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CURRICULUM UPDATE

IS'2000: On Updating the IS'97 Model Curriculum for Undergraduate Programs of Information Systems.

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The purpose of a curriculum model is to provide information for faculty and administration who must provide an education system which enables students upon graduation to participate effectively in the work environment. Likewise, the reasons for changing the model must include either significant change in the target environment requiring new specifications or a significantly improved mechanism for transferring useful information to faculty.

In the early 1980's, the DPMA and the ACM released curriculum models to address the needs for guiding the education of information systems professionals (Ashenhurst 1973; DPMA 1981; DPMA 1986; Couger 1983; Nunamaker 1982). These models were used as guides for approximately 1000 academic programs of information systems (Longenecker 1991).

IS'90 was the first significant update of these early models (Longenecker 1991). The task force for this effort was composed of representatives from industry and academia. The IS'90 document contained a body of knowledge, and sample course descriptions for teaching the body of knowledge. A depth of knowledge metric based on Bloom's Taxonomy of Educational Objectives was incorporated to indicate exit level knowledge requirements from each course, and from the degree program. Specified depth levels were based on survey data as well as the experience of the task force. The course descriptions were given to be illustrative rather than prescriptive. The task force recognized the need to incorporate local requirements and to package the course according the needs of a particular university.

IS'95 (Longenecker 1995; Couger 1995) and IS'97 (Longenecker 1996; Davis 1997) incorporated a body of knowledge built from the IS'90 body of knowledge with inclusions of the CSC 1991 (Turner 1991), an NSF task force on ethics recommendations, and a synthesized software engineering body of knowledge (Williams 1997). Exit level depth specifications were determined by 1995 survey of academics (Longenecker 1996) and of IS industry professionals (Mawhinney 1994). The results of the early surveys are shown in figure 2 (below), along with a similar survey of academics conducted during August 1999. The knowledge categories of the current survey were identical with those surveyed in 1995. While survey participants were given the opportunity to add new knowledge areas none were submitted in either 1995 or in 1999.

In the Information industry there is no question that enormous change is taking place. The significance of E-commerce reflects one of the largest economic events ever. The impact of this form of business is expected to reach $3.2 trillion by 2003. At the top level "CIOs are on the move. They're heading to companies where E-business and a seat on the executive committee present new opportunities... The chance to be part of the new digital economy was to good to pass up..." (Mateyaschuk 1999).

The question is not whether E-commerce is important, rather, what are expectations of new hires? Ten years ago customer focus, business process re-engineering and quality were the important concerns. In order to evaluate this question we decided to evaluate current newspapers to find the mix of skills requested within IS-job advertisements. A thousand ads were collected from the Internet publications of 17 major national US news papers. Each ad consisted of a number of words or short phrases. The collected words were grouped and categorized under the exit curriculum sub-areas of IS'97 (italics in figure 1). All of the collected words fell within the two exit curriculum areas of IS'97: D. Development of Information Systems, and E. Deployment of Information Sys-

ACM (1982) DPMA'81/86	IS'90 IS'95 IS'97	IS'2000
user centered designs, process automation central systems → LAN 3rd GL Programming	business process re-engineering, quality, customer focus LAN → WAN 4th GL → Visual Pgm	customer driven enterprise, global web based business intranet / extranet RAD / ERP / E-Tools
1980's	1990's	2000+

tems. A survey was built consisting of all of the words. The survey was sent via the web (http://is2000.org) to ~6800 academics in computing departments identified within Alta Vista listing of US Universities. Of the requests to participate:

340 were returned as wrong E-mail address
316 answered at least 1 question
210 completed the survey as of 8/15/99
330 responded via E-mail that they would not participate

FIGURE 1: Exit Level Activity Expectations of Undergraduate Information Systems Majors

