system development theories (D7)



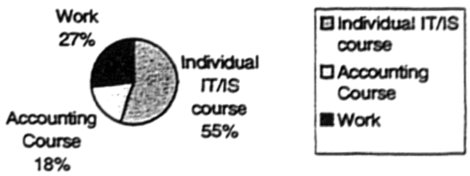
8-Knowledge of and ability to use state-of-the-art system analysis and design techniques (D8)



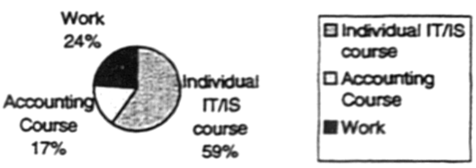
9-Algorithm Concepts and Information Management (D9)



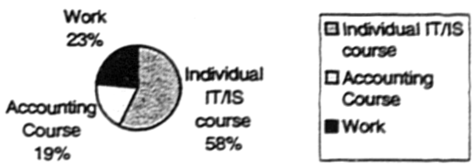
10-Knowledge in the role of information in organisation design and behaviour (D10)



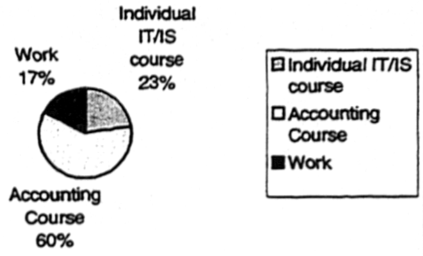
11-System design techniques (D11)



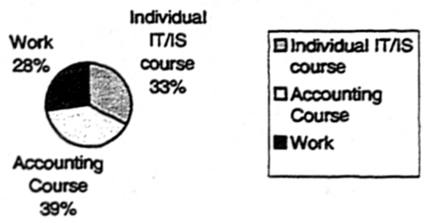
12-System acquisition/development life cycle phases, tasks and practices and maintaining control over system development processes D12)



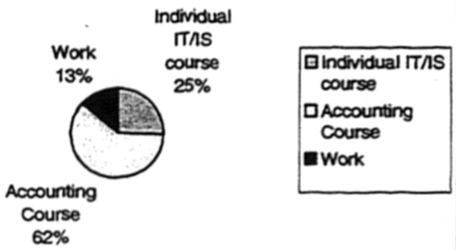
1-Internal control in computer-based systems (E1)



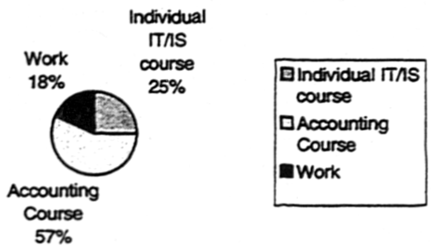
2-Understanding of characteristics of EDP systems, their major components , and methods of operation (E2)



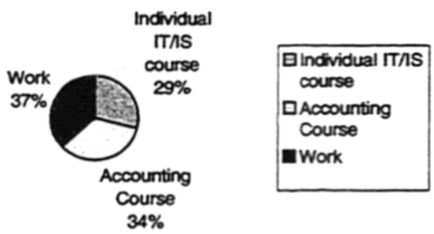
3-Ability to design and apply computer-assisted audit techniques for a variety of audit purposes E3)



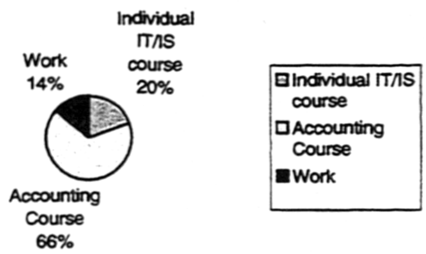
4-Ability to specify, identifies, and documents financial and operational controls in computer-based systems (E4).



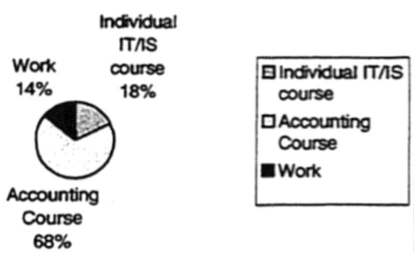
5-Ability to evaluate effectiveness and efficiency of management and operations in computer-based system (E5)



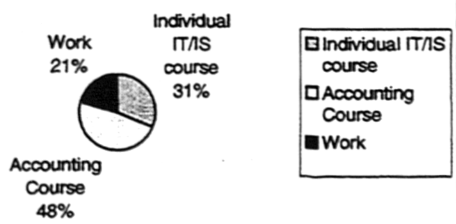
6-Auditing of Accounting Information Systems (E6)



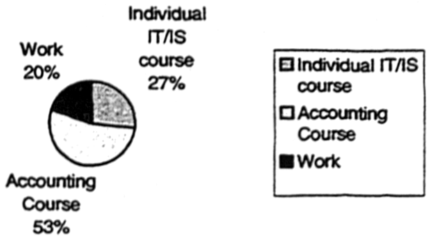
7-Accounting systems internal control (E7)



