Mis-alignment between IT knowledge/skills importance and IT knowledge/skills integration level into the accounting curriculum in Egypt

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Abstract

Purpose – This paper aims to investigate the alignment between the information technology (IT) knowledge/skills importance or required by the business environment and the IT knowledge/skills integration level in the accounting curriculum in the specific context of Egyptian universities.

Design/methodology/approach – Data were collected from a survey of 249 accountant lecturers by emails.

Findings – The results indicate that the most important technologies are generalized audit software, embedded audit modules/real-time modules, small business accounting software, computer-aided systems engineering tools, test data and tax return preparation software, and the most technologies integrated in the accounting curriculum in Egypt are wording processing, electronic spreadsheets and electronic presentations. These results mean there is a gap between what is required and what is integrated in the accounting curriculum.

Originality/value – This study is the first attempt to investigate the alignment between the IT required and integrated in the accounting curriculum, especially in Egypt.

Keywords Accounting curriculum, Accounting education, IT alignment, IT knowledge and skills

Paper type Research paper

1. Introduction

Pondering over the recent trends in international businesses, we can assume that there are drastic and rapid changes that are related to information technologies (IT), concentration power in certain market investors and globalization (Arnold and Sutton, 2007). These changes on businesses' operational environment resulted in decreasing the cost of information than before and increasing the level of competition among businesses (Celik and Ecer, 2009).

To some extent, the root of all three of these changes is IT. The integration of IT helped the dissemination of information by quite inexpensive prices through two basic premises of systems: if the rules for deriving information reports can be explained, these rules can be programmed into a system that will produce the standardized report

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required by users. However, if the data about all business events within an enterprise database are captured, this information can be retrieved and any subset can be provided to a user through the construction of database query. This relates directly to the second change, namely, the market investors' demand for additional information. In addition, the reduction in time and effort to communicate globally through electronic commerce applications facilitates the market to be global. In other words, technology helped the growth of globalization (Arnold and Sutton, 2007).

Not only have these changes completely changed the business environment, but they have also had a dramatic impact on the accounting profession in general and the accounting education in particular.

In this respect, Albrecht (2002) argues that there have been three strikes against the accounting profession. First, accounting is no longer seen as a profession that is difficult to practice and understand. Today, almost any one armed with the right software can be an "accountant" and he/she can produce reliable financial information. Second, because competitive levels increase among organizations, stakeholders require high performance on the spot. This demand for immediate results creates a difficult environment for a profession that heavily deals with numbers and calculation. Finally, global competitors often have different cost structures that can be exploited to render obsolete historically successful business models. Therefore, accounting, which in many ways is a traditional profession, has fallen behind the times. So, the auditing practice and education need new skills and knowledge to respond to the recent changes in the business environment (Merhout and Buchman, 2007).

2. Literature review

In response to the rapid use of IT in business environment, the auditing profession requires new updated guidance for auditing conducted in an IT environment. Various authoritative bodies, such as the American Institute of Certified Public Accountant (AICPA), the International Federation of Accountants (IFAC) and the Information System Audit and Control Association, have issued standards in this area (Yang and Guan, 2004). These standards require from the audit practitioners and educators to develop themselves to understand the variety of technology used in business environment (Merhout and Buchman, 2007).

Coenenberg *et al.* (1999) argue that the present accounting educational system of the accounting profession in Germany is not in line with the international standards. They further argue that there are various issues which have to be taken into consideration to meet the challenges of the future. Hermanson *et al.* (1999) examined the integration level of IT in the undergraduate accounting programs across the curriculum in the US universities. Results indicated that integrating IT into the accounting curriculum is important, while few departments have an IT policy, coverage of IT topics is minor to moderate and students' usage of computer applications is fairly low. Additionally, according to Albrecht (2002), the changes that have taken place in the business world have affected the accounting education in several points. He contends that accounting curriculum is irrelevant to the market demands in respect to technology needs, Next, he points out that pedagogy and teaching methods still adopt traditional methods that rely on memorization, which does not develop creativity. This traditional look resulted in focusing too much on content rather than developing students' skills. Those who adopt these traditional practices have the attitude that adopting technology is still cost. To cap

it all, most of the faculties of accountancy are often isolated from their peers in other business school disciplines.

