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IS 2002 and Accreditation: Describing the IS Core Areas in Terms of the Model Curriculum

Jeffrey P. Landry
University of South Alabama
Mobile, AL 36688, USA

J. Harold Pardue
University of South Alabama
Mobile, AL 36688, USA

John H. Reynolds
Grand Valley State University
Grand Rapids, MI 49401, USA

Herbert E. Longenecker, Jr.
University of South Alabama
Mobile, AL 36688, USA

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Jeffrey P. Landry
jlandry@usouthal.edu
J. Harold Pardue
School of CIS, University of South Alabama
Mobile, AL 36688

John H. Reynolds
School of CIS, Grand Valley State University
Grand Rapids, MI 49401

Herbert E. Longenecker, Jr.
School of CIS, University of South Alabama
Mobile, AL 36688

ABSTRACT

The authors propose a reasonable linkage between information systems (IS) curriculum accreditation and the IS 2002 model curriculum by mapping the learning units of IS 2002 into the six IS core areas defined by IS curriculum accreditation guidelines. The implication of the mapping is to facilitate a straightforward aggregation of bottom-up, outcome-based course assessment data for use in curriculum accreditation.

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1. INTRODUCTION

A major component of the three-year-old process of information systems (IS) curriculum accreditation involves the coverage of six major areas of IS curriculum content. The accrediting body for information systems programs (ABET 2003) requires schools to report on semester hour coverage in each of these six areas, called the IS core areas for accreditation. The six content areas include: *hardware and software*, *a modern programming language*, *data management*, *networking and telecommunications*, *analysis and design*, and *role of IS in organizations* (ABET 2003, p. 9)

While not the only guidelines for curriculum self-study, the six core areas provide a comprehensive umbrella under which a school's IS curriculum efforts should fit. The existence of this short-list of content areas suggests that IS curriculum accreditation, in part, comes down to these two fundamental questions:

- *where do we provide coverage of these areas in our IS curriculum? and*
- *how proficient are our graduating IS seniors in these six areas?"*

Schools with undergraduate IS degree programs seeking accreditation would be well-informed to understand how their curriculum provides adequate course coverage and student proficiency in each of the content areas.

Answering the fundamental accrediting questions is an important focus of the self-study process, and there are multiple approaches. Accrediting bodies generally expect you to provide an estimate of semester-hour-coverage (SHC) for each course for each of the six areas to answer the first question, and examples of student performance to answer the other. Our approach is to take a bottom-up, or courses-to-curriculum, perspective, reusing the work done by faculty to develop and assess their courses using objectives and outcomes-assessment in a way that the IS 2002 model curriculum intended. From a bottom-up perspective, answering these questions involves considering all of a curriculum's content detail—including courses, objectives, teaching methods, assignments, and testing—and figuring out how they "add up" toward answering the fundamental accrediting questions.

Table 1 - IS Core Areas (ABET CAC 2003)

IS Core Area	IS 2002 LU's	%of Model	Sp 04 Avg
Hardware and Software	13	8.67%	40
Modern Programming Language	13	8.67%	41
Data Management	18	12%	47
Networking and Telecommunications	10	6.67%	42
Analysis and Design	45	30%	47
Role of IS in Organizations	51	34%	52
Totals	**150**	**100%**	**48**

IS curriculum accreditation is viewed as part of an ongoing process of continuous curriculum improvement. Prior work (Daigle et al. 2003) has described a "step one" of the process, that of mapping one's course objectives to the learning units of the IS 2002 model. This paper is thus a "step two." The purpose of this paper is to demonstrate and present a mapping, using the Information Systems Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems (IS 2002—Gorgone et al. 2002), of low-level learning units to high-level content areas for IS accreditation. It makes sense to use IS 2002 for curriculum accreditation, as both IS 2002 and ABET accreditation are so very similar in form and purpose. By demonstrating and presenting this link between the two compatible curriculum assessment mechanisms, we hope to provide a bridge for faculty to use both mechanisms as part of the same process.

2. IS CORE AREAS

The IS core areas, listed in the table below, are a concise set of content areas for IS. Although they are not formally defined or described by ABET (2003), they are easily recognizable by IS faculty. We believe that the six core areas subsume the learning units of IS 2002; in other words, each learning unit can find a place in at least one of the IS core areas. The core areas are compatible with IS 2002 and are similar to some of the 11 logical courses that have been described as "containers" for organizing the 150 learning units of IS 2002. These learning units are at the heart of the IS 2002 undergraduate degree program guidelines, providing detailed educational goals and objectives on a variety of IS topics taught at various levels of depth.

