THE RELEVANT INFORMATION TECHNOLOGY KNOWLEDGE AND SKILLS FOR ACCOUNTING CURRICULUMS IN TANZANIA HIGHER LEARNING INSTITUTIONS

Kajale Joel Kasika, Assistant Lecturer
Department of Accounting and Finance
The University of Dodoma
And

Pamela Kishimbo, Assistant Lecturer
Department of Accounting and Finance
The University of Dodoma

Abstract

The goal of Information Technology – Accounting integration is to produce "hybrid accountants", who are capable of evaluating Information Technology (IT) issues in Tanzania environment. To ensure enhancement of that goal there are number skills and knowledge that accounting graduates needs to possess. Recognizing the importance of Information Technology (IT) to the accounting profession, the International Federation of Accountants (IFAC) issued an International Education Guideline IEG11 named "Information Technology in the Accounting Curriculum" in December 1995. Guidelines from IFAC and other professional bodies were found to be too ambitious or lack of specificity in terms of regional applicability. The study aimed to have a clearly defined set of Information Technology (IT)knowledge and skills applicable to accounting students in Tanzania higher learning institutions. The study adopted descriptive research design and through questionnaire, data were collected from the final year students as well as the academic members of staff. The random sampling design was used come up with the total of 5 higher learning institutions as representative of the population. From the empirical data, the study found relevant Information Technology (IT)knowledge and skills for accounting graduates in Tanzania. The identified topics were classified into different degrees of importance. The first group represent the first class of topics the respondents considered essential because they found that knowledge applied repetitively at work places. Thus, the study suggests curriculum to include advanced Information Technology (IT)knowledge and skills on the first-class topics. The first-class topics include Application software strategy, System software concepts, General system concepts and Hardware concepts. The second group include the second class of topics important because they are occasionally used at work places; and therefore, the study suggests, students need to be taught basic knowledge and skills. This research has contributed to the body of knowledge in accounting education and to accounting curriculum policy and design.

Key words: *Accounting, curriculum, Information – Technology(IT), Integration.*
Subject: Management

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Introduction

Many companies all over the world are aware of the benefits of information technology in accounting which results in efficiency and profitability. At the turn of the century, the world has witnessed a revolution in the field of information technology (Qatawneh, 2012). The former United Nations Secretary-general Kofi Annan stated that "If harnessed properly, Information Technologies (ITs) have the potential to improve all aspects of our social, economic and cultural life, IT can serve as an engine for development in the twenty - first century" (Annan, 2003). In accounting field, Romney and Steinbart(2012) makes it clear that, the accounting is the language of business and that the Accounting Information System (AIS) is the intelligence of that language. IFAC (1995, para. 2), defines "the term information technology encompasses hardware and software products; information system operations and management processes; and the skills required to apply those products."

Nowadays, many developing countries are adopting Information Technology (IT) in all aspects of life, specifically in accounting, and this is happening at a fast pace (Majed, 2012). The goal of IT – Accounting integration is to produce "hybrid accountants", who are capable of evaluating IT issues such as strategic alignment, value delivery, resource management, performance measurement, and risk management in some depth and thereby, bridging the "information-technology gap" for themselves (Ismail, 2009). Accounting Information System plays a pivotal role in decision makers' service; this is what made the use of computers as processors of information as requisite in the world of accounting (Afolabi, 2012; and Majed, 2012). Therefore, accountants need to have information system processing capabilities to create and sustain competitive advantage of the organization they work with (Ismail, 2009).

Ebimobowei et al., (2013) examined the usage of IT in Accounting and Auditing professional activities in Nigeria. The result showed that, the coverage of IT was very limited. Another study was made in Botswana on the IT integration coverage. The results found the government with a mammoth task of increasing information technology skills to accounting personnel who are labeled as limited skills (Nkwe, 2011). Recognizing the importance of IT to the accounting profession, the International Federation of Accountants (IFAC) issued an International Education Guideline IEG11 named "Information Technology in the Accounting Curriculum" in December 1995. The guideline was revised several times due to the rapidly changing IT and business environments. The IEG11 has recently been re-titled as Practice Statement 2.1 "Information Technology for Professional Accountants" (IFAC, 2006). IFAC broadly classify IT knowledge into General knowledge, specific application skills and additional application knowledge required based on the accountant's professional role. Hermanson et all, (2011); Senik& Broad, (2011); Callaghan et al, (2000); Chang, & Hwang, (2002) examined the coverage level of information technology into accounting curriculum with reference to International Federation of Accountants' (IFACs') International Education Guideline No. 11. The study found coverage differing from one place, institution, and country to the another, and the reason behind it wasn't clearly addressed.The guideline details the recommendations for IT education for accounting students; and was developed for aiding and encouraging implementation of USA recommendations with the belief that the guideline will be applicable universally (Heales, 2005). Nevertheless, information technology guidelines for accountants that fit Tanzanian or African environments are yet to be developed. Currently, it is on the instructor's discretion to determine the extent and depth coverage, the level of difficulty, and the mode of transferring IT skills and knowledge. It's therefore important for Tanzania to have a clearly defined set of IT knowledge and skills applicable to accounting students in higher learning institutions.

