

**Summer/Fall 1996**

## What to Teach in an Information Systems Curriculum: Depends on Whom You Ask!

**ABSTRACT:** Alumni surveys provide useful ways to evaluate the effectiveness of current programs and to provide direction for program modifications. A recent survey of alumni of a Pacific Northwest university undergraduate IS program reveals that they view communication skills and data communication, network and client server skills highly. Group Projects with Real Clients was the highest rated topic for the alumni respondents. Further analysis of the data shows that responses are highly tied to the current IS position and focus of the respondent. As schools evaluate their programs via alumni surveys, they should be aware of this influence.

**KEYWORDS:** Information Systems Education, Alumni Surveys, Information Systems Curriculum

### INTRODUCTION

"If the first thinking process should lead us to answer the question 'what to change?', the second thinking process should lead us to answer the question 'what to change to?'" [1, p. 336]

Information systems educators responsible for curricula design in business schools must develop the two thinking processes identified in The Goal. We must constantly evaluate what courses, concepts, and methodologies

we offer to students in our programs. In order to prepare our students for a career we must ensure that we offer them the opportunity to acquire the skills necessary to become employed. While this is not the sole purpose of a university education, it is a critical component, especially in IS with its changing technology base. Our curricula must keep pace with the changes in technology so that our graduates will possess a current skill base which enables them to be competitive in the job market.

The questions remain: what do we change? and what do we change to? The answers, we learned, depend on who is asked.

### REVIEW OF LITERATURE

The IS '95 joint task force curriculum report [2, p. 175] states, "The applied nature of the IS discipline suggests a critical link with the practicing profes-

sional community." Clearly the evolution of the field over the past three decades has been marked by numerous stages of curriculum reform and debate with the current joint task force report representing the culmination of these activities. The academic literature provides a wealth of ideas and opinions regarding the development of IS curricula and means to insure this linkage. Researchers have gathered data from executives [3], IS professionals [4], other academics [5,6, 7,8], and alumni [9,10]. Todd, McKeen and Gallupe [11] recently completed a study of the IS job skills by comparing, via content analysis, IS job advertisements from 1970 to 1990.

One typical methodology is to ask graduates about the value of their program of study. As Cohen [5, p. 16]

notes, "...we increasingly must keep in touch with the work place. To accomplish this, we must know what tools, skills, and knowledge our graduates actually use. One way to accomplish this feedback is through strong alumni ties. Another is through advisory boards. Both tools provide us with the feedback we need to refresh and refine our curriculum." Seeborg and Ma [12] found that alumni of an undergraduate business program did not feel that they were prepared for their first job. Another survey of alumni found that

employers rewarded non-technical skills such as problem solving while business schools focused on specific technical skills [13]. In a recent study, Womble

[9] asked alumni if they possessed any of the 38 skills/knowledge sets identified by the ACM [14] as important in entry level IS positions. The study then asked them to evaluate the importance of each skill or knowledge set in an entry level position. She found that the graduates felt they were fairly well trained and that most of the skills they did not possess were not important. Sass and McGinnis conducted a comparative survey of 1988 and 1993 graduates [10]. They note that the job market is changing with many students opting to work with smaller companies. This switch leads to a dichotomy for educators as graduates headed towards a large firm environment may well still need exposure to COBOL and mainframe management issues while others may need exposure to a PG-oriented environment.

A second common strategy in research regarding curriculum evaluation is to compare the opinions of one group to those of another. Lewis and Ducharme [15] found practitioners and academics agree that IS graduates lack proficiency in quantitative, communication, and people skills. Heiat et al. [16] found that IS professionals and academics disagree on the importance of sev-

era! skills/knowledge areas. In general, their findings show that practitioners believe IS programs need to provide more "real world" practice. Another recent study [3] asked IS managers, end-user managers, IS consultants, and IS professors to identify key skills and knowledge domains for the IS professional in the future. The results of this study indicate that curricula should focus on the integration of applications, technologies, data, and business functions. The final conclusion was that business schools need to prepare students for a career rather than provide training for a specific job. Todd, McKeen, and Gallupe [11] report that job profiles have not changed dramatically and that the changes that have occurred suggest an increased emphasis on the technical aspects of IS jobs.

#### **THE PRESENT STUDY Purpose**

We, like most other faculty of AACSB accredited colleges of business, are faced with a difficult dilemma. On one hand, we try to prepare our students for a career in IS. On the other hand, we must deal with limitations in the number of classes we can offer, the support we receive from other colleges in the university, and a very dynamic technology-based environment. Therefore, we must constantly look at our curriculum and ask, what do we change? and what do we change to?