Lin *et al.* (2005) surveyed the required skills and knowledge and pedagogy for accounting education as perceived by accounting practitioners, lecturers and students in China. Results revealed the respondents generally agreed on the number of IT knowledge and skills subjects that should be developed in China accounting education, although some variance exists among respondents regarding the perceived importance of those IT knowledge and skills. The results also revealed that the respondents believed that the current state of accounting education in China could not satisfy the development of the needed IT knowledge and skills. Similarly, Chandra *et al.* (2006) surveyed about the gap between IT skills demanded of management accountants and those supplied by higher education. The results suggested that accounting students are not being taught the IT skills required by the business world.

Ahmed (2003) surveyed what IT skills and knowledge accountants should possess, which skills and knowledge employers expect them to have and which skills and knowledge employers prefer them to have. The study also investigated the level of IT skills and knowledge integrated in accounting education in UK universities. The results suggested that accounting education did not equip the students with sufficient IT skills and knowledge for their potential role in their employment. In addition, there is a gap between the IT skills and knowledge that students currently learn in accounting education at the university level and what accountants practice in the real world.

Harrast *et al.* (2010) analyze the technology skills of undergraduate accounting students to determine their technological strengths and weaknesses. They found that a large fraction of students are not proficient in requisite technologies even after completing the majority of their undergraduate accounting course work. This supports the argument that the accounting curriculum would benefit from an increase in technology training. Furthermore, the technologies students were most interested in learning were tax software, small business accounting, generalized audit software and spreadsheets.

Accounting education should provide students not only with the IT knowledge and skills required, but also with the know-how that enables students to apply those skills. Moreover, it should provide them with the wisdom, critical ability and ethics needed for them to make the right decision at the right time (Mohamed and Lashien, 2003). Arguing in a similar vein, Greenstein and Mckee (2004) contend that there is a low level of knowledge for e-commerce, advanced technologies and audit automation constructs among educators and practitioners. On the other side, there is a relatively high level of knowledge for office automation and accounting firm office automation constructs. Greenstein and Mckee (2004) contend that there is a learning gap between educators and practitioners.

Literature is rich with evidence that IT auditor must have interpersonal skills to interact with multiple levels of personal and technical skills to understand the variety of technology used in organizations (Greenstein and McKee, 2004; Merhout and Buchman, 2007; Brazel and Agoglia, 2007; Janvrin *et al.*, 2008; Helliar *et al.*, 2009). There is also an argument that the education required of students entering the job market today with a degree in accounting should be very different from the education provided 25 or more years ago in a world driven by manual processes or computerized systems that simply

automated the manual processes (Merhout and Buchman, 2007; Arnold and Sutton, 2007; Helliar *et al.*, 2009).

Generally, previous studies have attempted to identify and address the IT knowledge level (Coenenberg *et al.*, 1999; Merhout and Buchman, 2007) or the importance of IT knowledge and skills (Greenstein and Mckee, 2004; Greenstein *et al.*, 2008; Janvrin *et al.*, 2008; Helliar *et al.*, 2009) among professionals. Few have attempted to investigate the alignment between IT knowledge and importance to the current accountants' role (Ismail and Abidin, 2009; Rai *et al.*, 2010). Furthermore, most of prior studies have been conducted in developed countries, with very few of them having been conducted in developing countries such as China (Lin, 2008), Turkey (Celik and Ecer, 2009) and Malaysia (Ismail *et al.*, 2005), and no one attempted to investigate the alignment between the IT knowledge/skills importance or required by the business environment and the IT skills integrated in the accounting curriculum.