Elliot (1994); AICPA (1994); IFAC, (1995); Helms &Mancino (1998); Greenstein &Feinman, (2000); AICPA (2000); AICPA (2002); and Strong &Portz, (2015) suggest lists of general knowledge topics and application skills suitable for the professional accountant whom either practice accounting or work as managers (*see* Appendix I, II & III). Therefore, the objective of this study was to identify the Information Technology (IT) knowledge and skills desirable to accounting curriculums in Tanzania Higher Learning institutions. The significance of the study was to provide information and insights for educators who are in the position of organizing Accounting Curricula in Higher Learning Institutions. Also enable readers to detect the weaknesses and strengths in the content of our courses. Finally, the study assists instructors to determine the extent and depth coverage, the level of difficulty of IT skills and knowledge for accounting students.

Hypothesis

Ho: There is no significant difference between mean score of one selected topic and the other.

Algebraically,

H0: $\mu 1 = \mu 2 = \mu 3 = + \ldots + \mu (n)$

H1: not all μi are equal

Methods

The research design for this study was descriptive survey. The study also utilized random sampling design to choose elements from the population as the sample objects. The population of this study was made up of 45 fully fledged Tanzanian higher learning institutions registered by Tanzania Commission of Universities (TCU) and National Accreditation Council for Technical Education (NACTE). A total of 5 higher learning institution equivalent to 10% of all fully ledged Tanzanian higher learning institutionswere selected to serve the purpose of this study. According to Stockton and Clark (1975:166), 10% percent of the population served provides a minimum representative sample. Table 1 below, shows the summary of higher learning institutions selected and the regions in which they are located.

Table 1: summarized regions and the institutions selected

Region		**Institution**	**Accounting Courses**
1	Dodoma	The University of Dodoma	Offer
2	Dar es Salaam	University of Dar es Salaam	Offer
3	Iringa	Ruaha Catholic University	Offer
4	Arusha	University of Arusha	Offer
5	Dodoma	College of Business Education	Offer

The data collection method was questionnaire. The respondents involved academic staff and the students from the department of Accounting and Finance. Final year students were the priority because (i) they have good experience in the institution under study, and (ii) they know the importance of IT in accounting works as they must have attended field practices. The academic staff involved only the well-informed members of academic staff from the department of accounting and finance.

The sample size ranged 31 to 40 for each institution in the sample. Among the total sample, 3 respondents were academic or management staff working with the respective institution. The remaining respondents were the final year students from the department of Accounting and Finance. The rationale for the sample size based on the arguments of Sekaran and Bougie (2010), Roscoe (2001), and Sekaran and Bougie (2010) argued that too large or too small a sample size is detrimental to a

research project. In addition, Roscoe (2001) described that a sample size larger than 30 is appropriate for most research and if a research divides samples into sub-samples, the minimum number of each sub-sample is 30. Therefore, the sample for this study exceeded 30.

Questionnaires

The questionnaires contained four sections. The first section demanded the demographic information. The second section was for the first objective and the third section covered the second objective. The fourth section collected suggestions for knowledge and skills not mentioned in the questionnaires. Each question was rated on the suitability of the topic to the accountants.

The study adopted the two version of Likert scales developed by (Tam, 2011) which included a simple scale (1 = not relevant to 6 = essential) and a second scale (1 = not relevant/not required, 2 = awareness only, 3 = minimum understanding, 4 = good understanding, 5 = full understanding and 6 = able to use and apply). The scale versions were used based on the nature of the questions. Topics with mean scores equal to or greater than 4 were interpreted as those regarded by the respondents as requiring either 'good understanding', 'full understanding' or 'able to apply and use'. These topics weresorted in descending order based on mean of ranks, and then stepwise F tests for equality of means were conducted. The test continued from the first rank until the null hypothesis was rejected. Topics with mean scores less than 4 (i.e. 3 = minimum understanding, 2 = awareness only and 1 = not relevant/not required) were to be eliminated.

According to Tam (2011), topics with mean scores of 5 and above are considered – Essential / Used daily / need advanced knowledge and skills. Topics with mean scores of 4 are regarded – Important / Used occasionally/ Need basic knowledge and skills. Likewise, those with mean scores below 4 are considered – Not important / Too technical and only awareness is needed.