Activities	Exit Level Expected
Systems analysis and design	
ABILITY	
computers and IS fundamentals	3.4
IS analysis and design	3.3
systems and quality thinking	3.2
strategic use of IS	3.1
IT and organizational systems	3.0
SKILL	
business problems	2.9
IS planning	2.8
business operations	2.7
accounting, distribution	2.6
decision making	2.6
Database	
ABILITY	
development	3.0
SKILL	
modeling	2.8
administration	2.6
Software development	
ABILITY	
problem solving	3.6
programming	3.4
application development	3.2
page development	3.2
system documentation	3.2
algorithms	3.1
client server development	3.1
web programming	3.1
Systems integration	
SKILL	
computer systems software	2.9
Lan/Wan networking	2.9
system configuration/operation	2.8
computer systems hardware	2.7
operating systems mgmt	2.7
Lan/Wan design	2.4
Personal Activities	
ABILITY	
communication	3.7
commit/completing	3.7
personal habits	3.5
customer focus	3.5
self direction	3.5
learning to learn	3.5
interpersonal habits	3.4
ethics	3.3
design	3.3
accountability	3.1
methodology	3.1
SKILL	
modeling/abstraction	2.7
use of theory	2.3
Team Activities	
ABILITY	
life cycle management	3.0
project goal setting	3.0
SKILL	
specifications/deploy	2.9
continuous improvement	2.8
Support Services	
ABILITY	
Office software	3.3
SKILL	
IT Services	2.5
IS Management	
SKILL	
Project tracking	2.9
IRM mgmt	2.6
IS function mgmt	2.4

FIGURE 2: Knowledge Requirement Expectations of Undergraduate Information Systems Majors

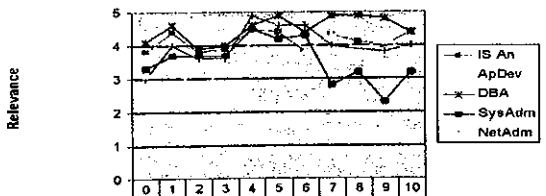
	Knowledge Areas	IS Academics A-1994	IS Academics A-1999	IS Industry In-1994
2.1	Interpersonal Skills/Communication	3.9	3.6	4.0
3.1	Systems Implementation/Testing	3.5	3.2	3.6
1.6	Database	3.7	3.0	3.5
2.8	Legal and Ethical Aspects of IS	3.0	2.7	3.5
2.9	Professionalism	3.0	2.7	3.5
3.2	Approaches to Systems Development	3.2	3.0	3.4
3.8	Information /Business Analysis	3.4	2.9	3.4
1.1	Computer Architecture	3.1	2.4	3.4
3.10	Systems and Information Concepts	3.1	3.6	3.3
3.3	Sys Development/Methodologies	3.2	2.9	3.3
1.2	Algorithms and Data Structures	3.4	3.0	3.2
1.3	Programming Languages	3.7	3.0	3.2
3.9	Information Systems Design	3.6	3.0	3.1
1.4	Operating Systems	3.2	2.3	3.1
1.5	Telecommunications	3.2	2.9	3.0
3.5	Applications Planning	3.6	2.9	3.0
3.7	Project Management	3.3	2.8	3.0
2.7	Managing the Process of Change	2.8	2.5	2.8
2.1	General Organizational Theory	2.8	1.9	2.6
3.4	Sys Development/Tools/Techniques	3.5	2.9	2.5
2.2	Information Systems Management	3.2	2.6	2.5
2.4	Organizational Behavior	2.8	2.7	2.4
2.3	Decision Theory	2.7	2.5	2.4
1.7	Artificial Intelligence/Exper Systems	2.6	2.7	1.9
3.12	Specific Types of IS Development	3.2	2.6	
3.11	Systems Operation/Maintenance	3.5	2.2	

FIGURE 3: Perceived Relevance of IS'97 Course Architecture for Undergraduate Information Systems Majors

IS'97 Courses

IS'97.P0 Knowledge Work Software Tool Kit
IS'97.1 Fundamentals of Information Systems
IS'97.2 Personal Productivity with IS Technology
IS'97.3 Information Systems Theory and Practice
IS'97.4 Networks and Telecommunications
IS'97.5 Programming, Data and Object Structures
IS'97.6 Information Technology Hardware and Software
IS'97.7 Analysis and Logical Design
IS'97.8 Physical Design and Implementation with DMBS
IS'97.9 Physical Design and Implementation with Programming Environments
IS'97.10 Project Management and Practice