3. MAPPING LU'S INTO THE IS CORE AREAS

We attempted to establish the link between model curriculum and accreditation by mapping the learning units to the IS core areas for accreditation. One expert assigned each of the 150 learning units of IS 2002 into a single IS core area. He looked at the learning unit title and goal, and then assigned it to the category that best seemed to fit. Most of the learning units fit cleanly into one area. In some cases, an LU was assigned to a first and second-closest match to be double-checked later. Once all of the learning units were considered, and a consistent rationale was well-understood, the mappings were revisited, and a few were changed. A co-author double-checked the mappings with the first author, and they agreed on changes. A third co-author also

suggested a change that was agreed to by the others.

The table above lists the number of learning units assigned to each core area, and the percentages are given to indicate the relative areas of emphasis of the model curriculum learning units. According to our mapping, the *role of IS in organizations*, together with *analysis and design*, describe about 64% of all learning units in the model curriculum. *Data management* has the next largest with 12% coverage in the model curriculum, followed by *a modern programming language*, *hardware and software*, and *networking and telecommunications*.

4. IS EXIT ASSESSMENT EXAM

To provide further evidence of student performance in the areas of accreditation, it is possible to use the learning unit mappings to aggregate the results of the IS Exit Assessment Exam (CCER 2004; Reynolds et al. 2004; Landry et al. 2003), which is based on the IS 2002 learning units. The overall results of the Spring 2004 IS Exit Assessment Exam are reported in Table 1, with averages reported on a percentage basis for each content area. The 256 multiple-choice items were assigned a IS core area categories based on the learning units they tested. Average scores in the various areas ranged from a high of 52 in the role of IS in organizations to a low of 40 in hardware and software. A total of 938 students from 33 schools took the exam on a nationwide basis, and a score of 50 was considered to be a passing score. Clearly, the ability of a school to aggregate its student performance in these core areas and compare these scores to the national results shown would be a powerful tool for curriculum self-assessment.

5. CORE AREA-BY-CORE AREA BREAKDOWN

The next section details each of the learning unit to IS core area mappings. For each IS core area, a table of learning units is presented at the end of the paper. The LU's are ordered by logical course and then LU number. The LU short title is given, but the LU's educational goal, used in the mapping process, is omitted here for brevity. An example of the mapping detail is show in Table-2 below. If the learning unit was covered on the most recent IS exit exam, the national average, given as a percentage, is listed in the last column. Because the IS 2002 logical course numbers are listed only, a list of the logical courses follows:

0 - Personal Productivity with IS Technology
1 - Fundamentals of Information Systems
2 - Electronic Business Strategy, Architecture and Design
3 - Information Systems Theory and Practice
4 - Information Technology Hardware and System Software
5 - Programming, Data, File and Object Structures
6 - Networks and Telecommunication
7 - Analysis and Logical Design
8 - Physical Design and Implementation with DBMS
9 - Physical Design and Implementation in Emerging Environments
10 - Project Management and Practice

Data Management Mappings

The data management core area's learning units come primarily from three areas. First, learning units that deal with database and data and information fundamentals coming from the IS.0 logical course are included. Learning units on data and file structures from the IS.5 logical course are mapped, as are the database-related objectives from the IS.8 logical course. Data management makes up 12% of the IS 2002 model curriculum, according to our mapping.

Analysis and Design Mappings

The 45 learning units grouped into the Analysis and Design area represents 30% of the model curriculum and the second-largest area. The learning units actually come from eight of the 11 logical courses, not just the analysis and design (IS.7) course as one might expect. A total of 107 test items on the Spring 2004 IS Exit Assessment Exam covered learning units in analysis ands design, making it the area of highest concentration. Some of the project management learning units are included

here due to their emphasis on analysis and design activities rather than on project management activities.

Role of IS in Organizations Mapping

The 51 learning units grouped into the Analysis and Design area represents 34% of the model curriculum, the area of highest concentration. The learning units come from nine of the 11 logical courses. This was the second-highest area of concentration on the Spring 2004 IS Exit Assessment Exam with 72 questions or 28% of the exam.

Modern Programming Language Mappings

The ABET guidelines call for students to learn "a modern programming language." From the model curriculum, this guideline was interpreted as meaning simply "programming," as distinct from analysis and design. Most of the learning units mapped to the modern programming language area come from the Programming, Data, File and Object Structures (IS.5) logical course. The 13 learning units make up 9% of the model curriculum.

