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INFORMATION SYSTEMS AUDIT CURRICULA CONTENT MATCHING

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Abstract

Financial and internal auditors must cope with the challenge of performing their mission in technology enhanced environment. In this article we match the information technology description found in the International Federation of Accountants (IFAC) and the Institute of Internal Auditors (IIA) curricula against the Model Curriculum issued by the Information Systems Audit and Control Association (ISACA). By reviewing these three curricula, we matched the content in the ISACA Model Curriculum with the IFAC International Education Practice Statement 2 and the IIAs' Global Model Internal Audit Curriculum. In the IFAC and IIA Curriculum there are 16 content elements, out of 19 possible, which match, in their description, the ISACA Model Curriculum's content. We noticed that a candidate who graduates an IFAC or IIA compliant program acquire IS auditing competences similar to the specific content of the ISACA model curriculum but less than the requirements for a professional information systems auditor.

1. Introduction

In today's ever-changing business environment companies use information technology (IT) integrated in their accounting information systems (AIS) which induces a new array of risks which must be addressed. In this setting, financial and internal auditors must cope with the challenge of performing their mission in more complex and technology enhanced environment. AIS expertise or knowledge is a distinct domain of competences for auditors (Brazel, 2004).

Auditors, both financial and internal, are required by their professional bodies to acquire and develop IT knowledge and skills. The International Federation of Accountants (IFAC) and The Institute of Internal Auditors (IIA) require for candidates and constituents to have a certain level of IT proficiency.

The International Education Standard 2 (IES 2) issued by IFAC states the knowledge content of professional accounting education programs that candidates need to acquire. Besides accounting, finance, and organizational and business knowledge, candidates are required to have information technology knowledge and competences (IFAC, 2010a). IIA require candidates to the internal audit profession to have competences in: internal audit basics, internal audit practice and internal audit knowledge elements. This last component contains topics related to information technology and business continuity (IIA, 2013).

In this article we match the information technology content found in the curricula issued by IFAC and IIA against the Model Curriculum issued by the Information Systems Audit and Control Association (ISACA). The content in the ISACA Curriculum is similar to the requirements to become a Certified Information System Auditor. Of course, one could not expect either financial or internal auditors to have a level of IT Audit knowledge similar to a certified specialist. But, at least financial auditors, need to have sufficient IT competences to enable them "(a) to formulate the questions to be answered by ... the IT auditor and (b) to understand the outcome of the activities of such specialists" (IFAC, 2010b: 129).

2. Literature review

While the use of information technologies and systems spreads in all business environments so does the business risks associated with these. This is why IT auditing is needed to evaluate the adequacy of information systems and to evaluate the adequacy of internal controls. Universities responded to these needs by integrating IT courses into accounting programs (Gallegos, 2003).

Merhout & Buchman (2007:473) investigating the skill and knowledge requirements

for IT Auditors found that 27% of the investigated companies (out of 595 job advertisements) "preferred knowledge of the audit process". The authors consider that this is due to the interaction with financial auditors and the need to apply a formal audit process in IT audits. Also, "while the requirements for IT auditing skills are changing and emerging every day, all IT auditors are expected to possess a minimum level of general skills and qualifications" Merhout & Buchman (2007:472). A large portion of the companies posting adverts for IT audit jobs required a degree in accounting, finance, information systems, computer science or related. Based on this findings, for the purpose of this article we intend to investigate the degree at which the curriculum for financial auditors and internal auditors meet the requirements of the Information Systems and Control Association (ISACA) as a leading organization for information systems or information technology (IS/IT) auditing.

Omoteso, Patel & Scott (2009: 14) investigating the impact of information and communication technologies (ICT) on audit tasks and auditors found that ICT skills were considered to have a "small impact on the recruitment of new auditors...[but] in the very near future this trend will extend to recruitment, and such skills will form one of the bases in the selection process for auditors".

Consulting and public accounting companies hiring AIS graduates consider as being very or at least important that they have competences in: auditing computerized AIS, ERP systems, network security, IS/IT requirements gathering techniques and input and output design (Dillon & Kruck, 2008).