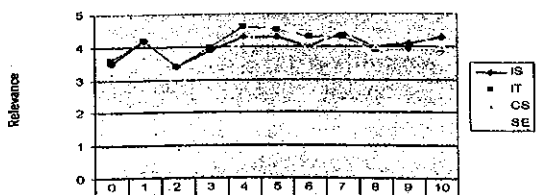
Relevance of IS'97 Courses by Job



	0	1	2	3	4	5	6	7	8	9	10
IS An	3.8	4.4	3.8	3.9	4.5	4.4	3.8	4.3	4.1	4	4.4
ApDev	3.1	3.3	2.7	3.3	4.1	4.7	3.8	4.3	3.9	4.1	3.8
DBA	4.1	4.6	3.9	4	4.6	4.9	4.4	4.9	4.9	4.8	4.4
SysAdm	3.3	3.7	3.7	3.7	4.5	4.2	4.3	2.8	3.2	2.3	3.2
NetAdm	3	4	3.6	3.6	4.9	4.6	4.6	4	3.9	3.8	4

IS'97 Course Numbers

Relevance of IS'97 Courses by Discipline



	0	1	2	3	4	5	6	7	8	9	10
IS	3.5	4.2	3.4	3.9	4.3	4.3	4	4.4	4	4.1	4.3
IT	3.6	4.2	3.4	4	4.6	4.5	4.3	4.3	3.9	3.9	3.9
CS	3.2	3.7	3.1	3.4	4.1	4.7	3.9	4.5	4	4.4	4
SE	3.1	3.8	2.8	3.6	4.2	4.7	4.1	4.5	3.7	3.8	3.6

IS'97 Course Numbers

Data collected as of August 15 is included herein. Desired abilities and skills of IS graduates are shown in Figure 1. Figure 2 is a survey of related knowledge obtained from the same survey. Participants were given the ability to submit extra skill categories: none were proposed. Participants were given the ability to rate skill and knowledge areas as irrelevant to the curriculum. None of the participants indicated that presented skill and knowledge areas were irrelevant.

In addition, survey participants were asked to evaluate the relevance of the IS'97 course set. Participants could review the details of the hyper-linked course descriptions and attached learning units. Figure 3 (top) shows that the courses were perceived as very relevant for students over the next few years. Please note that surveys were sent to participants who identified themselves as Information Systems (IS), Information Technology(IT), Computer Science(CS) and Software Engineering(SE) faculty members. An unanticipated result was that there was significant agreement among all classes of faculty. This result may indicate that a common core may be appropriate among the related computing disciplines. Field specific differentiation could be accomplished by specific course work later in the course sequences. It must be kept in mind that to develop the higher level abilities (Bloom >3.0) requires considerable curriculum time.

Figure 3 (bottom) differentiates survey participants according to specific jobs for which faculty provide course material. The curriculum was perceived to be relevant for all except systems administrators who apparently felt their students needed less experience in system design and implementation, and application designers who felt they needed less up-front experience, particularly in the conceptual areas of information systems.

We interpret these preliminary findings to mean that the IS'97 curriculum is relatively well targeted. What is needed now to perform minor updates to the body of computing knowledge, and to examine the learning units to ensure that their language is consistent with current usage. The learning units of IS'97 were designed to map to the course architecture of any university. We are preparing web capable software that will allow this mapping to be completed by academic units desiring to participate. In the process of the mapping each academic unit is asked to give specific questions that could be used to evaluate their students according to the objectives of the IS'97 learning unit. These questions are referred to as "local objectives". Examination of these local objectives and the needed skill-ability descriptions will give teams the opportunity to recast the learning units. If necessary, new units will be added.

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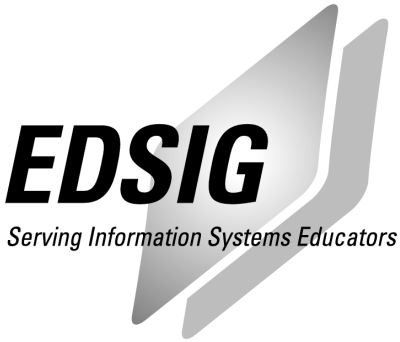

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