To achieve the objectives of the study, a total of 200 questionnaires, 40 to each institution, were issued to the respondents. Of them, 178 questionnaires were collected from the selected higher learning institution.

Findings, data analysis and discussion

The demographic information about the respondents, in Table 2 below, shows that 65.73% of all respondents were male and 34.27% were female. The age difference category of all respondents is clearly shown in the same table.

Table 2:Demographic information

	< 20 years	20 - 25 years	26 - 30 years	> 30 years	Total
Male	0	65	29	23	117
Female	2	48	8	3	61
Total	2	113	37	26	178

Source: Field data

The transformation, of raw data from returned questionnaires, was accomplished by a descriptive analysis. The frequencies of the likert scales along with mean score of each variable (topic) were

computed using excel. The topics were then sorted in descending order (essential to not – relevant) based on mean of ranks. Stepwise *F* tests for equality of means of one topic and the others were conducted using STATA 12 to test the hypothesis.*F* – test was used to check whether there were significance differences among respondents' rankings on the perceived importance of Information Technology skills and knowledgeto accounting students.

The analysis was for the three categories of IT knowledge and skills for accounting students. The first category was for the general IT topics denoted as$X_1 + \ldots + Xn$; second category for Computer application skills required by Tanzania accounting students / staff, represented by $Y_1 + \ldots + Yn$; and the third one was for the additional application knowledge required, based on the accountant's professional role, represented by $Z_1 + \ldots + Zn$. Means scores for the collected data, in each category, were computed and then ranked in descending order (Appendix I, II & III).

The results show the means scores from all the three categories were above 4.0(see Appendix I, II & III). This implies that all the IT topics in this study were relevant to the accounting students in Tanzania. However, the highest mean score was5.624 on X1, therefore, the first test was conducted to check whether X1 mean score of 5.624 was equivalent to 6. The results were$F$ (1, 177) = 36.65, p = 0.0000; this implies thatthere was a significant statistical difference between the two, and hence we reject the null hypothesis.Therefore, mean score of 5.624 was not equivalent to 6.

The second test was to test the equality of means between the first and second topics from each category.We tested mean scores for X1 and X2, Y1 and Y2, and Z1 and Z2 from category I, II and III respectively.

Algebraically,

$H0: \mu 1 = \mu 2$

$H1: \mu 1 \neq \mu 2$

The test results for category one, two and three are F (1, 177) = 0.02, p = 0.8845;F (1, 177) = 1.54, p = 0.2158; and F (1, 177) = 0.03, p = 0.8642 respectively. This implies that, there were no significant statistical differences in the first two tested topics from each category.Hence we failed to reject null hypothesis.Therefore, the mean scores of the first two topics from each category are statistically equal.

On the next and subsequent tests, we repeated the process by adding other topics until the null hypothesis was rejected. This procedure was done categorically as presented below. The subsequent hypothesis testswere:

$H0: \mu 1 = \mu 2 = \mu 3 = + \ldots + \mu(n)$

H1: not all μi are equal

Category one (general IT topics)

The test results on the subsequent tests, X1 to X5 were$F$ (4, 174) = 5.68, p = 0.0003 of which the null hypothesis was rejected.In exclusion of X5, the test results were$F$ (3, 175) = 1.61, p = 0.1863. Therefore, X1, X2, X3 and X4became the first group of topics since their mean scores were shown to be statistically equal. The topics include:

i. *Application software strategy (X1, μ1 = 5.624)*
ii. *System software concepts (X2, μ2 = 5.612)*
iii. *General system concepts (X3, μ3 = 5.596)*
iv. *Hardware concepts (X4, μ4 = 5.461)*

To form the second group of topics, we began the test with the topic eliminated from the previous test, i.e. X5 (*evaluation of computer based business systems*). The *F* – test for testing the equality of means, involved the mean scores of X5, X6, X7, X8, X9, X10, X11, and X12. The test results obtained were *F* (7, 171) = 1.03, *p* = 0.4144, of which we failed to reject the null hypothesis.When X13 was included in the group of*X*5 to *X12*, i.e. *(X5 + …+ X13)*, the null hypothesis was rejected at *F* (8, 170) = 2.76, *p* = 0.0069. Therefore,X5 to X12 form the second group of topics since their mean scores are statistically equal. The topics include:

i. *Evaluation of computer based business systems (X5, µ5 = 5.225)*
ii. *Information system processing (X6, µ6 =5.152)*
iii. *Transaction processing in typical applications (X7, µ7 = 5.118)*
iv. *Cost effectiveness of information technology control procedures (X8, µ8 = 5.073)*
v. *Risk and exposure in computer based information systems (X9, µ9 = 5.073)*
vi. *Networks and electronic data transfer (X10, µ10 = 5.067)*
vii. *Continuity of processing/disaster recovery planning and control (X11, µ11 = 5.028)*
viii. *Data organization and access methods (X12, µ12 = 4.972)*