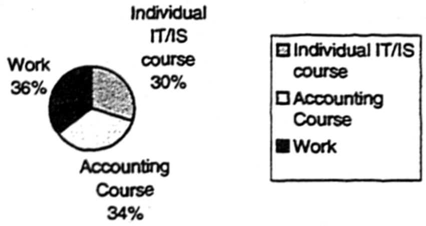
8-Evaluation of Decision Support Systems (E8)



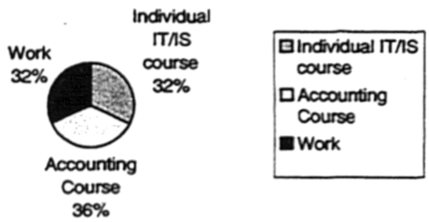
9-Legal, ethical, auditing and information system control standards (E9)



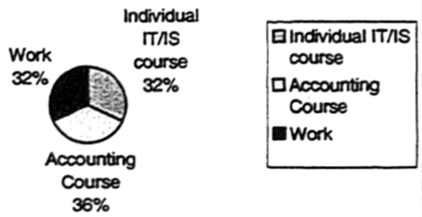
10-Evaluation objectives (E10)



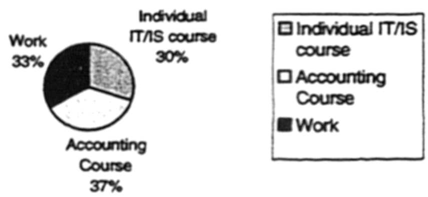
11-Evaluation methods and techniques (E11)



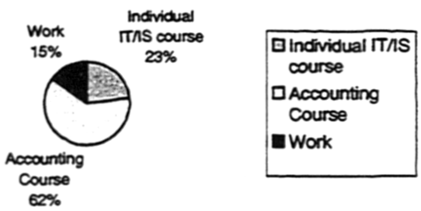
12-Communicating results of evaluations (E12)



13-Specific types of evaluations (E13)



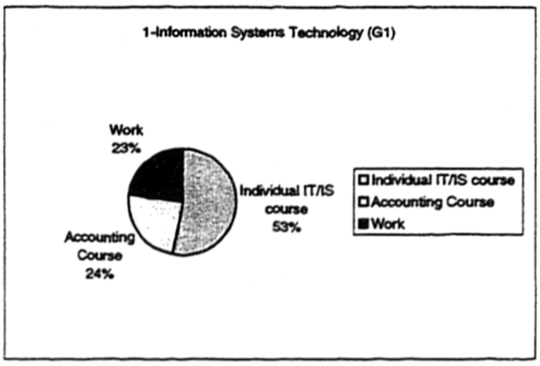
14-Computer-assisted audit techniques (CAATs) (E14)



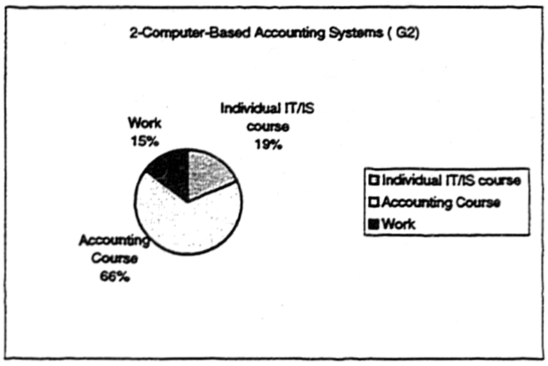
APPENDIX TWENTY SEVEN

(USA, UK, AND EGYPT) RESULTS ABOUT HOW SHOULD IT/IS SKILLS/KNOWLEDGE DELIVERED

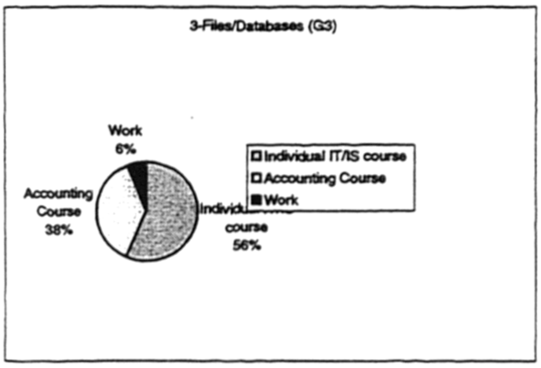
A- GENERAL INFORMATION TECHNOLOGY KNOWLEDGE (USA+UK+EGYPT)



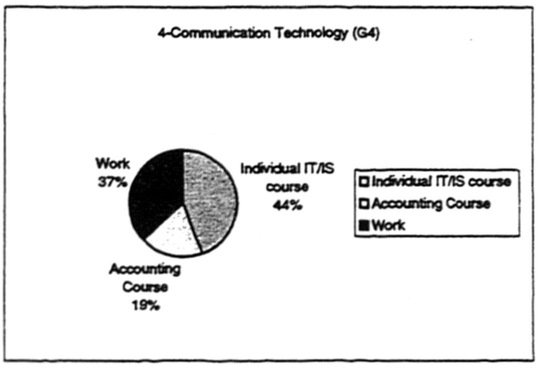
1-Information Systems Technology (G1)



