The Accounting Information Systems Curriculum: Compliance with IFAC Requirements

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This is the first known study examining the core accounting information systems (AIS) curricula across universities in Australia. The paper provides a useful insight into the current operation of the AIS subject with an examination and evaluation of current AIS curricula. This study was motivated by a similar study by Groomer & Murthy (1996) conducted in the United States which found a lack of consistency in AIS curricula across universities, attributed to the varied qualifications of coordinators and lack of authoritative guidance on content. Our research found reasonable consistency in terms of topic coverage in AIS curricula, with some differences in emphasis. However, there was little awareness amongst coordinators of the authoritative guidance provided by International Federation of Accountants Committee (IFAC). Australian professional accounting bodies through their IFAC membership should be considering IFAC requirements when accrediting accounting courses offered by Australian universities. Accordingly, reasonable consistency was expected in AIS curricula throughout Australia.

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1.   Introduction

It is paramount that the undergraduate accounting information systems (AIS) curriculum is kept up to date with changing technological developments. Many aspects of accounting practice have been changed fundamentally by information technology (IT), including financial reporting, managerial accounting, auditing and taxation. An accountant's role in the analysis and design, evaluation and use of information systems has been expanded and become more complex as the IT revolution moves forward. This development makes it even more essential for accounting students to understand IT architecture, develop proficiency in application software, understand the processing of transactions by AIS, develop familiarity with system development methodologies, understand IT controls and be aware of newly-developing technologies.

This study examines the curricula for core AIS subjects in Australian universities. It is the first known study of this kind in Australia and outlines the authoritative guidance on AIS knowledge requirements provided by the International Federation of Accountants Committee (IFAC) (IFAC 1995, 2003). Compliance with this guidance is assessed using a survey. Demographic information about AIS coordinators is summarized in order to explain apparent differences in the AIS curricula. A contribution of this study is to inform AIS coordinators of IFAC requirements and provide guidance on the design of the AIS subject.

2.   Prior Literature

There has been little prior research in AIS curriculum design. The only research in this area has been conducted by Groomer & Murthy (1996) in the United States (US). The study performed was the first of its kind researching universities and colleges offering the AIS subject. The research collected demographic information about institutions offering AIS, described subject content including materials used, topics covered and assessment, and analysed responses to questions regarding the AIS subject.

The authors designed two survey questionnaires. The first one gathered data about the institutions offering AIS and general information about the subject itself, for example enrolments. The second questionnaire obtained information about coordinators teaching AIS. This included data about the academic position of the AIS coordinator, their research interests, their education and training in information systems, the number of years they have taught AIS, and their attitudes towards teaching the subject. Questionnaires were mailed to accounting faculties of 453 US institutions. Responses were received from 60% of these institutions.

The results from this study are summarized below:

1. **Qualifications of AIS coordinators.** 65.5% of respondents held a PhD and 13.9% held an MBA.
2. **Academic position of AIS coordinators.** 12.1% were Professors; 32.1% were Associate Professors; 42.4% were Assistant Professors; 12.7% were Lecturers; and, 0.7 % were Adjunct Instructors.
3. **Research interests.** 21% of respondents had a primary research interest in accounting information systems and/or information systems; and 23.4% had a secondary research interest in accounting information systems and/or information systems.
4. **Education/training and work experience.** 61.7% were self-trained, 25.7% held a PhD minor in Information Systems (IS) and 9.6% held a Masters minor in IS. The study also gathered information on the work experience of the respondents revealing 46.7% of respondents had information systems work experience in industry; 34.7% of respondents

obtained information systems work experience in a CPA firm; and, 18.6% of respondents had other experience.

5. **Number of years teaching AIS.** On average, respondents taught AIS for 2 years; 51.5% had taught AIS for a period less than 5 years; 30.9% taught AIS for a period of 6 to 10 years; and, 17.6% taught AIS over a period exceeding 10 years.

6. **Content of the AIS Subject.** Regarding the emphasis placed on topics covered in the AIS subject, the four topics receiving greatest emphasis in order of importance were transaction cycles; auditing and controls; systems analysis and design; and, data modelling. Data bases were not covered by 16.1% of respondents.

7. **Software and Assessment.** Lotus 1-2-3 was the most popular software used. 40.8% of respondents set an accounting software assignment; 37.6% set non-computer related projects; 38.2% set a spreadsheet assignment; and, 20.4% set a database assignment.