While the answers to these questions may be difficult, we are not without help. The new IS '95 curriculum provides a well defined structure for an IS program. Cohen [5], Becker, Gibson, and McGuire [17] and the authors of IS '95 report [2] call for more integration of topics and "spiral learning. ~ Still, individual schools must match their needs to their own programs and graduates. Womble [9, p. 17] indicates that IS programs in smaller, new programs "may find that comparisons of outcomes from routine study of graduates with the most recently recommended curricula and industry needs or expectations, provides another strategy useful in designing curricula and preparing IS

professionals for a lifelong career."

As such, we conducted a survey of our IS alumni. The program is relatively small, has been in existence about twelve years, and focuses on analysis and database methodologies with limited emphasis on software coding. The current curriculum generally follows the DPMA guidelines. Our purposes for the survey were threefold. First, we wished to determine how well we were filling our market niche. Second, we wanted to respond to AACSB and university requests for outcomes assessment. Third, we wanted to maintain or reestablish ties with our IS alumni network. We hoped to use results of this survey to assist us in our efforts to move towards a more fully integrated, object-oriented curriculum.

#### **METHODOLOGY**

In order to accomplish this task we sent a survey to 106 graduates of our undergraduate Information Systems program. The survey contained three major sections-six general information, open-end questions dealing with courses, topics, and the respondent's current IS position; thirty-nine objects to be rated on a five point Likert-like scale (1=not important, 5=extremely important) ; and an address, phone database update question. Individual were sent the questionnaire along with a letter soliciting their assistance with the project and a postage paid return envelope. Forty-three usable surveys were returned (40.6%).

#### **FINDINGS**

Alumni Perceptions of Importance of Topics In order to evaluate the relative importance that graduates place on specific, possible topics to be covered in an IS curriculum a variety of statistical measures, including the mean and stan-

**TABLE 1 Typical CIS/MIS Curriculum**

COBOL I	DSS/ES/ESS/NN
COBOL II	IS Concepts
Computer Concepts	IS Projects
DBMS Concepts I	Management of IS
Data Communications	Microcomputer Applications
Data/File Structure	Systems Analysis and Design





puter hardware (mean=3.93) , and IS ethical issues (mean=3.76).

As we looked at the data in further detail, some interesting dichotomies were observed. Figure I displays some of these results. For example, on the topic COBOL the response pattern was nine scores of 5 (Extremely Important) , nine of 4, eleven of 3, five of 2, and seven of 1 (Not Important) , and two no response. The topic VM\CMS had five 5 scores, thirteen 4s, eight 3s, ten 2s, and three 1s. EXCELERATOR is the particular CASE tool used in our program. Alumni rated it with six 5s, seven 4s, fifteen 3s, eight 2s, and three 1s. Likewise, R-Base had been the software of choice to use in conjunction with the database management and senior design classes. Six of the alumni rated it Extremely Important, six rated it Not Important, nine gave it a rating of 4, eight gave it a 2 rating, and nine others indicated 3.

These results hardly show agreement among the alumni as to the relative importance of some key items in a potential curriculum. As noted in Table 1, substantial variability exists on many of the items. In order to further understand these opinions, we ran a series of cross tabulations of various relationships with SAS. From this, some interesting patterns began to develop. Certain cross tabulations showed a high degree of relationship between ratings which were also confirmed by visual verification of corresponding cross plots. Analysis of correlation coefficients between groups of the items further supported this direction of analysis.

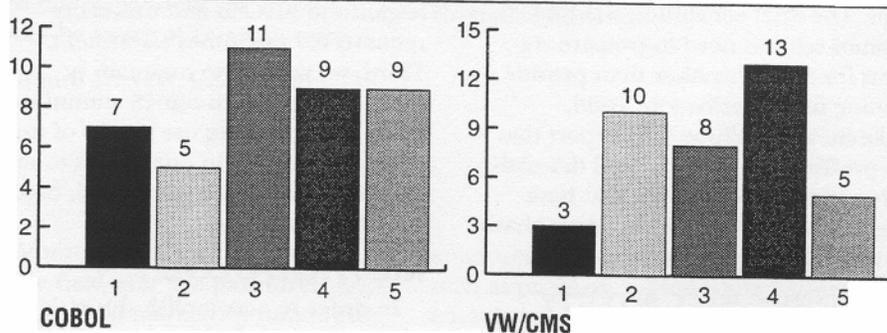
To isolate these relationships a principal components factor analysis was conducted on the thirty-nine items. Depending on the criterion used, either four or seven factors were deemed relevant. Since logical explanations of the meaning of the first four factors could be developed, we elected to use this set. Table 2 presents selected portions of the SAS factor analysis.