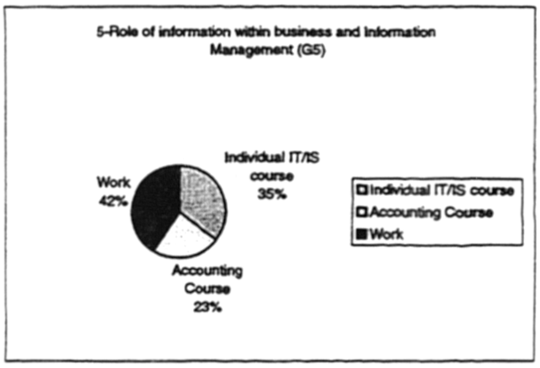
2-Computer-Based Accounting Systems (G2)



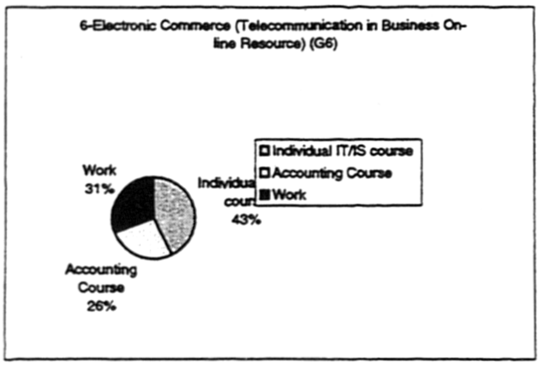
3-Files/Databases (G3)



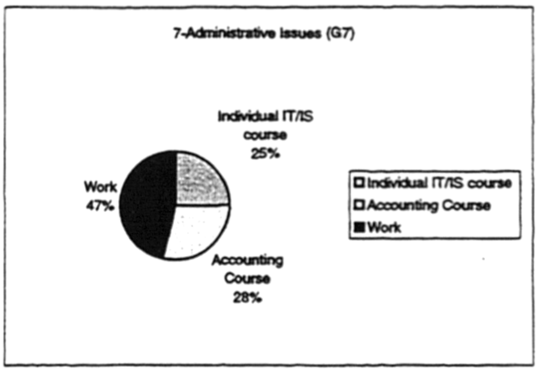
4-Communication Technology (G4)



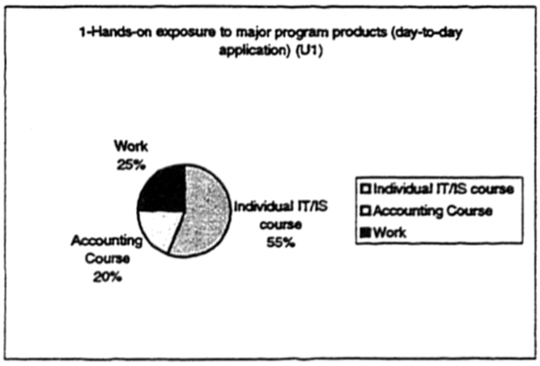
5-Role of information within business and Information Management (G5)



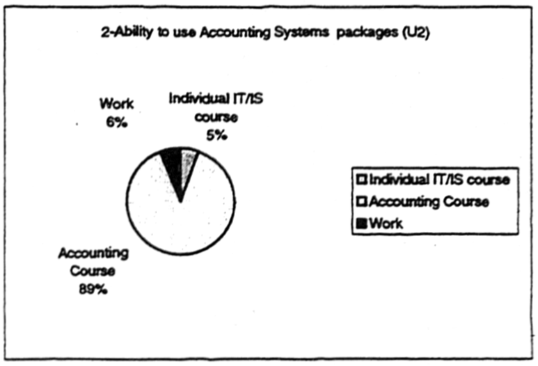
6-Electronic Commerce (Telecommunication in Business On-line Resource) (G6)



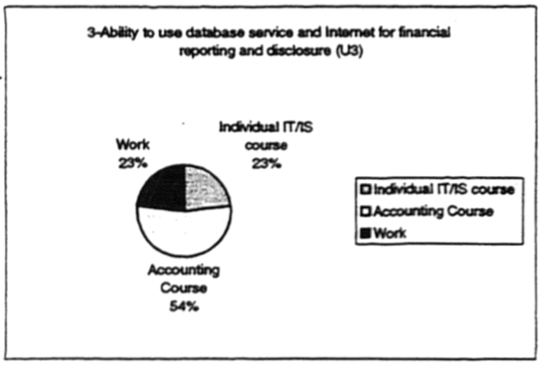
7-Administrative Issues (G7)