Overall results reported in Groomer & Murthy (1996) revealed a lack of consistency in the AIS curriculum across the responding institutions. The authors attributed this to *a lack of authoritative guidance* regarding the topics to be covered in an AIS subject and the *varied backgrounds of coordinators teaching the subject*. This made the subject content extremely diverse. The authors emphasised the importance of AIS coordinators having a background as professional accountants in order to reduce the diversity of the subject and enhance its AIS focus. The results from this study have provided a motivation for the current study which examines AIS curricula in Australia.

3.   IFAC Requirements and the AIS Curriculum

The *International Education Guidelines for Professional Accountants* published by IFAC (1995, 2003) are intended to 'assist member bodies to prepare professional accountants to work in the information technology environment'. These guidelines propose general IT and IT control knowledge and competency requirements. In addition, knowledge and competencies are presented which are relevant to accountants in the roles as user, manager, designer and evaluator (auditor) of IT systems.

IFAC recommends that pre-qualification accountants should obtain general IT knowledge, IT control knowledge and competencies, competencies relevant to the accountant as a user of IT, and competencies relevant to at least one of the remaining roles as a manager, designer or evaluator of IT systems. These guidelines acknowledge that the topics and competencies identified could be studied in a standalone AIS subject and/or be integrated within other accounting and auditing subjects.

Tables 1 to 6 summarise these general IT knowledge requirements, IT control knowledge areas and competencies, and IT competencies as a user, manager, designer and evaluator of IT systems, respectively (see IFAC 1995, 2003).

Accounting degree programs are accredited by CPA Australia and the Institute of Chartered Accountants in Australia, requiring courses to meet specific technical knowledge and generic skill requirements. Given the IFAC membership of the Australian professional bodies and this accreditation process, it was expected that AIS curricula throughout Australian universities would exhibit considerable consistency.

In order to assess compliance with IFAC guidelines, this study focused on the curriculum of the core AIS subject offered by universities in Australia. A survey was distributed in 2000 to Australian universities designed to collect data about AIS curricula. Table 7 presents the list of topic areas used to collect data about AIS curricula. This list of topic areas was compiled from chapter headings in leading AIS and electronic business textbooks (see references). For example, emerging IT topics have been included such as enterprise resource planning systems and supply chain management. Table 7 summarises the relevance of these topics to IFAC requirements for general IT knowledge, IT controls knowledge and competencies, and role competencies for accountants as user, manager, designer and evaluator of IT systems.

4.   Data and Research Design

The primary focus of this research is to determine whether AIS subjects in Australia meet the requirements of IFAC. However, in order to address this question, we examine whether or not consistency is evident across universities in Australia regarding the conduct of the AIS subject and whether the content is adequate to meet IFAC requirements. We find that the evidence of consistency across institutions in Australia can be determined by examining the current content coverage, the assessment applied and authoritative guidance referenced.

The research population was made up of 35 universities with respondents drawn from all states in Australia. Questionnaires were mailed in to the Head of the Department/School of Accounting/Commerce in each university, requesting the survey to be forwarded to the AIS subject coordinator. A response rate of 51.4% (18 respondents) was achieved, after some follow-up procedures were employed. It was considered that minimal non-response bias would be expected, given the similar criteria and processes that universities use to appoint academic staff and the impact of the professional body accreditation process.

5.   Analysis of Results

Table 8 shows that 14 (77.77%) respondents are professional accountants and 4 (22.2%) are IT professionals. Thirteen (94.6%) respondents hold the position of Lecturer or above.

[INSERT TABLE 8 HERE]

Table 9 reveals that 13 (72%) of the respondents hold at least a Masters or MBA degree. Only two respondents hold a Bachelor degree only. Three (17%) of the respondents hold a PhD qualification. This result is quite different to the findings of Groomer & Murthy (1996) where approximately 73% of the respondents held a PhD.

[INSERT TABLE 9 HERE]

Table 10 summarises the teaching experience of subject coordinators in AIS showing that 72% of respondents have taught the AIS subject for at least 5 years. In contrast, 48.5% of respondents in the US had taught AIS for at least 5 years. On average, in

Australia, AIS coordinators have more teaching experience than their US counterparts. Accordingly, they would be expected to have developed more in-depth knowledge of the AIS curricula and present more highly-developed subjects.

[INSERT TABLE 10 HERE]

Table 11 describes the primary and secondary research interests of AIS coordinators. Results show a much higher percentage of respondents interested in AIS and/or Information Systems (IS), than respondents in the Groomer & Murthy (1996) study. Ten (55.6%) respondents have AIS and/or IS as at least a secondary research interest. This is likely to be associated with coordinators dedicating at least 5 years to teaching AIS.

