Feedback On Developing An AIS Curriculum

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Abstract

This paper gathers evidence about an Accounting Information Systems (AIS) curriculum developed using a Model-Oriented, Tool-Enhanced (MOTE) framework. The evidence was gathered by eliciting the perceptions of employer stakeholders about the curriculum. The curriculum follows recommendations of the International Federation of Accountants' (IFAC) Guideline No. 11. The IFAC recommendations offer guidance on the information technology content in accounting curricula and are supported by the AICPA. The evidence gathered supports the inclusion of most elements of the curriculum.

Introduction

Over the past several years, a number of articles (e.g., Borthick, 1996; Callaghan, Lauer & Peacock, 1998; Davis & Leitch, 1988; Groomer & Murthy, 1996; Macur, 1998) have expressed the need for curriculum reform and have described existing curricula. However, very little research has been conducted to obtain professional feedback in assessing AIS curricula. Only one study could be found giving accounting practitioners' views of the content of AIS curricula (see Heagy and McMickle, 1988). But, because of rapid advances in information technology, the results of this study cannot be applied to the contemporary AIS situation. Novin et al. (1997) did a more recent study on the composition of 150-hour accounting programs. Although this study does contain some interesting AIS content, it is fairly limited as the focus is not at the detailed level of the content of AIS curricula.

It is the purpose of this paper to partially fill this gap by eliciting perceptions from current and prospective employers about the appropriateness and relevance of our AIS curriculum. This study also responds to the call by Albrecht and Sack (2000) to develop accounting curricula that are driven by the demands of the market, and not by the interests of faculty.

Recently, a Model-Oriented, Tool-Enhanced (MOTE) (Callaghan, Lauer & Peacock, 1998) framework was advanced and implemented as the basis for a model AIS curriculum. The Systems Development Life Cycle approach is used, which incorporates Information Engineering (IE) principles (Martin & McClure, 1988). The Systems Development Life Cycle framework is a systematic and orderly theoretical approach used to guide systems development, while the Information Engineering set of methodologies is used to implement this conceptual framework and to create a working, integrated business information system.

Readers with comments or questions are encouraged to contact the authors via Email.

The focus of our curriculum is to link financial theory and practice through the application of IT. The model-based aspect (MO) of the MOTE framework uses systems engineering methods that permit high-level abstractions of real-world financial systems. Included are accounting process (activity), data, and interaction models (including REA). The tool aspect (TE) uses advanced software that converts thesemodels into code that can be executed in many different technical environments. This combination of models and software permits the leveraging of modeling skills, independently from targeted technical environments. Thus, students can be taught practical system methods without selecting (and biasing them toward) any particular vendor's operating system, database, or programming language. This curricular approach is in dramatic contrast to traditional methods that either ignored technical environments (too abstract) or taught only specific technology (too ephemeral and trade-school-like) skills.

The MOTE framework has been augmented by guidance from the literature, current texts, and the authors' recent experiences while completing industry projects. In addition, their experiences from teaching and working with faculty in the information systems area were used in the curricular development.

The proposed model curriculum spans several courses. Two prerequisite Management Information Systems courses are included, while the core of the curriculum consists of a three-course AIS sequence, which trains students in the planning, analysis, design and implementation of business information systems.

As a first step in a curriculum evaluation process, Callaghan, Peacock and Savage (2000) assessed the MOTE curriculum against the IFAC International Education Guideline No. 11 (IEG 11), "Information Technology In The Accounting Curriculum" (IFAC, 1998). This guideline is supported by the AICPA (1996), and is the only authoritative AIS curriculum guidance offered since 1987, when the AAA Committee on Contemporary Approaches to Teaching Accounting Information Systems recommended curricular objectives for AIS (AAA, 1987; Macur, 1998).

IFAC uses the following breakdowns in developing its role-based educational framework. It establishes general IT educational requirements that are, in turn, divided into IT concepts for business systems and internal control in computer-based systems. It then establishes four professional roles, which are:

- The professional accountant as user of IT (*user* role)
- The professional accountant as manager of information systems (*manager* role)
- The professional accountant as designer of business systems (*designer* role)
- The professional accountant as evaluator of information systems (*evaluator* role).