We labeled the first factor, which explains 5.02% of the variance, OR and Planning in Large Systems. The variables which load positively on this factor include IS tools (forecasting, simula-

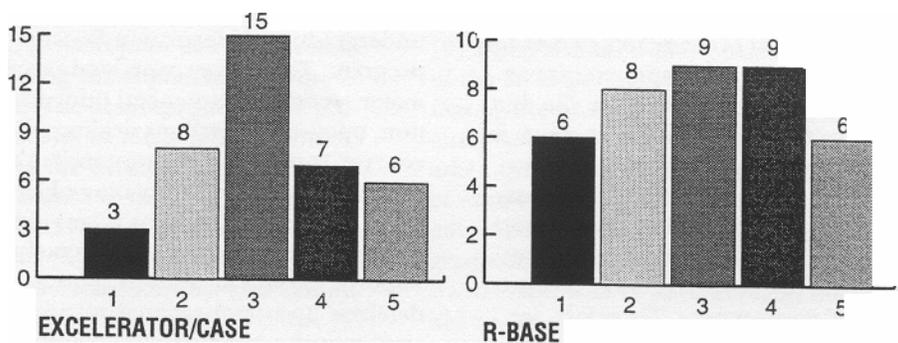
**Summer/Fall 1996**

tion, expert systems, DSS, and COBOL) and organizational concerns (information resource planning, organizational politics, and written communication). Variables with negative loadings are more commonly associated with small machines (UNIX, Visual Basic, C, and Oracle) .This factor represents those IS professionals who use IS tools to accom-

**FIGURE 1 Responses to Selected Items**



plish corporate-wide, or at least large-scale, planning tasks. They apparently interact with users from many departments through written communication. They probably spend little time working with small systems or software. This factor may represent alumni from our program's earlier years when these topics were the focus of the curriculum.



**TABLE 2 Comparison of IS '95 Curriculum Model and Typical CIS/MIS Curriculum Profile of the Current Research**

<b>IS '95 Courses</b>	<b>Curriculum Profile</b>
IS '95.0 Knowledge Work Software Tool Kit	Microcomputer Applications
IS '95.1 Fundamentals of Information Systems	S Concepts
IS '95.2 Personal Productivity With IS Technology	None
IS '95.3 Information Systems Theory and Practice	Management of IS
IS '95.4 Information Technology Hardware and Software	Computer Concepts
IS '95.5 Programming, Data, File and Object Structure	Data/File Structure COBOL I and II
IS '95.6 Telecommunications	Data Communications
IS '95.7 Analysis and Logical Design	Systems Analysis and Design
IS '95.8 Physical Design and Implementation with DBMS	DBMS Concepts I
IS '95.9 Physical Design and Implementation with Programming Environments	Systems Analysis and Design
IS '95.10 Project Management and Practice	IS Projects

The second factor ( 4.49% ) clearly represents the Programmers in the sam- ple. All of the programming languages listed in the survey, as well as object ori- entation in both programming and data base management systems and hard- ware, loaded positively on this factor. Both written and verbal communication loaded negatively, which, while painful for an IS professor to admit, certainly fits the programmer stereotype. The final two variables to load on this factor are a bit more difficult to explain. IRM loaded positively, which may indicate more of an appreciation for structure rather than resource management. An interpretation for the negative load for R-Base may be that the programmers see R-Base more of a "PC toy" than a "real" programming tool.

A description of the third factor (3.66%) is Analysts & Designers.

Positive variables in this factor are sys- tem analysis and design methodologies, CASE, distributed processing, object ori- ented programming, SQL, and systems integration. Stand-alone PC software, spreadsheets, VM/CMS, and hardware loaded negatively, showing a strong preference for systems as opposed to a single user approach. The focus here is clearly on the processes, both method- ologies and tools, for developing busi- ness solutions.

We labeled the final factor (3.49%) End-Users/Small System Developers.

This factor identifies those respondents working with small or PC data base sys- tems. They favored distributed process- ing, Windows, both Oracle and R- Base, SQL, and systems ~alysis and design methodologies. The negative loading of assembler is consistent in that it repre- sents the older, main frame ap- proach to creating programs. Similarly, the nega- tive view of verbal communication and the positive view of VM/CMS may indi- cate self-sufficient end- users as opposed to analysts solving problems for others.

#### Open-End Questions

While most of the open-end questions were program specific, some general insight into IS programs was gained from looking at the responses to the

*Journal of Information Systems Education*

## Summer/Fall 1996

question "What topics/tools skills most helped you land your initial job in IS?" Figure 2 displays the pattern for more frequently occurring responses (multi- ple factors were possible for each respondent) .