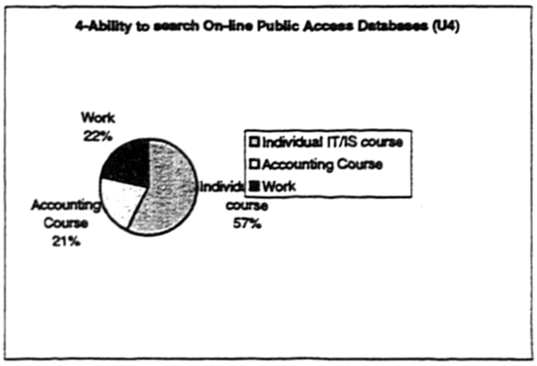
1-Hands-on exposure to major program products (day-to-day application) (U1)



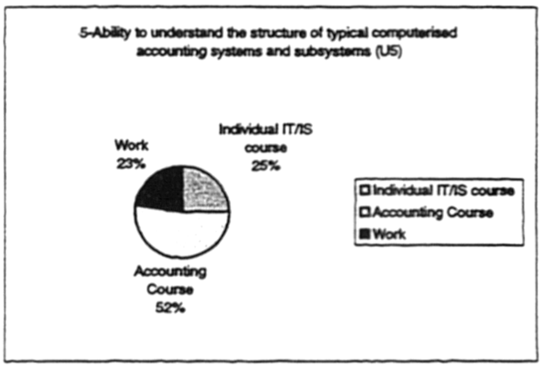
2-Ability to use Accounting Systems packages (U2)



3-Ability to use database service and Internet for financial reporting and disclosure (U3)

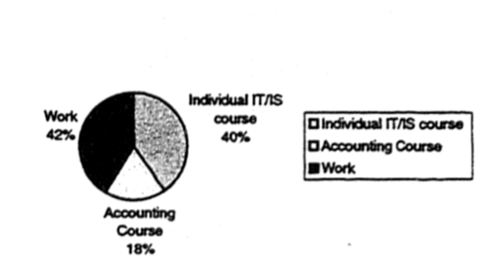


4-Ability to search On-line Public Access Databases (U4)

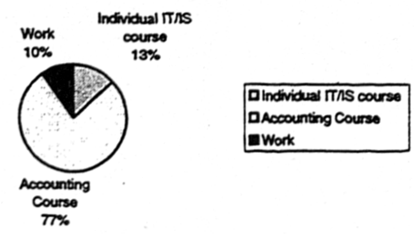


5-Ability to understand the structure of typical computerised accounting systems and subsystems (U5)

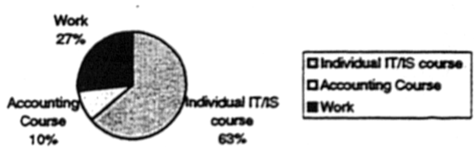
1-Data Resource Structures and Administration (M1)



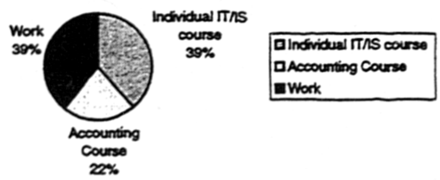
2-Management of Accounting Information Systems (M2)



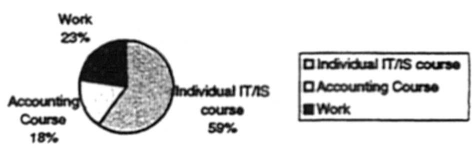
3-Global Information Management (M3)



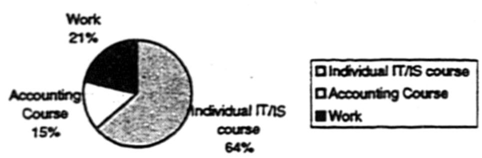
4-Executive Information Systems Management (M4)



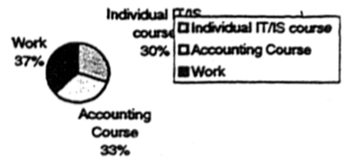
5-Ability to use financial database for planning and control purposes (M5)



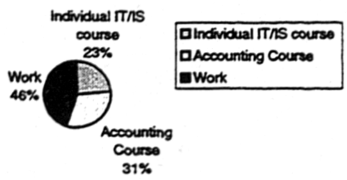
6-Ability for selection and acquisition of hardware/software (M6)



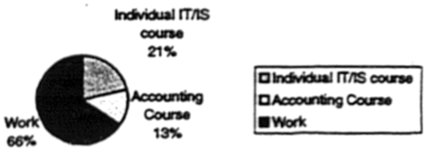
7-Ability for reinforcement of investment analysis using software (M7)



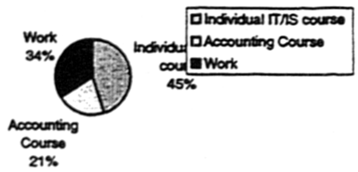
8-Ability to participate as part of system development team worth an appreciation of information and methods, behavioural consequences of project management (M8)