Egypt is one of the developing countries that have not effectively bridged the gap between the skills needed by the IT environment and the accounting education. Accounting education in university level in Egypt is characterized by the high ratio of students to lecturers. The average ratio in accounting department of public universities is about one lecturer for every one thousand students. This high ratio leads to difficulties in communication between students and lecturers and hinders effective teaching and learning processes (Rahman *et al.*, 2002). Furthermore, according to Rahman *et al.* (2002), undergraduate-level accounting and auditing courses lack the appropriate textbooks and educational materials in international accounting and auditing standards. However, the quality of accounting education at the postgraduate level is better because the curriculum includes international accounting and auditing standards, besides its emphasis on empirical research. In addition, the technological advancement in accounting education is hindered by the lack of financial resources and basic infrastructures among the public universities, and the adoption and integration of technology knowledge/skills in accounting curriculum is still weak among the public universities (Dahawy *et al.*, 2005). Considering the high ratio of lecturers to students and the lack of investment on technology wouldn't facilitate the self-learning process (Gerjets and Hesse, 2004). To achieve development in accounting profession, accounting students need to be familiar with the current technology (Mohamed and Lashine, 2003).

3. Methodology

This study used a list of 35 technologies which were used in prior studies by Greenstein and Mckee (2004), Greenstein *et al.* (2008) and Ismail and Abidin (2009) to identify the IT knowledge and skills. The reason is those technologies were already investigated and tested by IFAC, AICPA and previous researchers.

This study used the Internet-based questionnaire with emails to gather data relating to this study. However, prior to the actual survey, the questionnaire was pre-tested with five accounting lecturers in Malaysia and five accounting lecturers in Egypt Generally, they all agreed with the importance and contribution of the study to the accounting education in Egypt. Based on their comments, some modifications were made on the original questionnaire.

The population is a total collection of elements actually available for sampling, and it can be a group of people, events or things of interests that the researchers wish to investigate (Sapsford and Jupp, 2006). This study investigates the gap between the IT

knowledge and skills integrated into the accounting curriculum, and the IT knowledge and skills required by business environment. Therefore, the population of this study is the accounting lecturers in the Egyptian universities. Accounting lecturers in Egypt have the knowledge of what the employers need because most of them are also engaged in accounting and auditing profession, whether through their private offices or as advisers to public or private companies. The Accounting Practice Law 133 allows accounting lecturers with more than three years' teaching experience also to practice accountancy. Due to the difficulty to get the number of lecturers engaged in accounting and auditing profession, there are currently 554 accounting lecturers in 17 public universities in Egypt, considered to be the population of this study (Supreme Council of Egyptian Universities, 2010). Considering the limited number of accounting lecturers in Egypt, and the difficulty of obtaining the number of lecturers who are also practicing accountants, the present research includes all accounting lecturers engaged in the accounting and auditing profession in Egypt. They were selected by answering question about their experience as a professional accountant.

A total of 554 questionnaires were emailed to the accounting lecturers in Egypt. In all, 323 questionnaires were returned with complete answers, giving a response rate of 69.02 per cent. Respondents were asked to identify their experience as an professional accountant and non-professional accountants were excluded (while non-professional respondents [lecturers] may correctly answer questions related to the level of integration into the curriculum, they may not have sufficient knowledge to answer correctly questions related to the importance [relevance] of those technologies in practice), so the number of questionnaires used for further analysis was 249. Respondents were asked to measure their perceptions of the importance of 35 technologies. Each question used a 5-point scale, where the score of 1 was headed "not important" and the score of 5 was headed "very important". Furthermore, respondents were asked to indicate the integration level of 35 technologies in the accounting curriculum using a 5-point scale from1 (not integrated) to 5 (fully integrated).

4. Analysis of results

4.1 Demographic results

Table I presents the demographical results of the 249 lecturers who responded to the questionnaire; the majority of them were male (90 per cent) and rest (10 per cent) were female. A large proportion of the respondents were aged $>$ 45 years (73.5 per cent), 26.1 per cent were between 35 and 45 years and the remaining 0.4 per cent were $<$ 35 years. The majority of respondents were professors (39.8 per cent), 35.7 per cent were lecturers and 24.5 per cent were assistant professors. In all, 90 per cent of respondents have had academician working experience over 15 years. Furthermore, in the case of respondents having high experience level in technologies, 89.6 per cent were experts on using word processing application, 71.9 per cent of respondents were experts on using electronic spreadsheets application, 78.3 per cent were experts on using electronic presentations application, 53.8 per cent were experts on using the accounting applications and 45 per cent were experts on using the tax return preparation applications.