The *F* – test to form the third group of topics involved the mean score of X13, X14 and X15. The results obtained were*F* (2, 176) = 0.53, *p* = 0.5869 of which we fail to reject the null hypothesis. thus, no significant statistical difference was found in the tested variables.Therefore, X13, X14 and X15form the third group of topics.The topics include:

i. *System acquisition/development (X13, µ13 = 4.775)*
ii. *Control over system selection and acquisition (X14, µ14 = 4.719)*
iii. *Controls over system implementation (X15, µ15 = 4.660)*

The first two groups contain topics with mean scores greater or equal to 5. Topics with mean scores of greater or equal to 5 are regarded by respondents as topics which need full understanding. These topics are the basic IT topics carrying the basic IT knowledge of which no application skills can be well acquired before getting full understanding of these topics. According to Tam (2011), topics with mean scores of 5 and above are considered essential because of their daily use at work stations. Moreover, Tam (2011) added that students need advanced knowledge and skills on these topics at higher learning institution level. Therefore, the program instructors are needed to prepare the course contents with full coverage on the first two groups' topics in class sessions, computer lab and their applications in accounting field environments.

The third group includes topics with mean scores greater or equal to 4 and less than 5. These topics are considered by respondents as topics on which students need good understanding. Apart from that, Tam (2011)considers the knowledge acquired from these topics occasionallyapplied at work places. Therefore, studentsneed basic knowledge and skills on these topics at higher learning institution level.

Category Two (Computer application skills required by Tanzania accounting students / staff)

In this category, topic Y1 (Accounting Package) obtained the highest mean score of 5.0787. The remaining topics under this category had mean score below 5 (see Appendix II). The *F* – test was run to test the hypothesis whether the below 5 mean scores were statistically equivalent to 5.0787. Algebraically, the null hypothesis was H0: µ1 = µ2 = µ3 = + …+ µ (n).We tested the equality of mean scores of Y1 to Y7 and the test results were, *F* (6, 172) = 1.53, *p* = 0.1712. On these results, we failed to

reject null hypothesis. Thus, mean scores on the tested topics (Y1 to Y7) are statistically equal. When the mean scores of Y8 was added, the test results became F (7, 171) = 3.10, p = 0.0042. This implies that, the mean score of Y8 was not statistically equal to 5.0787. Therefore, the first group of topics under this category includes:

i. *Accounting Package (Y1, μ1 = 5.0787)*
ii. *A Spreadsheet package (Y2, μ2 = 4.9663)*
iii. *A word processing package (Y3, μ3 = 4.927)*
iv. *E-mail (Y4, μ4 = 4.927)*
v. *A database package (Y5, μ5 = 4.8933)*
vi. *Electronic working paper (Y6, μ6 = 4.809)*
vii. *Generalized audit software (Y7, μ7 = 4.7978)*

The above topics are classified as computer application skills. These topics were considered by respondents as topics on which students need full understanding. According to Tam (2011), topics with mean scores of 5 and above are considered essential because of their daily use at work stations. Moreover, Tam (2011) added that students need advanced knowledge and skills on these topics at higher learning institution level. The identified topics are consistent with the study of Awayiga et al. (2010) which identified similar topics and considered them as important skills and knowledge for accounting graduates in Ghana.

In forming the second group of topics with equal means, we started with Y8, eliminated from the previous test. The F – test for testing equality of means involved means scores of Y8 to Y15. Algebraically, the null hypothesis was H0: μ8 = μ9 = μ10 = + …+ μ 15. The test results found no significant statistical difference on the tested mean scores of variables *(Y8 + … + Y15), F* (7, 171) = 1.95, p = 0.0643.When mean score of Y16 was added after Y15. i.e.(μ8 +…+ μ16), the test results became F (8, 170) = 3.54, p=0.0008. The results show that, the null hypothesis is rejected after adding Y16's mean score. Therefore, Y8 to Y15 form the second group of topics with equal means. The topics include:

i. *Electronic presentations (Y8, μ8 = 4.5281)*
ii. *Internet search and retrieval (Y9, μ9 = 4.5225)*
iii. *Expert systems (Y10, μ10 = 4.4944)*
iv. *Test data (Y11, μ11 = 4.4831)*
v. *Time management and billing system (Y12, μ12 = 4.4775)*
vi. *Embedded audit modules (Y13, μ13 = 4.3708)*
vii. *Database search and retrieval (Y14, μ14 = 4.3371)*
viii. *Image processing (Y15, μ15 = 4.1854)*

The remaining two topicsare flowcharting/data modeling (Y16, *μ16 = 4.118*) and computer aided system engineering tools (Y17, *μ17 = 4.0618*).The F – test was run to test equality of mean scores of Y16 and Y17. The hypothesis test results were, F (1, 177) = 0.24, p = 0.6261.With these results, we failed to reject null hypothesis, thus, the difference found was not statistically significant. Therefore, the mean scores of Y16 and Y17 are statistically equal. This makes the third group of topics under category two.