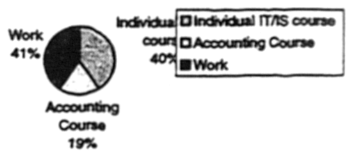
9-Understanding of the methods of operating and managing business systems once implemented (M9)



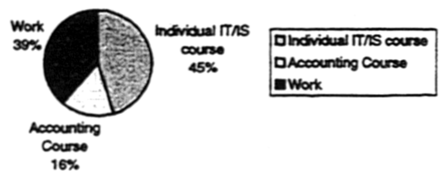
10-Understanding of the system development life cycle, its phases, and management principles for the system development process (M10)



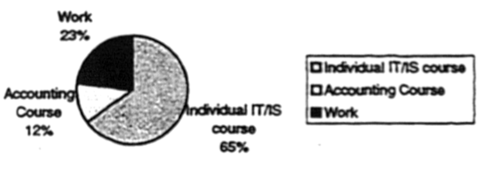
11-Appreciation of the social, economic, and legal implications of computer technology, including effects of automation on work, institutions, and freedoms (M11)



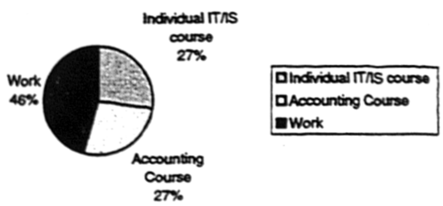
12-Decision Support Systems (M12)

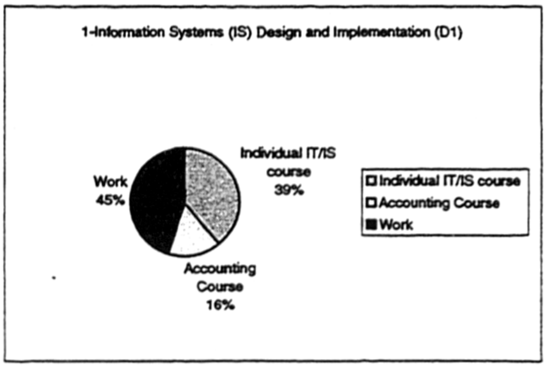


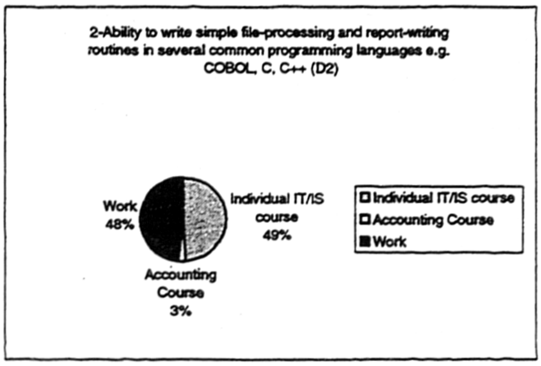
13-Strategic considerations in IT/IS development (M13)

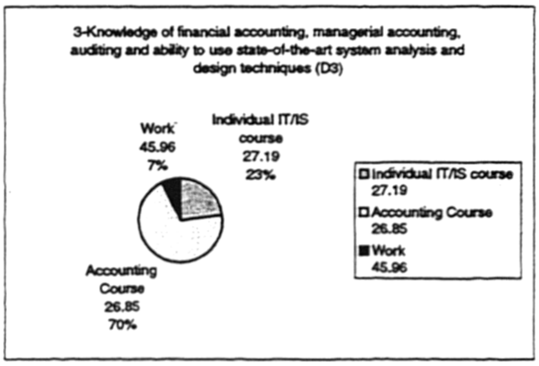


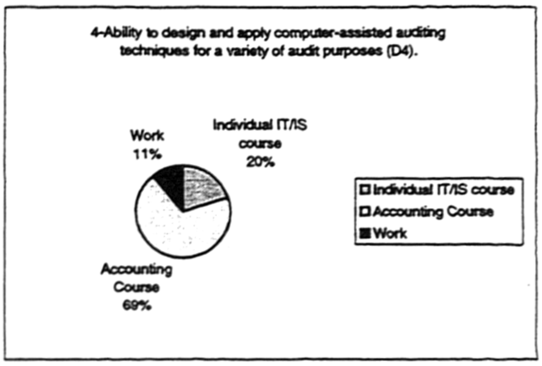
14-Administrative issues (M14)