A satisfying curriculum would meet the general requirements and permit accountants to fulfill their *user* role. In addition, a curriculum supporting one of the three remaining roles (*manager*, *designer* or *evaluator*) would be required. The MOTE approach elects a curriculum in support of the *designer* role. One rationale for developing curricula based on the *designer* role is that it permits the maximum flexibility to students in terms of providing building blocks for the remaining two roles identified by IFAC. Another rationale for choosing the *designer*-role approach is that is permits a disciplined, normative approach to systems development (see Callaghan, Peacock, Savage, 2000).

As a result of the evaluation of our curriculum against the IFAC guidelines for the designer role, the original curriculum content was adjusted to address deficiencies revealed by the analysis. This paper presents a continuation of this research by taking the evaluation process a step further, and eliciting feedback from current and prospective employers about our AIS curriculum.

The remainder of the paper is organized as follows. First, the methodology employed in this study is examined. Second, the findings of this study are put forth. Lastly, study conclusions and limitations are stated.

Methodology

Sample

Our goal in choosing our sample for the survey was to get opinions from those individuals in a variety of industries who had some contact with our undergraduate program, either by being employers, members of advisory boards, attendees at our conferences, or colleagues of faculty. All recipients were known professionally to at least one of the authors. We considered this group to have sufficient qualifications and experience to understand the survey and give a realistic opinion. To further explain the sample population, branches of 170 of the Fortune 500 firms are located in the immediate area of our university. Additionally, there are some 40,000 other businesses, including basic manufacturing, assembly, retail, software development, consulting, health care, and business support services.

The authors mailed out 229 surveys to 75 of these professionals in the manufacturing, public accounting, and health service industries. The cover letter requested that the recipients complete one copy of the questionnaire and distribute the remainder to persons with the appropriate skills and experience. If recipients felt they could not complete their own copy, they were then requested to forward their copy to appropriate personnel. In total, 43 (18.8%) copies of the survey were returned (a second request resulted in the receipt of three surveys which are included in the total).

Summary demographic information is contained in Table 1. The sample included comparable numbers of IT professionals (IT), public accountants (PA), and non-public (NPA) accountants (see Panel A of Table 1). The educational backgrounds of the respondents are, by highest degree attained, depicted in Panel B of Table 1. Panel C shows the respondents' work experience levels by job category. While ITs and NPAs had roughly the same experience levels, PAs had, on average, less experience.

Panels D and E of Table 1 show the respondents' self-rating in terms of Information Technology (IT) and Accounting proficiencies. On a scale of one to ten, for example, IT professionals averaged 8.29 for IT proficiency and 4.43 for Accounting proficiency. Perhaps somewhat surprising are accountants' self-perception of their IT proficiency. Accountants generally are confident of their IT skills, especially compared to the IT professionals' confidence in their Accounting proficiency. Overall, the respondents appear to believe in both their IT and Accounting proficiencies.

Questionnaire

The research instrument used in this study is a questionnaire. The questionnaire is structured as follows. The first section elicits demographic information from the respondents. The body of the questionnaire (available from the authors), contained in the second, third, and fourth sections, follows our curriculum in terms of its stages: prerequisites (PRE), then a core component (CORE), and finally some additional, post-core elements (ADD). Within each of these sections are the broad knowledge areas comprising the designed curriculum. These broad areas are then decomposed into the main topics or elements of the curriculum. Thus, beyond demographics, the questionnaire consists of a hierarchy representing our curriculum, consisting of elements within knowledge areas, within stages. The stages,