Unlike the first group from this category, the second and third groups contain topics with mean scores which are below 5. The respondents considered them as topics on which students need good understanding. According to Tam (2011) Topics with mean scores of 4 are regarded as important and also used occasionally at work stations. Tam (2011) added that, on these topics accounting students

need basic knowledge and skills. Therefore, program instructors are urgedto cover the basic part of knowledge and skills.

Category Three (The additional application knowledge required based on the accountant's professional role)

The additional application knowledge on IT comes after the first and second category of computer general knowledge and application skills have been covered. These topics are considered important when an accountant practices professional role. In this category, topic Z1 (Specialized audit software) obtained the highest mean score of 4.8371 (see Appendix III). The *F* – test was run to test the hypothesis whether the Z1 mean score was statistically equal to the mean scores of Z2, Z3 +…+ Z (n). Algebraically, the null hypothesis was H0: μ1 = μ2 = μ3 = + …+ μ (n). The F-test which involved mean scores of Z1 to Z7, the results were, F (6, 172) = 2.02, p = 0.0652, thuswe failed to reject null hypothesis. Following these results, we added another mean score of Z8, and the test results became F (7, 171) = 2.67, p=0.0121. The null hypothesis was rejected after adding Z8; therefore, the mean scores of Z1 to Z7 are statistically equal. Thus, these form the first group of topics in category three. The topics include:

i. *Specialized audit software (Z1, μ1 = 4.8371)*
ii. *Tax preparation software (Z2, μ2 = 4.8202)*
iii. *Internet access (Z3, μ3 = 4.764)*
iv. *Tax research software (Z4, μ4 = 4.6404)*
v. *Statistical analysis software (Z5, μ5 = 4.618)*
vi. *Operating system software (Z6, μ6 = 4.6124)*
vii. *Virus protection software (Z7, μ7 = 4.5955)*

The remaining two topics under this category are System design software (Z8, *μ8 = 4.4213*) and Presentation software (Z9, *μ9 = 4.3652*). The *F* – test was run to test equality of mean scores of Z8 and Z9. The hypothesis test results were, F (1, 177) = 0.15, p = 0.7025. Thus, the difference was found not statistically significant. Therefore, the tested mean scores, which form the second group in this category, are statistically equal.

The respondents considered the two groups as topics on which students need good understanding. According to Tam (2011) Topics with mean scores of 4 are regarded as important and also used occasionally at work stations. It was also added that, on these topics accounting students need basic knowledge and skills. The ranking of the respondents was perhaps caused by the decisive nature of the topics. They considered these topics are suitable for managers. Therefore, the program instructors are urged to cover the basic part of knowledge and skills.

Conclusion

The motivation of this research was to identify IT knowledge and skills desirable for Tanzania accounting students. It was apparent that every higher learning institution offering accounting courses, had its own IT coverage to accounting students. IFAC issued International Education Guideline IEG11 named "Information Technology in the Accounting Curriculum", but was found to be focusing on developed countries. Guidelines from other professional bodies were found to be too ambitious or lack of specificity in terms of regional applicability. It was therefore important for Tanzania to have a clearly defined set of IT knowledge and skills applicable to accounting students in higher learning institutions. data were collected from academicians and third year students pursuing accounting courses, and who

had recently come back from practical field studies. The respondents were assumed to be aware of the IT knowledge and skills needed at work places. From the empirical data, the study found relevant IT knowledge and skills for accounting graduates in Tanzania. The identified topics were classified into different degrees of importance. The first group represent the first class of topics the respondents considered essential because they found that knowledge applied repetitively at work places. Thus, the study suggests curriculum to include advanced IT knowledge and skills on the first-class topics. The first-class topics include *Application software strategy, System software concepts, General system concepts and Hardware concepts.* The second group include the second class of topics important because they are occasionally used at work places; and therefore, the study suggests, students need to be taught basic knowledge and skills. This research has contributed to the body of knowledge in accounting education and to accounting curriculum policy and design.

Area for further research, after getting to know the IT coverage desirable in Tanzania, another research be to study the challenges facing the integration of IT skills and knowledge into accounting curriculums.

BIBLIOGRAPHY

Afolabi, S. O. (2012). The impact of E-commerce, Accounting Information Technology and Globalization on Selected Firms in Nigeria. International Journal of Economic Development Research and Investment, Vol. 3, No 1, April 2012, p 33

AICPA (1994). Information Technology Competencies in Accounting Profession: AICPA Implementation Strategies for IFAC International Education Guideline No. 11, AICPA, New York, NY.