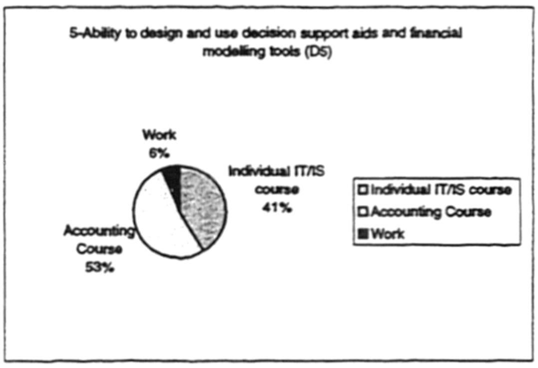


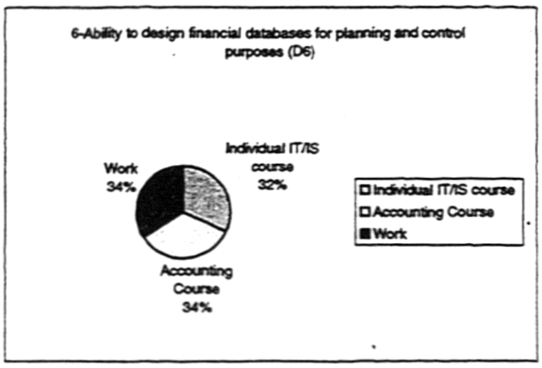

1-Information Systems (IS) Design and Implementation (D1)
Work 45%
Individual IT/IS course 39%
Accounting Course 16%
Individual IT/IS course
Accounting Course
Work


2-Ability to write simple file-processing and report-writing routines in several common programming languages e.g. COBOL, C, C++ (D2)
Work 48%
Individual IT/IS course 49%
Accounting Course 3%
Individual IT/IS course
Accounting Course
Work

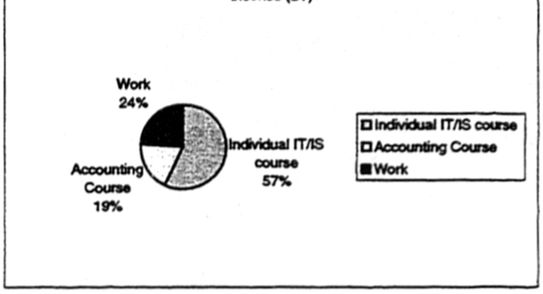

3-Knowledge of financial accounting, managerial accounting, auditing and ability to use state-of-the-art system analysis and design techniques (D3)
Work 45.96 7%
Individual IT/IS course 27.19 23%
Accounting Course 26.85 70%
Individual IT/IS course 27.19
Accounting Course 26.85
Work 45.96


4-Ability to design and apply computer-assisted auditing techniques for a variety of audit purposes (D4).
Work 11%
Individual IT/IS course 20%
Accounting Course 69%
Individual IT/IS course
Accounting Course
Work

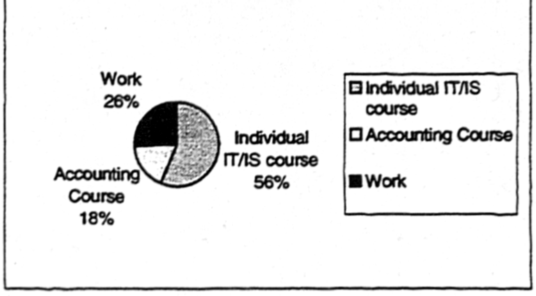

5-Ability to design and use decision support aids and financial modelling tools (D5)
Work 6%
Individual IT/IS course 41%
Accounting Course 53%
Individual IT/IS course
Accounting Course
Work


6-Ability to design financial databases for planning and control purposes (D6)
Work 34%
Individual IT/IS course 32%
Accounting Course 34%
Individual IT/IS course
Accounting Course
Work

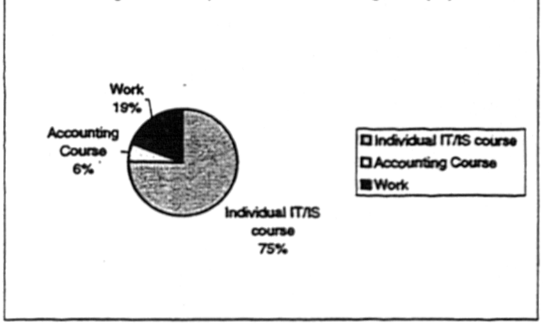
7-Ability to participate as part of a system development team with an appreciation of information system development theories (D7)



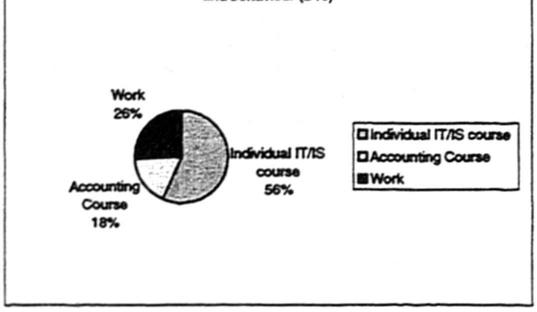
8-Knowledge of and ability to use state-of-the-art system analysis and design techniques (D8)



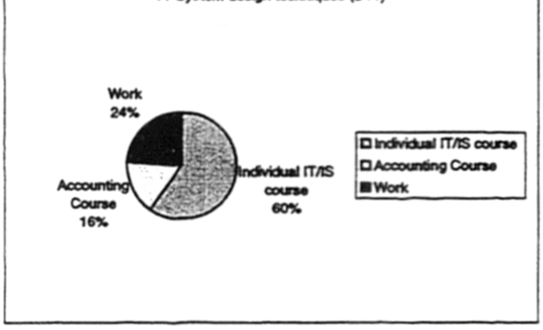
9-Algorithm Concepts and Information Management (D9)