Networking and Telecommunications Mappings

The networking and telecommunications core area had the closest fit with any logical course in the model curriculum. All 11 of its learning units come from the Networking and Telecommunications (IS.6) logical course.

Hardware and Software

This area is made up of 13 learning units, nine of which come from the IT Hardware and Software logical (IS.4) course. Only two learning units from this area were tested on the IS exit assessment exam, so this area turned out to be the least represented among the IS core areas.

6. DISCUSSION

The main contribution of this paper is to provide a detailed mapping of IS 2002 learning units into the six IS core areas for accreditation. We showed that each of the 150 learning units of the model curriculum could be fit into one of the six IS core areas. The value of the mapping is in its contribution in enabling the IS 2002 model curriculum to be used for IS curriculum accrediting. The implication is that bottom-up curriculum data, coming from courses that use learning units, can be organized to provide an aggregate view of curriculum and performance. Faculty can focus on improvements and assessments at the course level, and then easily show how the curriculum is affected. If course improvements and curriculum changes are kept up with on a continuing basis, aggregate reporting will become easier, and a process of continuous, measurable curriculum improvement will possible with a minimum of data collection and reporting effort. An objective, defensible, easy to assemble, accreditation self-study, backed up with detailed data, would also follow.

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8. APPENDIX –MAPPING DETAIL: LEARNING UNITS BY IS CORE AREA

Table 2 - Data Management

Course	LU	LU Title	Sp04 Avg
0	13.05	Organizing personal data resources	
0	13.06	Database terminology and concepts	
0	13.07	Accessing/retrieving/storing data	
0	13.12	Implementing a simple database design	
0	15	Information Use Strategies	55
5	42	Information Measurements/Data/Events	61
5	43	Data: Characters, Records, Files, Multi-Media	
5	53	ADTs: Data and Files Structures	
5	54	ADTs: Arrays, Lists, Trees, Records	30
5	55	ADTs: Indexed Files, Keys	53
7	81	IS Database Applications Development	54
8	88	IS Data Modeling	55
8	89	ADTs: Database Models and Functions	
8	90	IS Database and IS Implementation	42
8	91	IS Database Application Structuring	34
8	92	IS Database Application Implementation	45
8	95	IS Database Conceptual/Logical Models	54
10	111	IS Requirements and Database	34

Table 3 - Analysis and Design

Course	LU	LU Title	Sp04 Avg
0	2	Knowledge Work Software	
0	3	Problem Solving, Small IS	
0	13.02	Support: individuals vs groups	
0	13.03	Info analysis: individual vs group	
0	13.04	Info analysis: finding IS/IT requirements	
0	13.08	Is life cycle: developing with packages	
0	13.09	Configure and customize a package	
0	13.14	IS Development with Prototyping	
0	13.16	Implementing a personal IS application	69
0	14	Problem Solving, with Packages	51
1	5	Systems and Quality	
1	8	IT Systems Specification	65
1	13	IS Personal Level Systems	47
3	19	Personal, Cognitive Process	
3	24	Systems, Work-Flow, Organizational Systems	
5	45	Problem Solving, Formal Problems and IS	
5	46	Object Representation of a System	
5	56	Problem Solving, IS Applications, Sub-Structures	
5	57	Problem Solving, Data and File Applications	32
5	58	Problem Solving, with Files and Database	42
5	59	Problem Solving, File/DB Editors/Reports	50
7	72	IS Analysis and Design Tasks	65
7	73	IS Commercial Implementations	39
7	74	IS Requirements and Specifications	74
7	75	IS Design and Implementation	46
7	76	IS Rapid Prototyping	51
7	77	IS Development Risks/Feasibility	
7	82	Problem Solving, Complexity Metrics	
7	83	IS Software Quality Metrics	
7	84	Systems and Quality Metrics/Assessment	43
8	93	IS Application Development/Code Generation	34
8	96	IS Functional Specifications	45
8	98	IS Development and Conversion	49
8	99	IS Requirements/Work-Flow Planning	
8	117	Personal, Presentation	39
9	100	IS Application with Programming Language	29
9	101	IS Implementation with Objects, Event Driven	
9	103	IS Development Testing	43
9	116	IS Life Cycles and Projects	42
10	105	IS Development, Project Planning	41
10	106	IS Development, Project Management	45
10	107	IS Development, Project Management	39
10	108	IS Development, Project Management Tools	30
10	109	IS Development, Project Close Down	
10	110	IS Applications, Production Systems	56