AICPA (2000). Top Ten Technologies, AICPA, New York, NY.

AICPA (2002). The CPA Vision Project: 2011 and Beyond, AICPA, New York, NY.

Alsharayri, M (2012). Evaluating Performance of Accounting Information Systems in Jordanian Private Hospitals, Journal of Social Sciences 8 (1): 74 – 78, 2012

Annan, K. (2003). Message from United Nations Secretary-general Kofi Annan. Retrieved March 3, from http://www.int/wsis/annan.html

Awayiga, J., Onumah, J., and Tsamenyi, M (2010) Knowledge and skills development of accounting graduates: The perceptions of graduates and employers in Ghana, Accounting Education: an International Journal. 19, 139 – 158.

Business Research, A Practical Guide for Undergraduate and Postgraduate Students. Macmillan Press Ltd. Hampshire and London.

Callaghan, J., Peacock, E., & Savage, A (2000) Assessment of Accounting Information Systems Curriculum: An Analysis of the International Federation of Accountants' International Education Guideline No. 11. The Review of accounting Information Systems. Vol. 4 (1) 1 - 12

Chang, C. J & Hwang, N. R (2002) Quests on Building IT-Related accounting Curricula, Journal of Contemporary Accounting. Vol.3 (1), 1 – 20.

Cornford, T. and Smithson, S. (1996) Project Research in Information Systems: A Student's Guide. Macmillan Press Ltd, London.

Dumitra, V (2011) Improving the Quality of the Information Presented in Financial Statements by using Information Technology., Annals of the University of Petrosani, Economics, 11(4), 2011, 109-118

Ebimobowei, A., Ogbonna, G.N., and Enebraye, Z. P (2013) Auditors' Usage of Computer Assisted Audit Tools and Techniques: Empirical Evidence from Nigeria. Research Journal of Applied Sciences, Engineering and Technology 6(2): 187-195, June 2013

Elliot R.K. (1994). Confronting the future: choices for the attest function. Accounting Horizons, September, pp. 112-4.

Elliot, R.K. (1992). The Third Wave Breaks on the Shores of Accounting, Accounting Horizons, 6, 2: 61-85.

Grande, U. E., Estebanez, P. R., &Colomina, M. C. (2010). The impact of Accounting Information Systems (AIS) on performance measures: empirical evidence in Spanish SMEs. The International Journal of Digital Accounting Research, 11(2011), 25 – 43.

Greenstein, M. and Feinman T. (2000). Electronic commerce: security, risk, management, and control. McGraw-Hill, New York, NY.

Heales, J. (2005). Undergraduate performance in accounting and business-based information technology. Accounting and Finance, 45(3), 395-413.

Helms G.L. and Mancino j. (1998). The electronic auditor—wave goodbye to the paper trail. J Account, April, pp. 48-8.

Hermanson, D. R., Hill, M. C., and Ivancevich, D. M (2011) Information Technology in the Undergraduate Accounting Curriculum. The Review of Accounting Information Systems. Vol. 3 (4), 1 – 10.

Hunton E. J (2002) Blending Information and Communication Technology with Accounting Research, Accounting Horizons, Vol. 16, 2002 Hussey, J. and Hussey, R. (1997)

International Federation of Accountants (1995) Education Guideline No. 11: Information Technology in the Accounting Curriculum, IFAC, New York

Ismail, N.A. (2009). Accounting Information system: Education and Research Agenda. Malaysian Accounting Review, Vol. 8 No. 1, 63-80.

Jim Chen, Desta Damtew, Jean-Marie Banatte, Johnnie Mapp (2011) Information Technology Competencies Expected in Undergraduate Accounting Graduates, Research In Higher Education Journal – Volume 3: p.6

Kharuddin, S., M. Z. Ashhari, & Nassir, M. A. (2010). Information System and Firms' Performance: The Case of Malaysian Small Medium Enterprises. International businessresearch, 3(4), 33.

Kouser, R., Awan, A., Rana, G., & Shahzad, F. (2011). Firm Size, Leverage and Profitability: Overriding Impact of Accounting Information System. Journal of Management and Business Review, 1(10), 58-64.

Krejcie, R.V. & Morgan, D.W. (1970). Determining sample size for research activities. Educational and psychological measurement. 30. p. 607-610.

Leary, R. (1995) Behavioral Research Methods, Pacific Grove: Brooks/Cole Publishing Company.

Majed A. (2012) Evaluating the Performance of Accounting Information Systems in Jordanian Private Hospitals, Journal of Social Sciences 8 (1): 74-78, 2012

NBAA (2014) Get Through Guide: C1-Reporting, 1st ed, National Board of Accountant and Auditors, Dar es Salaam.