[INSERT TABLE 11 HERE]

Table 12 reports content coverage in the AIS subject across institutions. The responses of accounting AIS coordinators are summarized separately from those of IT professionals. Findings reveal that accounting professionals cover theoretical topics such as internal control, transaction cycles and electronic commerce **before** covering technical issues such as database management systems, management information systems, decision support systems, the systems development life cycle and expert systems. The majority (88.89%) of AIS coordinators covered transaction cycles and internal control and only 49% of respondents utilize ERP software as part of the practical component.

IT professionals cover the technical issues **before** covering the theoretical topics. This illustrates that accounting and IT professionals cover similar topics in the AIS subject but with different emphases indicating a less of consistency in topic delivery. However, all of the respondents claimed that the subject adapts to emerging issues in information technology. Despite these perceptions, only seven respondents included enterprise resource planning systems in the curriculum.

[INSERT TABLE 12 HERE]

Table 13 presents the types of assessment applied by respondents. Respondents who are accounting professionals appear more likely to set, in order of preference, an accounting software assignment, spreadsheet assignment and/or database

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assignment. IT professionals assign practical database assignments in favour of accounting assignments.

[INSERT TABLE 13 HERE]

The software used in AIS subjects is summarized in Table 14. Approximately 67% of the respondents used MS Excel and 33% used MYOB to demonstrate practical issues. Five (27%) respondents used the SAP R/3 financial accounting module for the practical component of the subject. In contrast, most of the respondents in the US study used Lotus 1-2-3 as part of the practical component (Groomer & Murthy 1996).

[INSERT TABLE 14 HERE]

Table 15 reports the factors affecting the delivery of the AIS subject with the highest concerns being time constraints, suitable textbooks, qualified staff and technical support. The lack of adequate AIS textbooks was also a similar finding in Groomer & Murthy (1996).

[INSERT TABLE 15 HERE]

Authoritative guidance in the form of IFAC (2003) is available to coordinators when developing the AIS curriculum. Due to the existence of authoritative guidance and the professional bodies' accreditation process, the curricula delivered in AIS subjects should reveal reasonable consistency across universities in Australia. Table 12 shows that topic coverage across universities is fairly uniform with the majority of topics covered by at least 60% of respondents. The exceptions appear to be data base software, enterprise resource planning systems, enterprise resource planning software, expert systems and spreadsheet software. Tables 12 and 13 indicate that accounting professionals cover more theoretical, business-oriented topics, and set more accounting related assignments. In contrast, IT professionals cover topics in their AIS subject with a more technical emphasis and set more technical assignments. Overall, the apparent differences in emphasis seem to be associated with the *professional background* of the AIS coordinator. This was also a finding in Groomer & Murthy (1996) in the US study.

Table 16 reports respondents' awareness of authoritative guidance. Our results reveal that 44.44% of respondents believe there is a lack of authoritative guidance for

the design of AIS curricula. Respondents listed prior lecture notes, advice from prior coordinators, journals, the Internet, textbooks and industry representatives as sources of such guidance. Approximately 28% of respondents believed there was adequate guidance and a similar proportion remained undecided as to the issue. Only one respondent has considered IFAC guidelines in developing the AIS curriculum. Our findings suggest that AIS subject coordinators are not well informed about the existence of IFAC guidelines.

[INSERT TABLE 16 HERE]

6.   Conclusion

The objective of this study was to provide insight into the operation of the AIS subject throughout Australian universities. This study was motivated by a similar study by Groomer & Murthy (1996) conducted in the US which found a lack of consistency in AIS curricula across universities, attributed to the varied qualifications of instructors and lack of authoritative guidance on content. Our study found reasonable consistency in AIS curricula in Australia but differences in emphasis. Despite the lack of awareness of IFAC guidelines, AIS curricula in Australia covers topics relevant to these guidelines. Australian professional accounting bodies through their IFAC membership should be considering IFAC requirements when accrediting accounting courses offered by Australian universities.

Given the importance of the AIS subject to accounting students, there is no evidence to suggest that the variation currently existing in the AIS curricula will have any negative or significant impact on the ability of accounting graduates produced by Australian universities to practice in the technological environment that will confront them.

Our results were subject to several limitations. This study focused only on the curriculum of the core AIS subject. Owing to differences in degree structure and teaching/research interests of coordinators, topics relevant to IFAC guidelines may be covered in subjects other than the core AIS subject. For example, accounting software, spreadsheet software, internal control and audit of information systems may be incorporated within other subjects, such as financial accounting,

management accounting and auditing. This study has not attempted to assess whether the core subjects in accounting degrees in combination meet IFAC requirements. Further research could explore this question. A further limitation is that a more thorough analysis could have been achieved if a better response rate had been achieved. Future research could address this problem by considering alternative approaches to collect and analyse the data.