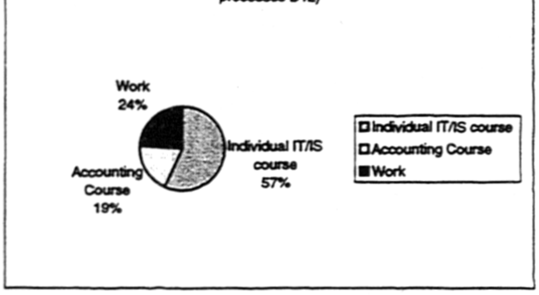
10-Knowledge in the role of information in organisation design and behaviour (D10)



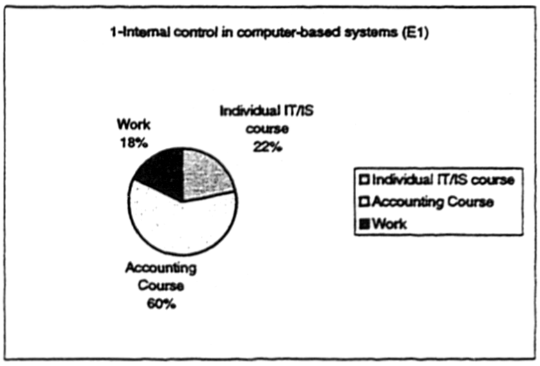
11-System design techniques (D11)

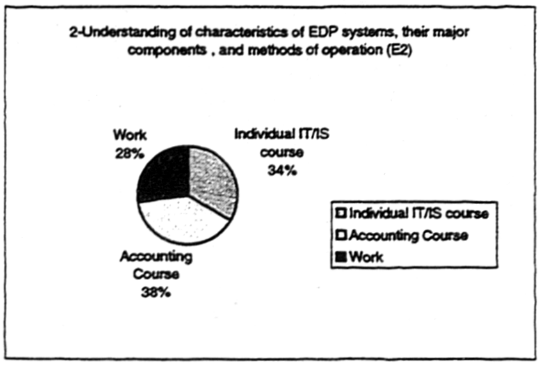


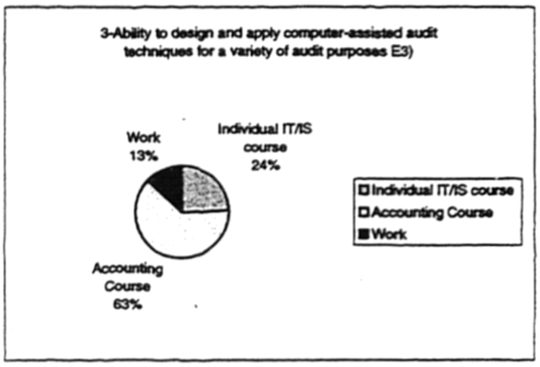
12-System acquisition/development life cycle phases, tasks and practices and maintaining control over system development processes D12)

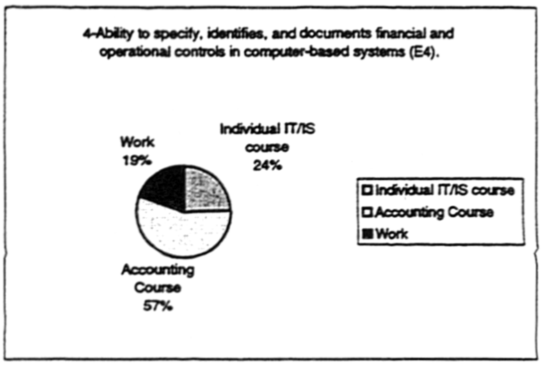


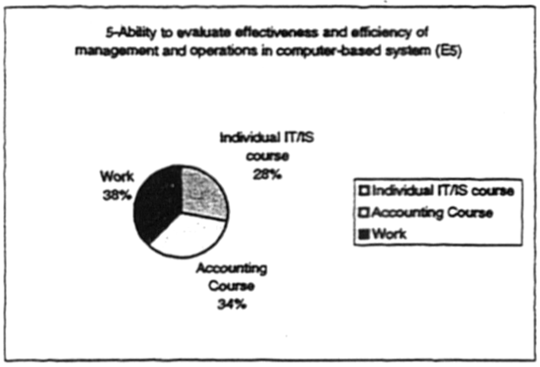
E- IT/IS SKILLS/KNOWLEDGE AS EVALUATOR (USA+UK+EGYPT)