Portuguese and Brazilian Universities Accounting Curricula, (unpublished report)

Qatawneh, A. M (2012) The Effect of Electronic Commerce on the Accounting Information System of Jordanian Banks, International Business. Vol. 5, No. 5; 158 – 165. May 2012 (www.ccsenet.org/ibr accessed on June 2013)

Riccio, E. R., Sakata, M. C., & Gualberto, L (2005) INFORMATION SYSTEMS AND TECHNOLOGY IN ACCOUNTING EDUCATION: A Web-Based Study Comparing

Romney, M. B., &Steinbart, P. J. (2012). Accounting information system. New Jersey: Prentice Hall.

Routio, P. (2003) Models in the Research Process. The Science of Artefacts [Online] Available from http://www2.uiah.fi/projects/metodi/177.htm [Accessed on 16th November 2013]

Sajady, H., Dastgir, M., &Hashemnejad, H. (2008). Evaluation of the effectiveness of accounting information systems. International Journal of Information Science & Technology, 6(2).

Saunders M., Lewis P. & Thornhill A. (2012) Research Methods for Business Students, 6th Ed, Pearson Education Ltd, England

Saunders, M. et al (2000) Research Methods for Business Students. 2nd ed. Prentice Hall, London.

Sekaran, U., & Bougie, R. (2010). Research methods for business: A skill-building approach (5th ed.). Haddington: John Wiley & Sons.

Senik, R & Broad, M (2011) Information Technology Skills Development for Accounting Graduates: Intervening Conditions, International Education Studies. Vol. 4, No. 2; May 2011

Soudani S. N (2012). The Usefulness of an Accounting Information System for EffectiveOrganizational Performance, International Journal of Economics and Finance. Vol. 4, No. 5; 136 – 145. May 2012

Stockton, J. K. and Clark, C. T (1975) Introduction to Business and Economic Statistics. Cincinnati: Ohio South – Western Publishing Company. USA

Strong, J., &Portz, K (2015) IT Knowledge: What Do Accounting Students Think They Know? Do You Know More Than I Do? An Exploratory Study. Review of Business Information Systems – Vol. 19 (2), 39 – 50.

Sutton, S.G. (2004a). Editors Comments: Rediscovering our is Roots, International Journal of Accounting Information Systems, 5: 1-4.

Tam, T (2011) 'The relevant information technology knowledge and skills for accounting graduates in New Zealand', DBA thesis, Southern Cross University, Lismore, NSW.

The University of Nairobi (2013) Impact of Accounting Information Systems on organizational effectiveness of automobile companies in Kenya, Unpublished Report.

UNCTAD-ISAR (2011), Model Accounting Curriculum (Revised) (publication reference: UNCTAD/DIAE/MISC/2011/1).

Vaus, D. (1996) Survey in Social Research. 4th ed. UCL Press Ltd. London.

Zikmund, W. (1984) Business Research Methods. The Dryden Press, Chicago

APPENDIX I		GENERAL INFORMATION TECHNOLOGY TOPICS AND RATINGS									
S/n	Topics	Frequency of Rank						Total Frequency	Mean of Rank	Hypothesis test results, *F*&*p*-value	Group Ranks and Group mean
		6	5	4	3	2	1				
1	Application software strategy (X1)	139	20	13	3	3	0	178	5.624	Ho: μi = μ(i=1 +…+ 4), *F* (3, 175) = 1.61, *p* = 0.1863 If μ5 included, Ho: μi = μ (μ1 +…+ μ5), *F* (4, 174) = 5.68, *p*=0.0003	1 Group mean = 5.5730
2	System software concepts (X2)	137	22	12	5	2	0	178	5.612		
3	General system concepts (*X3*)	136	17	21	3	1	0	178	5.596		
4	Hardware concepts (X4)	121	23	30	3	1	0	178	5.461		
5	Evaluation of computer based business systems (X5)	108	29	21	13	7	0	178	5.225	Ho: μi = μ μ5+… + μ12 *F* (7, 171) = 1.03, *p* = 0.4144 If μ13 is included, Ho: μi = μ (μ5+… + μ13), *F* (8, 170) = 2.76, *p* = 0.0069	2 Group mean = 5.0885
6	Information system processing (X6)	99	40	14	17	8	0	178	5.152		
7	Transaction processing in typical applications (X7)	95	33	28	20	2	0	178	5.118		
8	Cost effectiveness of information technology control procedures (X8)	87	45	24	16	6	0	178	5.073		
10	Risk and exposure in computer based information systems (X9)	98	34	17	19	10	0	178	5.073		
9	Networks and electronic data transfer (X10)	95	36	18	22	7	0	178	5.067		
11	Continuity of processing/disaster recovery planning and control (X11)	91	39	19	20	9	0	178	5.028		
12	Data organization and access methods (X12)	87	40	18	25	8	0	178	4.972		
13	System acquisition/development (X13)	82	34	19	26	17	0	178	4.775	Ho: μi = μ μ13+… + μ15 *F* (2, 176) = 0.53, *p* = 0.5869	3 Group mean = 4.7210
14	Control over system selection and acquisition (X14)	70	42	26	26	14	0	178	4.719		
15	Controls over system implementation (X15)	67	39	30	30	12	0	178	4.669		