The challenge for accounting/commerce departments/schools and AIS coordinators is to prepare accounting graduates for the technological environment in which they will work. The current IFAC (2003) guidelines should be considered in designing AIS curricula. Institutions should also adopt strategies to deal with some of the constraints affecting the effective delivery of AIS subjects, including suitable textbooks, attracting qualified staff, computer facilities, real-world application software and technical support. These issues represent significant challenges that academic institutions must face in the twenty-first century and beyond.

Table 1
General IT Knowledge Requirements

Knowledge Area	Illustrative Topics
IT Architecture	**General systems concepts, transaction processing, hardware, software, data organization and access**
System Acquisition/Development	**Investigation and feasibility study, system design, selection, development, implementation, maintenance**
Management of IT	**IT organization, change controls, performance monitoring**
IT Strategy	**Enterprise strategy and vision, IT strategic planning, IT governance**
Business Process Enablement	**Impact of IT on entity's business models, processes and solutions**

Table 2
IT Controls Knowledge and Competency Requirements

Knowledge Area	Competency
Control frameworks	
Control objectives	**Select suitable control criteria to analyse and evaluate controls**
Layers of control	
Responsibility for control	
Control environment	**Evaluate control environment**
Control over acquisition/development	**Evaluate system acquisition/development process and controls**
Risk assessment	**Evaluate risk assessment processes**
Control activities	**Evaluate system processing operations and controls**
Information and communication	
Monitoring of control compliance	**Evaluate monitoring processes**

Table 3
User Role Competency Requirements

Competency
Apply appropriate IT systems/tools to business/accounting problems
Demonstrate an understanding of business and accounting systems
Apply controls to personal system

Table 4
Manager Role Competency Requirements

Competency
Manage entity's IT strategy
Manage IT organisation
Manage IT operations effectiveness and efficiency
Manger inter-organisational computing
Manage end-user computing
Maintain financial control over IT
Manage IT controls
Manage system acquisition, development and implementation
Manage system change and problem management

Table 5
Designer Role Competency Requirements

Competency
Analyse and evaluate role of information in the entity's business processes and organisation
Apply project management methods
Apply system investigation and project initiation methods
Apply user requirements determination and initial design methods
Apply detailed system design, acquisition/development methods
Apply system implementation methods
Apply system maintenance and change management methods

Table 6
Evaluator Role Competency Requirements

Competency
Obtain and document an understanding of the flow of transactions and elements of control relevant to the audit
Test and evaluate relevant information systems controls over financial reporting processes and asset safeguarding
Test computer-based records to establish their accuracy and to substantiate financial representations
Plan system evaluation
Evaluate system, including application of computer-assisted audit techniques (CAATs)
Communicate results of evaluations and follow up

Table 7
Summary of AIS Topics Relevant to IFAC Requirements

AIS Topic	General IT	IT Controls	User of IT	Manager of IT	Designer of IT	Evaluator of IT
Accounting/Spreadsheet packages	X		X		X	
Audit of Information Systems						**X**
Business Process Re-engineering	X			X	X	
Data Base Management Systems (DBMS)	X		X	X	X	
Decision Support Systems (DSS)	X		X			
Electronic Commerce	X		X			
Enterprise Resource Planning Systems	X		X	X	X	
Executive Information Systems (EIS)	X		X			
Expert Systems (ES)	X		X			
Internal Control	X		X	X	X	**X**
IT Architecture	X					
Management Information Systems (MIS)	X			X		
Supply Chain Management	X		X	X		
Systems Design/System Development Life Cycle	X		X	X	X	**X**
Transaction Processing (Cycles)	X	X	X	X	X	**X**

Table 8
Academic Position of AIS coordinators

	Accountants	Information Technology Professionals
Associate Lecturer	1 5.55%)	0
Lecturer	6 (33.33%)	2 (11.11%)
Senior Lecturer	6 (33.33%)	2 (11.11%)
Professor	1 (5.55%)	0
TOTAL	**14 (77.77%)**	**4 (22.22%)**

Table 9
Educational Qualifications of AIS coordinators

Qualification/s	Respondents (%)
Bachelor Degree only	2 (11.11%)
Bachelor + Honours	3 (16.67%)
Bachelor + Masters	7 (38.88%)
Bachelor, Honours and Masters	1 (5.55%)
Bachelor, Masters and MBA	1 (5.55%)
Bachelor, Graduate Diploma and Masters	1 (5.55%)
Bachelor, Masters and PhD	2 (11.11%)
Bachelor, Honours, MBA and PhD	1 (5.55%)
TOTAL	**18 (100%)**