4.2 Perception of IT importance

The survey questionnaire asked the accounting lecturers to rate their perceptions of importance and integration level of each IT knowledge/skills on a 5-point scale. The

Title	Respondents' demographic	Frequency	Per cent
Gender	Male	224	90.0
	Female	10	10.0
Age	< 35 years	1	0.4
	35-45 years	65	26.1
	46 years and older	183	73.5
Academic experience	< 10 years	3	1.2
	10-15 years	22	8.8
	> 15 years	224	90.0
Current position	Professor	99	39.8
	Assistant Professor	61	24.5
	Lecturer	89	35.7
Technology experience (expert)	Word processing application	223	89.6
	Electronic spreadsheets application	179	71.9
	Electronic presentations application	195	78.3.
	Accounting application	134	53.8
	Tax return preparation application	112	45

Table I.
Respondents' demographic information

mean value of the responses for each of the 35 technologies' importance is shown in Table II. We chose the midpoint of the response range as benchmark. Using a 5-point scale, the midpoint is 2.5 (Greenstein and Mckee, 2004). The results of Table II show that the mean values for 35 items are above the midpoint. The technologies range between 2.57 and 4.89 and the mean value for about 94 per cent (33 item/35 item) of the technologies ranks between 3.51 and 4.89, which implies that most of the accounting lecturers in the sample perceived that technologies' items are important for the accounting curriculum to be integrated. The highest mean value for the technologies is for generalized audit software, followed, in descending order, by embedded audit modules/real-time modules, word processing, electronic spreadsheets, small business accounting software, computer-aided systems engineering tools, test data and tax return preparation software. This finding suggests that technologies related to the accounting and auditing process are seen to be the most important technologies among the respondents. Generalized audit software, embedded audit modules/real-time modules, small business accounting software, computer-aided systems engineering tools, electronic working papers, test data and tax return preparation software are among the most important ten items. Technologies related to the office automation like word processing, electronic spreadsheets and electronic presentation received third, fourth and tenth highest ranking, respectively. This finding reveals the respondents' characteristic. This is that each of the respondents had a professional experience and professional qualifications in accounting. Therefore, they were focused on the technologies related to the practice of accounting and auditing profession such as generalized audit software, embedded audit modules/real-time modules and small business accounting software first and the technologies related to the office automation such as word processing, electronic spreadsheets and electronic presentation second.

4.3 Perception of IT integration level

Table II shows the mean value of 35 technologies, most of technologies are below the midpoint (26 items) and only nine items are above the midpoint (2.5). This result

Technology	Importance Mean	Importance Rank	Integrated Mean	Integrated Rank
Word processing	4.87	3	4.39	1
Electronic spreadsheets	4.82	4	4.18	2
Email	4.64	12	1.90	18
Internet search and retrieval	4.64	13	1.62	22
Image processing	4.14	23	1.38	28
Electronic presentations	4.69	10	3.91	3
Groupware	4.46	18	1.26	33
Small business accounting software	4.81	5	2.26	10
Tax return preparation software	4.72	9	1.65	20
Time management and billing systems	4.34	19	1.98	16
Electronic working papers	4.79	6	2.51	9
Generalized audit software	4.89	1	2.24	11
Embedded audit modules/real-time audit modules	4.89	2	2.03	15
Expert systems	4.26	21	2.24	12
Firewall (software/hardware)	4.30	20	1.50	24
External network configurations	3.52	32	1.34	31
User authentication systems	4.14	24	1.65	21
Internal network configurations	2.57	35	1.35	30
Intrusion detection and monitoring	3.91	28	1.37	29
Wireless communications	3.71	30	1.53	23
Digital communications	3.97	27	1.49	25
Encryption software	4.52	15	1.83	19
EDI–traditional	4.60	14	2.05	14
EDI–web-based	4.67	11	1.33	32
Agent technologies	3.56	31	1.42	27
Database search and retrieval	4.47	17	3.28	4
Simulation software	3.81	29	2.67	8
Flowcharting/data modeling	4.09	25	2.78	7
Computer-aided systems (CASE) engineering tools	4.78	7	1.92	17
Cooperative client/server environment	3.52	33	1.19	34
Workflow technology	4.01	26	2.15	13
Database design and installation	4.52	16	3.03	6
Test data	4.74	8	3.13	5
Enterprise resource planning	4.17	22	1.45	26
Application service providers	2.76	34	1.03	35

Table II.
Compare the mean rank among IT importance, integration and the alignment

suggests that most of the technologies are not fully integrated in the accounting curriculum in Egypt. For example, generalized audit software, which was rated by respondents as the most important item with mean value of 4.89, received a mean value of 2.24 and ranked 11th.