APPENDIX II COMPUTER APPLICATION SKILLS REQUIRED BY TANZANIA ACCOUNTING STUDENTS / STAFF:

S/n	Topics	Frequency of Rank						Total Frequency	Mean of Rank	Hypothesis test results, *F*&*p*-value	Group Ranks and Group mean
		6	5	4	3	2	1				
1	Accounting Package (Y1)	103	33	17	10	8	7	178	5.0787	Ho: μi = μ (μ1 +…+ μ7), *F* (6, 172) = 1.53, *p* = 0.1712 If μ8 included Ho: μi = μ (μ1 +…+ μ8), *F* (7, 171) = 3.10, *p*=0.0042	1 Group mean = 4.9141
2	A Spreadsheet package (Y2)	88	40	22	15	10	3	178	4.9663		
3	A word processing package (Y3)	85	43	24	7	16	3	178	4.927		
4	E-mail (Y4)	90	33	26	14	11	4	178	4.927		
5	A database package (Y5)	72	57	26	10	7	6	178	4.8933		
6	Electronic working paper (Y6)	82	29	38	13	12	4	178	4.809		
7	Generalized audit software (Y7)	77	44	28	10	11	8	178	4.7978		
8	Electronic presentations (Y8)	65	35	39	16	14	9	178	4.5281	Ho: μi = μ (μ8 +…+ μ15), *F* (7, 171) = 1.95, *p* = 0.0643 If μ16 included Ho: μi = μ (μ8 +…+ μ16), *F* (8, 170) = 3.54, *p*=0.0008	2 Group mean = 4.4249
9	Internet search and retrieval (Y9)	61	46	32	11	20	8	178	4.5225		
10	Expert systems (Y10)	55	50	36	12	15	10	178	4.4944		
12	Test data (Y11)	60	46	31	16	11	14	178	4.4831		
11	Time management and billing system (Y12)	62	41	28	22	17	8	178	4.4775		
13	Embedded audit modules (Y13)	62	36	29	21	17	13	178	4.3708		
14	Database search and retrieval (Y14)	50	47	33	18	21	9	178	4.3371		
15	Image processing (Y15)	49	35	37	28	15	14	178	4.1854		
16	Flowcharting/data modeling (Y16)	42	40	40	23	19	14	178	4.118	Ho: μi = μ (μ16 +…+ μ17), *F* (1, 177) = 0.24, *p* = 0.6261	3 Group mean = 4.082
17	Computer aided system engineering tools (Y17)	39	44	35	26	17	17	178	4.0618		

APPENDIX III THE ADDITIONAL APPLICATION KNOWLEDGE REQUIRED BASED ON THE ACCOUNTANT'S PROFESSIONAL ROLE:											
S/n	Topics	Frequency of Rank						Total Frequency	Mean of Rank	Hypothesis test results, *F*&*p*-value	Group Ranks and Group mean
		6	5	4	3	2	1				
1	Specialized audit software (Z1)	82	40	24	12	17	3	178	4.8371	Ho: μi = μ (μ1 +…+ μ7), *F* (6, 172) = 2.02, *p* = 0.0652 If μ8 included Ho: μi = μ (μ1 +…+ μ8), *F* (7, 171) = 2.67, *p*=0.0121	1 Group mean = 4.5955
2	Tax preparation software (Z2)	86	29	30	18	8	7	178	4.8202		
3	Internet access (Z3)	81	33	28	17	15	4	178	4.764		
4	Tax research software (Z4)	67	48	25	17	12	9	178	4.6404		
5	Statistical analysis software (Z5)	67	39	33	22	10	7	178	4.618		
6	Operating system software (Z6)	66	42	33	14	18	5	178	4.6124		
7	Virus protection software (Z7)	71	40	27	12	20	8	178	4.5955		
8	System design software (Z8)	61	40	34	14	14	15	178	4.4213	Ho: μi = μ (μ8 ,μ9), *F* (1, 177) = 0.15, *p* = 0.7025	2 Group mean = 4.3933
9	Presentation software (Z9)	54	39	33	25	24	3	178	4.3652		