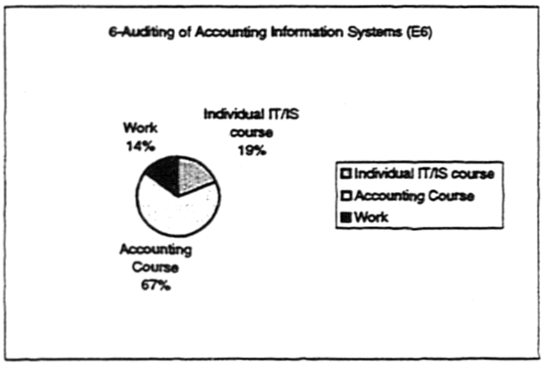






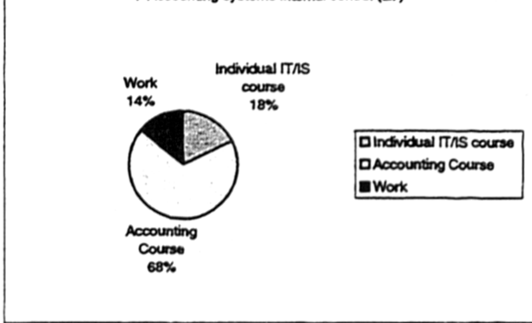




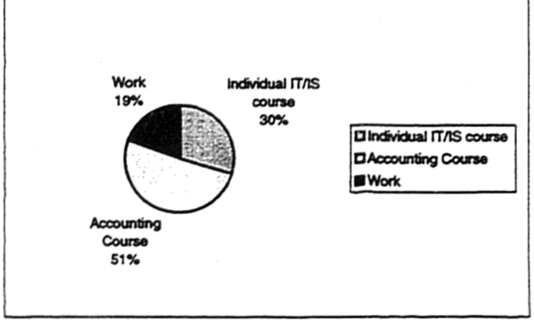


E- IT/IS SKILLS/KNOWLEDGE AS EVALUATOR (USA+UK+EGYPT)

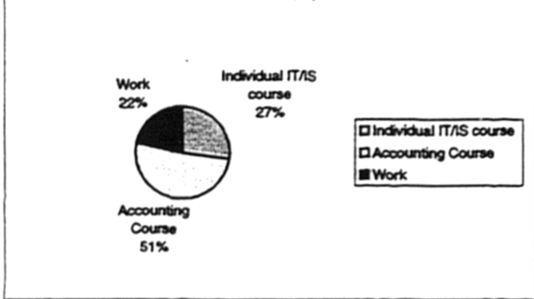
7-Accounting systems internal control (E7)



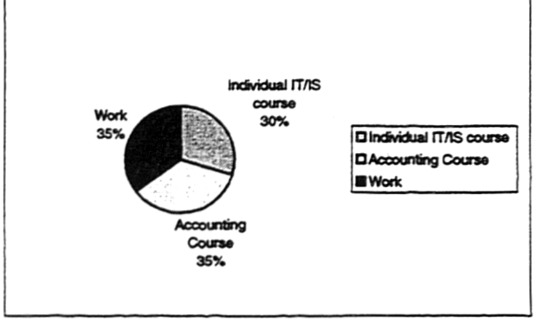
8-Evaluation of Decision Support Systems (E8)



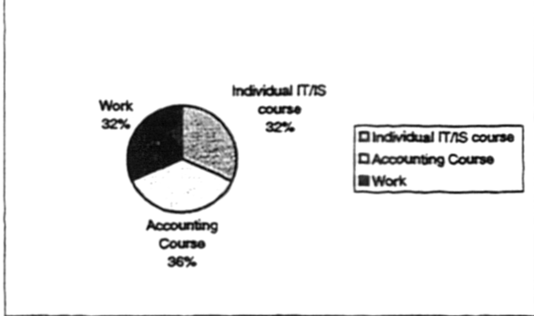
9-Legal, ethical, auditing and information system control standards (E9)



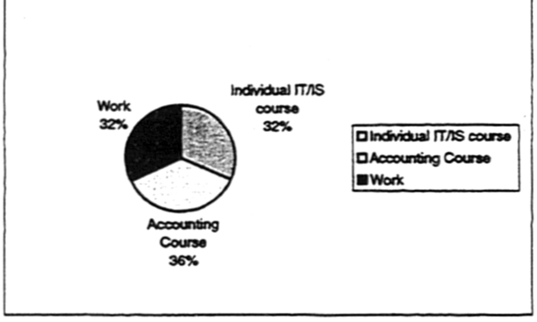
10-Evaluation objectives (E10)



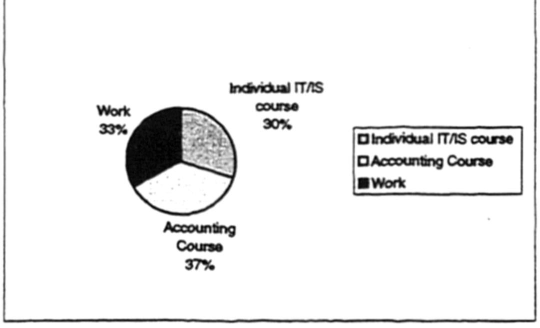
11-Evaluation methods and techniques (E11)



12-Communicating results of evaluations (E12)



13-Specific types of evaluations (E13)



14-Computer-assisted audit techniques (CAATs) (E14)