The highest mean value of the technologies integrated in the accounting curriculum in Egypt is for wording processing, followed, in descending order, by electronic spreadsheets, and electronic presentations. This result reveals that the accounting curriculum in Egypt focuses first on office automation, second on system design and implementation (database search and retrieval, test data, database design and installation, flowcharting/data modeling and simulation software) and third

on accounting and auditing automation (electronic working paper, small business accounting software, generalized audit software and expert systems). These findings are different from the importance of technologies' results, which indicate the accounting and audit automation are the most important technologies. This means that there is a gap between the IT knowledge/skills currently integrated in the accounting curriculum in Egypt and the importance of IT knowledge/skills in the perception of accounting lecturers for the graduates.

4.4 The alignment

To understand the relationship between importance and integration of IT knowledge/skills, a cross-tabulation technique was used. To simplify the analysis, responses of "1" and "2" for IT knowledge/skills importance were combined into one category called "not important". Similarly, responses of "4" and "5" were combined into one category called "important", while responses of "3" were left unchanged and indicated as being "less important". The same approach was applied to IT knowledge/skills integration. Responses of "1" and "2" were combined into one category called "not integrated". Similarly, responses of "4" and "5" were grouped into one category called "integrated", while responses of "3" were left unchanged and called "partially integrated". The italic-bold font was used to make it easy to identify large occurrences. The italic-bold font represents very high occurrences (100 or more), while the bold font represents high occurrences (50 and above but less than 100) (Ismail, 2004). Table III shows a summary of the results of the cross-tabulation between the IT knowledge/skills importance and integration.

From Table III, it is observed that three different patterns of IT knowledge/skills importance–IT knowledge/skills integrated emerged. The first pattern refers to a group of items with a very large number of occurrences (100 or more) for the category of "important - integrated". In this group, many lecturers perceived that these types of technology are important and required for accounting graduates. They also perceived that these technologies are currently being integrated in the accounting curriculum. Therefore, it is reasonable to label this group as the "aligned" group.

The second pattern refers to a group of items with a very large number of occurrences (100 or more) in categories of "important - not integrated" and "less important - not integrated". This group includes most of the IT knowledge/skills items (26 items). While many lecturers perceived that these IT knowledge/skills are important or less important, many also perceived that these IT knowledge/skills are not being currently integrated into the accounting curriculum. Therefore, it is reasonable to label this group of variables as the "non-aligned" group.

The third and final pattern represents a group of items that received an important rating but a mixture of responses for the integration (not integrated or partly integrated). Result for these items suggests that while many of the lecturers perceived these items are important or required for the accounting graduates, many also perceived that these IT knowledge/skills are not being integrated or partly integrated into the accounting curriculum. Therefore, it is reasonable to label this group as the "mixed" group. Table IV summarizes the three different types of alignment groups.

For the aligned group, the order of alignment is based on the value in the category of "important-integrated". Table IV shows that word processing had the highest value in

Technological importance	Integration: Not integrated	Partly integrated	Integrated	Total
Word processing				
Not important	0	0	0	0
Less important	0	0	0	0
Important	0	34	*215*	249
Total	0	34	215	249
Electronic spreadsheets				
Not important	0	0	0	0
Less important	0	0	1	1
Important	0	49	*199*	248
Total	0	49	200	**249**
Email				
Not important	1	0	0	1
Less important	5	3	0	8
Important	*188*	46	6	240
Total	194	49	6	249
Internet search and retrieval				
Not important	0	0	0	0
Less important	8	3	0	11
Important	*211*	22	5	238
Total	219	25	5	249
Image processing				
Not important	4	0	0	4
Less important	40	1	0	41
Important	*196*	8	0	204
Total	240	9	0	249
Electronic presentations				
Not important	0	0	0	0
Less important	0	1	6	7
Important	3	**68**	*171*	242
Total	3	69	177	249
Groupware				
Not important	2	0	0	2
Less important	12	0	0	12
Important	*231*	4	0	235
Total	245	4	0	249
Small business accounting software				
Not important	0	0	0	0
Less important	0	0	0	0
Important	*184*	**59**	6	249
Total	184	59	6	249
Tax return preparation software				
Not important	3	0	0	3
Less important	0	0	0	0
Important	*215*	20	11	246
Total	218	20	11	249
Time management and billing systems				
Not important	1	0	0	1
Less important	18	4	0	22
Important	*184*	38	4	226
Total	203	42	4	249