Table 1
Demographic Information

Panel A: Job Category Count of JobType		
JobType	Count	Percent
IT	14	33%
NPA	17	40%
PA	12	28%
Grand Total	43	100%
Panel B: Educational Background		
Count of Degree		
Degree	Count	Percent
Bachelors	27	63%
Masters	14	33%
Post	2	5%
Grand Total	43	100%
Panel C: Years of Professional Experience		
Average of Q2_7		
JobType	Average	
IT	16.32	
NPA	14.24	
PA	8.75	
Grand Average	13.38	
Panel D: IT Proficiency		
Average of Q2_8		
JobType	Average	
IT	8.29	
NPA	6.06	
PA	6.68	
Grand Average	6.96	
Panel E: Accounting Proficiency		
Average of Q2_9		
JobType	Average	
IT	4.43	
NPA	8.15	
PA	7.45	
Grand Average	6.73	

knowledge areas, and elements map into IFAC recommendations, assuming a choice of the designer role, over the evaluator or manager roles.

The content validity of the instrument relies heavily upon the IFAC recommendations. We selected those knowledge areas and elements of the recommendations culminating in the designer role. The stages in turn correspond to the IFAC hierarchy.

Statement of Hypotheses

The hypotheses of the study follow from the structure of the instrument. That is, hypotheses can be articulated at the stage, knowledge area, and element levels. Further, two types of hypotheses are put forth. First, hypotheses are made about whether or not a stage, knowledge area, or element should be included in the curriculum. Since we had no prior belief about inclusion, the null hypothesis is asserted to be 50%. That is, we assumed that inclusion would be random, with roughly half wanting inclusion, and half wanting exclusion.

However, since there was no practical way to impose a cost of inclusion upon the respondents, we fully expected the respondents to include stages, knowledge areas, and elements when they were doubtful about inclusion. This bias toward inclusion was anticipated, so a second type of hypothesis was put forth. For those respondents selecting inclusion, the extent of inclusion was elicited, with 1 indicating possible inclusion, 2 indicating inclusion, and 3 indicating definite inclusion. This scale offers the possibility of testing the respondent's intensity of inclusion preference, with a corresponding null hypothesis of inclusion (i.e., 2). The alternative two-tail hypotheses work either for not including or including the stage, knowledge area, or element. Presumably, if costs were to be imposed, those elements significantly scored below two would be excluded from the curriculum, while those significantly greater than two would be included, leaving the middle of the distribution uncertain for inclusion. The Table 2 summarizes the hypothesis types and counts associated with each type:

Table 2
Hypothesis Types

Category	**H_0: p= .5, H_a: p≠ .5**	**H_0: Score= 2, H_a: Score ≠ 2**
Stage	3	3
Knowledge Area	24	24
Element (Topic)	125	125

Findings

Under the first hypothesis type, no stages or knowledge areas were significantly less than 50%. These results were expected, given the lack of constraints imposed upon the respondents and the aggregation of counts over knowledge areas and stages. Panels A and B of Table 3 show the highest and lowest p-values of the test of proportions, based on respondent counts, for the ten least-favored and ten most- favored elements.

Even with no costs imposed, programming-related elements appear to be targeted for curricular exclusion. In contrast to such technical skills, business and auditing-related IT skills appear to be attractive curricular elements to the respondents. However, even some of the lowest scored elements (non-bolded of Panel A) were still significantly greater than the hypothesized 50%. From this perspective, all but four elements should be included. To gain a deeper insight, the intensity of inclusion is examined next.

Table 3
Ten Low/High Elements
Test of proportions

Panel A:

QID	Element	Z-score	P-value(p)
Q3_21	Programming Languages/Compilers	0.1525	**87.88%**
Q3_22	Programming Aids, Programming Software	0.7625	**44.58%**
Q6_3	Library Management Systems	1.5430	**12.28%**
Q6_2	Programming Languages /Compilers	1.9825	**4.74%**
Q6_24	Selection of Internet Service Provider	2.1602	3.08%
Q3_14	Input/Output Devices, Processing Speeds	2.4689	1.36%
Q6_1	Software Configuration	2.5925	0.95%
Q5_23	Prototyping	2.7775	0.55%
Q3_20	Utility Software	2.8975	0.38%
Q5_24	CASE Tools, Object Methods, etc.	2.8975	0.38%