Table 10
Teaching Experience in AIS

Years teaching AIS	Respondents	Percentage (%)
0 to 2	2	11.11
3 to 5	3	16.67
6 to 10	10	55.56
10 to 15	1	5.55
> 15	2	11.11
TOTAL	**18**	**100.00**

Table 11
Research Interests of AIS Coordinators

Research Interest	PRIMARY		SECONDARY	
	Respondents	Percentage (%)	Respondents	Percentage (%)
Accounting Education	1	5.55	0	0
Accounting Information Systems/Information Systems	8	44.44	10	55.55
Auditing	2	11.11	3	16.67
Electronic Commerce	2	11.11	2	11.11
Environmental Accounting	1	5.55	0	0
Ethics	1	5.55	0	0
Financial Accounting	1	5.55	1	5.55
Management Accounting	1	5.55	1	5.55
On-line delivery	0	0	1	5.55
Social Accounting	1	5.55	0	0
TOTAL	**18**	**100.00**	**18**	**100.00**

Table 12
Content covered in the AIS subject

Content/Topics	Respondent Accounting Professionals	Respondent IT Professionals	Respondents / Total Respondents	Percentage (%)
Accounting Software	11/14	3/4	14/18	77.77
Auditing of Information Systems	9/14	2/4	11/18	61.11
Business Process Re-engineering	10/14	3/4	13/18	72.22
Data Base Management Systems	10/14	4/4	14/18	77.77
Data Base Software	7/14	3/4	10/18	55.56
Decision Support Systems	8/14	3/4	11/18	61.11
Electronic Commerce	11/14	3/4	14/18	77.77
Electronic Data Interchange	9/14	3/4	12/18	66.67
Enterprise Resource Planning Software	2/14	0/4	2/18	11.11
Enterprise Resource Planning Systems	5/18	2/4	7/18	38.89
Executive Information Systems	8/14	3/4	11/18	61.11
Expert Systems	6/14	3/4	9/18	50.00
Internal Control	13/14	3/4	16/18	88.89
IT Architecture	14/14	4/4	18/18	100.00
Management Information Systems	11/14	4/4	15/18	83.33
Spreadsheet Software	7/14	3/4	10/18	55.56
Supply Chain Management	7/14	4/4	11/18	61.11
Systems Design and the Systems Development Life Cycle	11/14	4/4	15/18	83.33
Transaction Cycles	13/14	3/4	16/18	88.89

Table 13
Assessment applied in AIS

Type of Assessment	Respondent Accounting Professionals	Respondent IT Professionals	Respondents / Total Respondents	Percentage of Total Respondents (%)
Accounting software assignment	8/14	¼	9/18	50.00
Case Studies	1/14	0/4	1/18	5.55
Class presentations	2/14	¼	3/18	16.67
Data Base assignment	3/14	¾	6/18	33.33
Enterprise Resource Planning software assignment	2/14	¼	3/18	16.67
Final Exam	13/14	4/4	17/18	94.44
Hand-in exercises	2/14	0/4	2/18	11.11
Mid-Semester Exam	5/14	0/4	5/18	27.77
Multiple Choice weekly questions	1/14	0/4	1/18	5.55
Questions from the text	1/14	0/4	1/18	5.55
Spreadsheet assignment	4/14	¾	7/18	38.89
Theoretical assignment	3/14	¾	6/18	33.33
Tutorial participation	6/14	¼	7/18	38.89

Table 14
Software used in AIS

Software	Respondents	Percentage (%)
Attache	2	11.11
JIWA Financials	1	5.55
MS Access	4	22.22
MS Excel	12	66.67
MS Project	1	5.55
MYOB	6	33.33
Quicken	1	5.55
SAP R/3	5	27.77
Solution 6	1	5.55

Table 15
Factors affecting delivery of the AIS subject

Constraints	Respondents	Percentage (%)
Audiovisual aids	2	11.11
Computer facilities, hardware and software	7	38.89
Computers and/or laboratories	7	38.89
Faculty support	7	38.89
Finance	8	44.44
Qualified staff	11	61.11
Staff training	5	27.77
Student enrolment	2	11.11
Technical support	8	44.44
Texts	12	66.67
Time	14	77.77

Table 16
Are AIS coordinators aware of the Authoritative Guidance?

Lack of Authoritative Guidance	Respondent Accounting Professionals	Respondent IT Professionals	*Total* Respondents	Percentage of Total
Yes	8	0	8	44.44
No	3	2	5	27.78
Undecided	3	2	5	27.78
TOTAL	**14**	**4**	**18**	**100.00**

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