(*continued*)

Table III.
A summary of IT knowledge/skills importance and integration

Technological importance	Integration: Not integrated	Partly integrated	Integrated	Total
Electronic working papers				
Not important	1	0	0	1
Less important	2	0	0	2
Important	**80**	**96**	**70**	246
Total	83	96	70	249
Generalized audit software				
Not important	0	0	0	0
Less important	1	0	1	2
Important	*153*	**77**	17	247
Total	154	77	18	249
Embedded audit modules/real-time audit modules				
Not important	0	0	0	0
Less important	0	0	0	0
Important	*184*	**60**	5	249
Total	184	60	5	249
Expert systems				
Not important	0	0	0	0
Less important	30	6	1	37
Important	*128*	**67**	17	212
Total	158	73	18	249
Firewall (software/hardware)				
Not important	4	0	1	5
Less important	23	1	0	24
Important	*199*	20	3	222
Total	226	21	4	251
External network configurations				
Not important	33	1	0	34
Less important	**90**	1	2	93
Important	*119*	2	1	122
Total	242	4	3	249
User authentication systems				
Not important	4	1	0	5
Less important	39	3	2	44
Important	*177*	22	1	200
Total	220	26	3	249
Internal network configurations				
Not important	*115*	1	0	116
Less important	*117*	1	0	118
Important	15	0	0	15
Total	247	2	0	249
Intrusion detection and monitoring				
Not important	16	0	0	16
Less important	**74**	3	1	78
Important	*144*	9	2	155
Total	234	12	3	249
Wireless communications				
Not important	15	2	0	17
Less important	**75**	5	1	81
Important	*143*	8	0	151
Total	233	15	1	249

Table III.

(*continued*)

Technological importance	Integration: Not integrated	Partly integrated	Integrated	Total
Digital communications				
Not important	8	2	0	10
Less important	**53**	3	0	56
Important	*174*	5	4	183
Total	235	10	4	249
Encryption software				
Not important	1	1	0	2
Less important	5	0	0	5
Important	*196*	32	14	242
Total	202	33	14	249
EDI–traditional				
Not important	1	0	0	1
Less important	4	2	0	6
Important	*169*	46	26	241
Total	174	48	26	248
EDI–web-based				
Not important	2	0	0	2
Less important	8	0	0	8
Important	*238*	1	0	239
Total	248	1	0	249
Agent technologies				
Not important	9	1	0	10
Less important	**99**	4	0	103
Important	*130*	6	0	136
Total	238	11	0	249
Database search and retrieval				
Not important	0	1	0	1
Less important	6	7	2	15
Important	48	**88**	**97**	233
Total	54	96	99	249
Simulation software				
Not important	4	4	1	9
Less important	44	25	3	72
Important	**79**	**58**	31	168
Total	127	87	35	249
Flowcharting/data modeling				
Not important	4	0	0	4
Less important	21	13	5	39
Important	**99**	**74**	30	203
Total	124	87	35	249
Computer-aided systems (CASE) engineering tools				
Not important	0	0	0	0
Less important	0	0	0	0
Important	*230*	16	3	249
Total	230	16	3	249
Cooperative client/server environment				
Not important	14	0	0	14
Less important	**97**	0	0	97
Important	*136*	0	0	136
Total	247	0	0	247

(*continued*)

Table III.