Panel B:

QID	Element	Z-score	P-value(p)
Q3_31	Internet/Intranet/Extranet applications	6.5574	0.00%
Q6_16	Probability of Loss	6.5574	0.00%
Q6_17	Consequences	6.5574	0.00%
Q6_6	Effect of IT Audit on Organization, Controls	6.5574	0.00%
Q3_6	Role of Information in Business	6.4807	0.00%
Q4_10	General Ledger/Budgeting/Information Systems	6.4807	0.00%
Q6_15	Risk Exposures	6.4807	0.00%
Q6_18	Continuity of Processing/Disaster Recovery Planning	6.4807	0.00%
Q5_4	Reliability of Financial Reporting	6.2524	0.00%
Q3_28	Database Management Systems	6.1721	0.00%

Under the second hypothesis type, a two-tailed test of means against the middle of the scale, include or 2, was conducted. Those elements significantly less than 2 would be the most likely candidates for elimination if costs were imposed, whereas those elements that scored significantly greater than 2 would most likely be included, even with the imposition of cost constraints. Table 4 summarizes these tests.

Again, technical and programming-related elements fared poorly, while more traditional accounting, control, and higher-level systems elements were highly rated. This suggests that, especially when constraints are imposed, a curriculum emphasizing traditional accounting cycles with control or audit focus is preferred to one emphasizing purely technical skills. When systems elements are preferred, they are characterized by a higher level of abstraction.

Panels A and B of Table 5 below depict the second-hypothesis-type tests at the knowledge category and curricular stage levels, respectively. In general, the relative importance of stages decrease as one proceeds through the curriculum. This is consistent with the notion that precore is more important than core, which in turn is more important than additional. Interestingly, each stage is significantly less than two.

Table 4
Ten Low/High Elements
Test of means against 2

Panel A:

ID	Element	Mean-2	P-value(m)
Q6_2	Programming Languages /Compilers	-0.7143	0.00%
Q6_3	Library Management Systems	-0.7308	0.00%
Q6_23	Hardware Contracts & Software Licenses	-0.5143	0.00%
Q4_30	Tax Preparation	-0.4865	0.00%
Q4_18	Small Business Systems	-0.4571	0.00%
Q4_31	Decision Support & Expert Systems	-0.4167	0.01%
Q6_1	Software Configuration	-0.4667	0.01%
Q3_8	Human Information Processing	-0.4474	0.01%
Q6_20	Decision Tables & Trees	-0.4324	0.02%
Q4_27	Anti-virus Software	-0.4242	0.06%

Panel B:

ID	Element	Mean-2	P-value(m)
Q3_6	Role of Information in Business	0.5714	0.00%
Q3_11	Financial Analysis	0.4750	0.00%
Q4_4	Purchases/Payables/Payments	0.4500	0.00%
Q4_5	Inventories/Cost of Sales	0.4390	0.00%
Q4_3	Revenue/Receivables/Receipts	0.4146	0.02%
Q4_10	General Ledger/Budgeting/Information Systems	0.3333	0.14%
Q5_13	Control Procedures	0.2821	0.51%
Q4_6	MRP & Control/Costing	0.2683	1.34%
Q3_1	Nature & Types of Systems	0.2750	2.00%
Q3_3	Control & Feedback in Systems	0.2632	2.06%

At the knowledge category level, the results were similar to those at the element level analysis. That is, more technical hardware, software, application categories were shunned (e.g. counts 3, 4, 9, etc.) in favor of higher level of abstraction, traditional accounting and control, and business application of IT categories.

Conclusion and Limitations

This research brings about an integration of a Model-Oriented, Tool-Enhanced framework for AIS curriculum development, the IFAC recommendations for the integration of IT into the accounting curriculum, and feedback from business professionals. Even though professional feedback indicates a preference for the inclusion of business and auditing-related IT skills and abstract IT concepts, as opposed to technical hardware and software knowledge, the MOTE approach caters for this by allowing students to leverage their abstraction skills, while having a systems development tool to do the part that professionals do not consider that important (e.g., programming).