Curtis, Jenkins, Bedard, & Deis (2009: 88) call for research on how generalist auditors (internal or financial) obtain knowledge about information systems, raising the question of what training methods are being used. We consider that future a generalist auditor can acquire such knowledge and skills starting with their formal or informal education and training. By this we consider that suitable knowledge should be acquired during higher education degrees, either bachelor or master level.

3. Research methodology

As a starting point we identified the core competences related to the IS auditing in the ISACA *Model Curriculum for IS Audit and Control* which acknowledges the "need to fill positions with adequately prepared candidates... and many professionals who have requisite background obtain there IS auditing education through a university degree or certificate programs, which are delivered either a full-time or part-time student environment" (ISACA, 2012: 6). The ISACA

Model Curriculum covers five domains: *Process of Auditing Information Systems, Governance and Management of IT, Information Systems Acquisition, Development and Implementation, Information Systems Operations, Maintenance and Support and Protection of Information Assets*. As financial or internal auditors are not required to be proficient in all of the five domains we limit our matching process to the *Process of Auditing Information Systems*.

Next, we identified the IT/IS knowledge or competence requirements of IFAC and IIA. For IFAC we considered as relevant the International Education Practice Statement 2 (IEPS 2) *Information Technology for Professional Accountants* which offers guidance to member bodies to ensure that candidates possess the necessary general IT and IT control knowledge and competences required for qualification (IFAC, 2010b). For IIA we considered the *Global Model Internal Audit Curriculum* which guides universities in designing courses or programs compliant with the IIA's International Professional Practices Framework. For this article we considered only the *Information Technology Auditing and Advanced IT Systems and Auditing* courses and content recommendations (IIA, 2012).

By reviewing the three curricula, we matched the content in the IFAC IEPS 2 and IIA Global Model Internal Audit Curriculum with the ISACA Model Curriculum. For each content element, found in the IFAC or IIA Curriculum we gave the value 1 and, consequently, we gave the value 0 for missing content. Then, we established the total number of content match for each curriculum and we searched for reasons for the missing contents.

4. Results

In the ISACA Model Curriculum there are 21 content elements in the domain considered, *the process of auditing information systems*. We eliminated from the this domain two components: *audit charter/engagement letters* and *ISACA-IT audit and assurance standards, guidelines, assurance guide, tools and techniques, code of professional ethics* as they pertain more to the specific activities of information systems auditing and internal and financial auditors are not required by their professional bodies to be fully knowledgeable in such standards or to have a distinct charter/engagement letter when they their mission. Thus, we have 19 content elements left to be used as reference in the matching process.

The matching of content is presented below in Table 1. We found that in the IFAC and IIA Curriculum there are 16 content elements which match, at least from their description, the ISACA Model Curriculum's content. This means that 84,21 (16/19) percent of the IS auditing

process content requirements in the ISACA Model curriculum can be found in the IFAC or IIA curriculum for the same domain.

For the following ISACA content: *steps to determine regulatory requirements and use of self assessment*, we found no content description in the IFAC and IIA curriculum. These curricula describe, from an IT perspective, content related to the *applicable laws and regulations affecting the audit scope* but there is no correlation with the *steps to determine regulatory requirements* content in specific information systems auditing context. In the ISACA curriculum the *use of self assessment* content refers to the risk and control self assessment based on the Control Objectives for Information and related Technologies (COBIT) Framework. In the IFAC and IIA curriculum there are requirements for candidates to be familiar with COBIT but there is no reference to the use of this framework for self assessment.

In the IFAC curriculum we found no content for *fraud detection techniques and tools* requirements and in the IIA curriculum we found no content for *sampling methodologies* specific for IT/IS auditing. We admit that future financial and internal auditors must acquire such competences but in the general course of their mission. Still, considering the complexity of information systems and the lack of audit trail one would need specific skills to detect fraud or apply sampling methodologies.

Continuing our venture, we present below in Table 2 and Table 3 the content description in the IFAC and IIA curriculum matched against the ISACA model curriculum.