Technological importance	Integration: Not integrated	Partly integrated	Integrated	Total
Workflow technology				
Not important	6	2	1	9
Less important	28	15	1	44
Important	*139*	49	8	196
Total	173	66	10	249
Database design and installation				
Not important	2	0	0	2
Less important	3	9	3	15
Important	**79**	*97*	**56**	232
Total	84	106	59	249
Test data	0	0	0	0
Not important				
Less important	0	1	0	1
Important	**75**	*107*	**66**	248
Total	75	108	66	249
Enterprise resource planning				
Not important	4	0	0	4
Less important	43	0	0	43
Important	*200*	2	0	202
Total	247	2	0	249
Application service providers	**87**	0	0	87
Not important				
Less important	*101*	0	0	101
Important	**60**	1	0	61
Total	248	1	0	249

Table III.

that category and therefore the most aligned variable. On the other end, database search and retrieval had the lowest values and therefore the least aligned variable in the aligned group. For the mixed group, the order of alignment is based on the value in the category of "important-partly integrated". Table IV shows that test data appeared to have the highest value and therefore the most aligned variable in the mixed group, while simulation software had the lowest value and thus the least aligned variable in this group. Finally, the order of alignment in the non-aligned group is based on the value in the category of "important-not integrated". From Table IV, it appears that application service providers had the lowest value and therefore the most aligned variable in the non-aligned group. On the other end, tax return preparation software had the highest value and therefore the least aligned variable in the non-aligned group.

To further explore the alignment between the importance and integration of IT, we adopt the matching approach using deviation score analysis proposed by Venkatraman (1989). He suggests a method to measure the alignment by computing the absolute differences between the rating of IT knowledge/skills importance and the rating of the IT knowledge/skills integration level. A low value for the difference indicates that the alignment between the two variables is high, while a high value for the difference implies that there is a high degree of misalignment. The mean difference for each IT knowledge/skills is calculated by summing up the absolute difference for all responses

Aligned	Mixed	Non-aligned
Word processing	Test data	Application service providers
Electronic spreadsheets	Electronic working papers	Cooperative client/server environment
Electronic presentations	Database design and installation	External network configurations
	Flowcharting/data modeling	Internal network configurations
	Simulation software	Workflow technology
	Database search and retrieval	Agent technology
		Expert systems
		Wireless communications
		Intrusion detection and monitoring
		Generalized audit software
		EDI–traditional
		Time management and billing systems
		Digital communications
		User authentication systems
		Small business accounting software
		Embedded audit modules/real-time audit modules
		Email
		Enterprise resource planning
		Image processing
		Firewall (software/hardware)
		Encryption software
		Internet search and retrieval
		Computer-aided systems (CASE) engineering tools
		Groupware
		EDI–web-based
		Tax return preparation software

Note: Variables in each group are listed in descending order

Table IV.
A summary of alignment groups of 35 items

and divided by the number of responses. A mathematical representation of the above is as follows:

$$\text{Mean Difference} = \text{sum of absolute value of } [\text{required (Importance) IT knowledgeand skills rating} - \text{integration level of IT knowledge and skills rating}] / N$$

Table V shows that word processing, electronic spreadsheets, electronic presentations, internal network configurations and database research are most aligned with IT knowledge/skills integration level for the respondents in the sample. The greatest mismatching is observed for advanced technologies such as EDI – web-based, groupware, tax return preparation software and Internet search and retrieval. These results are consistent with those of the cross-tabulation technique.

Technologies	Mean	Rank
Word processing	0.63	1
Electronic spreadsheets	0.84	2
Electronic presentations	0.98	3
Internal network configurations	1.22	4
Database search and retrieval	1.37	5
Simulation software	1.51	6
Flowcharting/data modeling	1.70	7
Database design and installation	1.78	8
Electronic working papers	1.87	9
Test data	1.88	10
Application service providers	1.95	11
Expert systems	1.97	12
Workflow technology	2.07	13
Wireless communications	2.16	14
Agent technologies	2.16	15
External network configurations	2.19	16
Cooperative client/server environment	2.42	17
User authentication systems	2.46	18
Digital communications	2.47	19
Time management and billing systems	2.47	20
EDI–traditional	2.50	21
Intrusion detection and monitoring	2.53	22
Encryption software	2.66	23
Small business accounting software	2.69	24
Generalized audit software	2.691	25
Email	2.74	26
Image processing	2.75	27
Enterprise resource planning	2.78	28
Firewall (software/hardware)	2.79	29
Embedded audit modules/real-time audit modules	2.86	30
Computer-aided systems engineering (CASE)	2.87	31
Tax return preparation software	2.88	32
Internet search and retrieval	3.03	33
Groupware	3.17	34
EDI–web-based	3.35	35