Table 5
Test of means against 2
Panel A:
Knowledge Categories

Count	Category	Average	V. 2	P-Value
1	General Systems Concepts	2.1441	0.1441	0.34%
2	Management Use of Information	2.0513	0.0513	18.66%
3	Hardware	1.8434	-0.1566	0.51%
4	System Software	1.7870	-0.2130	0.00%
5	Application Software, Data Organization & Access	1.7489	-0.2511	0.00%
6	Networks & Electronic Data Transfer	1.9158	-0.0842	7.15%
7	Transaction Process in Business & Accounting Applications	2.2250	0.2250	0.00%
8	Experience in Business & Accounting Applications	1.8962	-0.1038	3.22%
9	Software	1.7979	-0.2021	0.00%
10	Control Objectives	2.0189	0.0189	38.30%
11	Control Framework Control Environment	1.8739	-0.1261	0.65%
12	Risk Assessment/Control Activities	2.1314	0.1314	0.28%
13	Role of Information in Organization Design & Behavior	1.8348	-0.1652	1.28%
14	Systems Analysis & Design Techniques	1.7905	-0.2095	0.00%
15	System Acquisition/Development Life Cycle Phases /Tasks/Practices/over System Development Processes	1.8617	-0.1383	0.01%
16	System software	1.3690	-0.6310	0.00%
17	Software	2.0610	0.0610	23.35%
18	Control Objectives	2.1037	0.1037	3.80%
19	Control Environment	2.0000	0.0000	50.00%
20	Risk Assessment	2.0234	0.0234	36.67%
21	Control Activities	1.9762	-0.0238	42.46%
22	Monitoring of control Compliance	2.1250	0.1250	15.87%
23	Systems analysis and Design	1.5676	-0.4324	0.02%
24	System Acquisition/Development Life Cycle Phases, Tasks/Practices/Maintain Control over Systems Development Processes	1.6250	-0.3750	0.00%

Panel B:
Curricular Stages

Count	Stage	Average	Vs. 2	P-value
1	Pre-core	1.9371	-0.0629	0.01%
2	Core	1.9161	-0.0839	0.00%
3	Additional Elements	1.9003	-0.0997	0.00%

Several limitations of the study can be considered. First, the survey is asking the respondent to make a decision regarding whether or not a topic should be included in a curriculum of study. Therefore, the respondents have the luxury of including anything that they think should be included given the survey instructions. This limitation then becomes a benefit because we have opinions that are not curbed by fear of lack of time. As long as those interpreting the data understand the conditions experienced by the respondents, then the feedback obtained is very valuable.

The authors understand that in a curriculum one is always confined by time and one cannot add material to a curriculum without having some concern for these limitations. This research is, however, concerned with a curriculum that will extend beyond the traditional single required systems class for an undergraduate program. Rather it is concerned with the type of curriculum that would be used in a 150-credit program, an AIS degree or a systems track in an undergraduate program.

A second limitation that could be considered is that the respondents are not curriculum experts. As most universities and companies manage their organizations, they are told constantly to listen to the customer. The changes in IT advancements link users very closely with educators because both are charged with the need to be at the leading edge. It is therefore appropriate to ask business personnel about curriculum content. They may not be educational experts, but they are current in their field and educators hope that their curriculum is also current and relevant to the needs of business professionals.

A third issue requiring discussion is that of who should drive innovation in curriculum development: professionals or academics. Certainly from a customer perspective it is now almost required to ask one's stakeholders for their opinions of one's programs. In the past, in many business disciplines, it was commonplace for academics to lead business. However, in recent times business innovations have been used by academics to create new material for classes. Future research could focus on the following questions: Is that the situation in information systems? Should we be reaching to professionals to critique our work? Does the suggested exclusion of some topics by professionals that are considered necessary by academics indicate that academics are leading the field in accounting information systems?

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Notes