Table 4 - Role of IS in Organizations

Course	LU	LU Title	Sp04 Avg
0	4	IT and Society	
0	13.01	Work and activity concepts	
1	6	Information and Quality	
1	9	IT and Attaining Objectives	
1	10	Characteristics of an IS Professional	
1	11	IS Careers	
1	12	Ethics and the IS Professional	
2	200	Evolution of IT use	
2	201	E-commerce relationship types	
2	202	Value and Supply chain concepts	
2	203	Customer issues and solutions	
2	204	E-commerce functionality	
2	205	Interorganizational Ethical Issues	
2	206	Hardware/Software Inter-organizational System	
2	207	Inter-organizational IS Development Methodologies	
2	208	Individual Privacy Concerns	
3	16	IS Theory	
3	17	IS as a Strategic Component	
3	18	IS Development and Management	
3	20	Personal, Goals and Decisions	
3	21	Decision Making, Simon Model	29
3	22	Systems and Quality, and IS	41
3	23	Systems, Role of Management, Users, Designers	52
3	25	Models, Organizational Relationship to IS	
3	26	IS Planning	
3	27	IS Types	
3	28	IS Development Standards	
3	29	IS Implementation, Outsourcing	
3	30	Personal, Performance Evaluation	
3	31	IS Society and Ethics	
3	119	Ethics and Legal Issues	66
3	123	IS Management of IS Function	
6	124	IS Management of Emerging Technologies	
7	78	IS Continuous Improvement and IS	50
7	79	Interpersonal, Consensus Development	59
7	80	Interpersonal, Group Dynamics	44
7	85	IS Professional Code of Ethics	
8	86	Interpersonal, Synergistic Solutions	
8	87	Interpersonal, Agreements and Commitment	56
8	94	IS Development and Project Management	42
8	127	Quality and Performance Management	54
9	112	Personal, Proactivity, Principled Action	67
9	113	Interpersonal, Empathetic Listening	39
9	114	Interpersonal, Goals, Mission, Alignment	51
9	115	IS Responsibility to Sell Designs to Management	39
9	118	Personal, Life-Long Learning	69

9	120	IS Management and IS Department Organization	50
10	121	Personal, Leadership and IS	67
10	122	IS Policies and Standards	
10	125	IS Implementation and Outsourcing	
10	126	Personal, Time and Relationship Management	68

Table 5 - Modern Programming Language

Course	LU	LU Title	Sp04 Avg
0	13.1	Procedural/event driven programming	
0	13.11	Implementing simple algorithms	
0	13.13	Implementing and event driven applications	
5	44	ADTs, Classes, Objects	
5	47	Problem Solving, Algorithm Development	27
5	48	Problem Solving, Top Down Implementation	41
5	49	Problem Solving, Object Implementation	
5	50	Problem Solving, Modules/Cohesion/Coupling	
5	51	Verification and Validation, A Systems View	
5	52	Problem Solving, Environments and Tools	
5	60	Problem Solving, Design, Test, Debug	55
5	61	Programming: Language Comparison	
9	104	IS Applications, Programming Environment	

Table 6 - Networking and Telecommunications

Course	LU	LU Title	Sp04 Avg
6	32	Telecom, Devices, Media, Systems	42
6	33	Telecom, Organizational Support By	
6	34	Telecom, Economics, Design Issues	34
6	35	Telecom, Standards, Standard Organizations	
6	36	Telecom, Central/Distributed Systems	
6	37	Telecom, Architectures, Topologies, Protocols	
6	38	Telecom, Hardware and Software	
6	39	Telecom, Services, Reliability, Security...	
6	40	Telecom, Installation, Implementation	50
6	41	Telecom, LAN, Installation, Configuration	

Table 7 - Hardware and Software

Course	LU	LU Title	Sp04 Avg
0	1	Systems and IT Concepts	
0	13.15	IS Technology Evolution	
1	7	IT Hardware and Software	
4	62	Telecom, Systems View HW/SW	41
4	63	IT Peripheral Devices	
4	64	IT Hardware Architectures	
4	65	IT Systems Software Components, Interactions	
4	67	OS Functions	
4	68	OS Environments and Resources	
4	69	OS, Installation, Configuration for Multi-Media	
4	70	OS, Interoperability and Systems Integration	
4	71	OS, Installation, Configuration of Multi-User Systems	38
8	97	IS Conversion Planning	