Table V.
Mean rating (matching approach) for IT alignment

5. Conclusion, limitations and future research

This study aims to achieve three objectives. The first objective is to identify the IT knowledge/skills required for accounting students as perceived by accounting lecturers in Egypt. Based on a sample of 249 accounting lecturers in Egypt, this study showed that most accounting lecturers perceived that it is important that all technologies listed in the survey to be integrated into the accounting curriculum. Results indicated that technologies related to the accounting and auditing process are seen to be the most important technologies among the respondents. Among the most important ten items are generalized audit software, embedded audit modules/real-time modules, small business accounting software, computer-aided systems engineering tools, test data and tax return preparation software. This implies that accounting lecturers in the sample

perceived that these technologies are important for the accounting curriculum to be integrated.

The second objective is to identify the level of IT knowledge/skills integrated into the accounting curriculum. Results showed that the mean rating of IT integration into the accounting curriculum is lower than that of IT importance. Furthermore, the findings indicated that the technologies mostly integrated into the accounting curriculum in Egypt are office applications such as word processing, electronic spreadsheets and electronic presentations. This means that the integration of IT into the accounting curriculum in Egypt places more emphasis on basic technologies. The second group of technologies that are integrated into the accounting curriculum in Egypt are system design and implementation technologies (database search and retrieval, test data, database design and installation, flowcharting/data modeling and simulation software), and the third group is accounting and auditing technologies (such as electronic working paper, small business accounting software, generalized audit software and expert systems). The present study also showed that the findings of integration of IT knowledge and skills into the accounting curriculum in Egypt are different from those of importance of IT knowledge and skills. This indicates that a gap exists between what is expected and what is being practiced. But the findings are consistent with those of previous studies, which found that the accounting lecturers in the sample perceived that while IT is important to be integrated in the accounting curriculum, it not currently being fully integrated into the curriculum.

The third objective is to examine the alignment between IT knowledge/skills importance and IT knowledge integration level into the accounting curriculum in Egypt. A comparison between the mean value of the perceived importance of IT knowledge/skills and the integration level indicated that integration level of IT items always received a lower mean rating than the IT knowledge/skills importance items. To further explain the results, a matching approach was used to examine the alignment between the importance of IT knowledge/skills and the actual level of integration of the IT knowledge/skills in the accounting curriculum in Egypt. The results suggest that the most aligned technologies are the word processing, electronic spreadsheets, electronic presentations and database research. The great mismatch items are advanced technologies such as EDI – web-based, groupware, tax return preparation software and Internet search and retrieval.

There are number of limitations that need to be addressed in future research. First, the sample of the present research focuses on the accounting lecturers who have professional experience only. Duplication of this research can be done using a sample of professional and non-professional lecturers to make a comparison between those two groups. Second, the 35 technologies examined in this study were mostly adopted from Ismail and Abidin's (2009) study. Therefore, some equally significant technologies may have been inadvertently overlooked in the literature and are not included in this research. Future research can use different list of technologies. Third, this research explores the alignment between required IT knowledge/skills and the level of IT knowledge/skills integrated in the accounting curriculum using the matching approach. Future research could explore other ways of measuring alignment, such as a moderating approach or a gestalt approach, which are more holistic, or incorporate various approaches so that it can provide different results.

Despite these limitations, this study is the first that provides important insights about the accounting education in Egypt. Findings of this study might be of interest to relevant education agencies in Egypt such as the National Authority for Quality Assurance and Accreditation of Education. The information provided might assist the policy makers in formulating education strategies in Egypt and also other developing countries with similar IT development. Finally, results from this study can be used as a benchmark by professional bodies, professionals and audit firms not only in Egypt but also in other developing countries with similar IT development to evaluate accountants' IT knowledge and skills.

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