For the other ISACA content elements we found one or more content elements in the other two curricula. Thus, we noticed that a candidate who graduates an IFAC or IIA compliant program might acquire IS auditing related competences from different modules or content elements, based on the ISACA requirements but, of course, not to the level expected for professional information systems auditors.

5. Conclusions, limitations and future research

For the purpose of this article, we tried to establish the content similarity between the three curricula based on their description. Information technology and systems bind the various resources and processes in an organization but also binds the competence and skill requirements of audit professionals. Higher education institutions might embrace the call to design accounting and/or information systems programs considering the requirements of the ISACA model curriculum, because they would also be IFAC and IIA compliant in the field of IS auditing process.

We acknowledge the limitations of this article, as our analysis was description based and

we didn't make an in-depth content analysis. Further research is needed to investigate in detail the content similarity based on the description and syllabus or other reference materials issued by the three professionals' organization to describe de content in the curricula.

As for the future, we plan to evaluate the compliance of the national accounting and/or information systems programs with the requirements of IFAC or IIA with regard to the ISACA model curriculum. This would give universities an opportunity to identify the gaps between their curricula and either of the curriculum described.

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Appendices

Table No.1
Competence matching between the ISACA, IFAC and IIA Curricula

No.	ISACA Content	IFAC	IIA
1	Risk assessment concepts	1	1
2	Control objectives and information system controls	1	1
3	Applicable laws and regulations affecting the audit scope	1	1
4	Quality assurance systems and frameworks	1	1
5	Technology and audit environment changes	1	1
6	Audit planning techniques and project management	1	1
7	Audit planning steps	1	1
8	Business processes	1	1
9	Performing risk assessments	1	1
10	Evidence collection techniques	1	1
11	Sampling methodologies	1	0
12	Internal controls and control types	1	1
13	Steps to determine regulatory requirements	0	0
14	Procedures for testing and evaluating internal controls	1	1
15	Fraud detection techniques and tools	0	1
16	Use of self assessments	0	0
17	Reporting and communication techniques	1	1
18	Exit interviewing	1	1
19	Presentation and reporting techniques	1	1
	TOTAL	16	16

Note. Own interpretation

Table No.2
Content in IFAC curriculum matched against the ISACA curriculum

ISACA	IFAC Competences
1	IT risk assessment
2	IT control frameworks / IT control objectives
3	Understand external regulatory controls / Regulatory environment
4	IT control frameworks / Perform quality assurance procedures
5	Business issues / Envision future status of systems
6	Apply project management tools and techniques
7	Plan the project / Execute the project plan
8	Business models / Effectiveness of the entity's business processes
9	IT risk assessment techniques
10	Systems analysis tools and techniques / Separate evaluation / CAATs
11	Separate evaluation (data integrity testing)
12	Controls over information systems
13	---
14	Separate evaluation / Computer-assisted audit techniques (CAATs)
15	---
16	---
17	Communicating results of evaluation and following-up
18	Communicating results of evaluation and following-up
19	Communicating verbally, electronically or in printed format

Note. Own interpretation

Table No.3
 Content in IFAC curriculum matched against the ISACA curriculum

ISACA	IIA Competences
1	Analyzing the unique risks of information technology and related data
2	Basic IT systems concepts (COBIT Framework)
3	Recognizing legislation and regulations related to IS auditing
4	Quality Assurance Process / ERM Frameworks
5	Development and integration of corporate strategy within IT strategy
6	Acquiring experience with..software to manage the..audit engagement.
7	Acquiring experience with..software to manage the..audit engagement.
8	How are business processes mapped into enterprise system software
9	Understanding risks and controls / ...methods used to assess risk
10	Acquiring experience with audit software, test application controls
11	---
12	General and application controls
13	---
14	Acquiring experience with audit software, test application controls
15	Electronic fraud investigation techniques
16	---
17	Developing written communications by writing audit reports / Reporting
18	Reporting / Performing interviews
19	Reporting

Note. Own interpretation