Clearly communication skills play a significant role in initial job placement. Actual projects in the analysis, database and senior design classes provided the students with "real world" experience. General IS background and knowledge is important. Seven individuals men- tioned some variant of the combined business/IS focus as being a contribut- ing factor. The response from one alumnus nicely summarizes this rela- tionship: "PC-knowledge plus hands-on product/ systems development in the senior design project. Also a good busi- ness sense-Don't downplay the busi- ness/marketing side of this major. It is a big plus to have an IS person with a solid business background."

Some of the variety shown in the responses in the first section was also present in these responses. Three indi- viduals indicated COBOL knowledge was an important factor. Four men- tioned directly their PC background. Three more mentioned internships as being important. If one combines this with the responses related to actual pro- jects, the role of "experience" is further stressed.

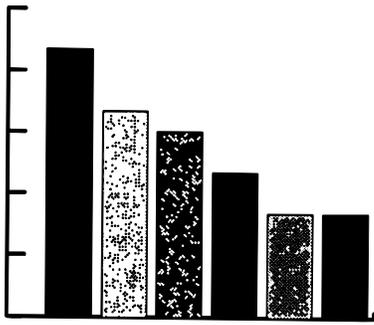
### DISCUSSION

The survey was intended to provide information with which to assess our program. The alumni indicated that sev-

eral topics were important. Communication skills were highly rated in both parts of the questionnaire. Group project experience also received strong ratings. The transition to a client/server environment and the role of networking and data communica- tions were topics of importance. Since most of the respondents to this survey graduated prior to the inclusion of such topics in the curriculum, they would not have found them important in ini- tial job placement.

Another topic which received a high rating was Project Management (rank 10, mean 4.33). When one also looks at the strong support for group projects, which provide experience in project management and team work, this area is one with strong support which was missing from our degree offerings. However, as one moves to more spe- cific topics, considerable variability begins to become preValent. The lack of agreement on key objects makes cur- riculum planning difficult. For exam- ple, several indicated that COBOL was Extremely Important; several found it to be Not Important at all. Further analysis of the response patterns via factor analy- sis indicates that the perceived impor- tance is largely a result of who you are and what you are doing. A person work- ing in a "big iron" environment likely is to see COBOL as an important topic. A systems developer may well find a 4thGL like Visual BASIC to be far more relevant. IAN managers will find client/ server, data communication and

**FIGURE 2 Factors Important in Initial IS Job Placement**



12



9

6

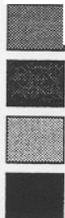
3

0

**Communication Skills**

Group Project | Hands-on Experience | Working in Teams

| Database Knowledge



Combined IS/Business Background

Analysis and Design

Knowledge of New Technologies

network issues more important.

Such findings are not surprising. However, many studies have not clearly defined this relationship as a possible source of noise in their findings. Womble [9, p. 14], when discussing importance of Skills/Knowledge, notes "This split in perception may be the result of different work environments and their effect on personnel. Further study may determine the effects that work environments have on the perceptions of personnel."

### CONCLUSIONS AND IMPLICATIONS

Trauth et al. [3, p. 301] indicate "Academic programs, for their part, need to continually reassess their markets and their customer requirements. Without compromising long-term educational benefits for short-term training, a school can select from the continuum of IS career paths those that best suit its circumstances and corporate customers." Todd et al. [11, p. 21] state: "It is clear that IS is becoming more business oriented. IS managers are forced to focus on bottom-line responsibility, and increasingly the IS group is a significant contributor to the development and implementation of organizational strategy. Thus, it seems unlikely that the need for business and systems skills is waning."

As such, they note that emphasis on increased technical skills does not necessarily mean a diminished importance for business and systems training. Our results are consistent with these findings. As a result of this survey, we have made several modifications to our program. In keeping with trends towards new technologies, we modified our introductory programming course from a C requirement to Visual BASIC. We have added a data communications course and this spring offered a networking elective course. Consistent with the Trauth et al. recommendations [3, p. 299], the analysis, design, and database courses are treated as a series of integrated, interrelated courses maintaining an applied focus. We have implemented a separate, elective pro-

## Summer/Fall 1996

ject management course.

In reviewing the survey, similar to others we found strong support for communications skills and project experience. Likewise, changes in IT platforms indicate a need for more emphasis involving technologies such as the client/server environment. We found less agreement on the importance of selected specific objects. Further analysis of the data set revealed that some of these differences can be largely explained by whom we asked.

The IS '95 guidelines provide an excellent set of recommendations. Still, individual programs must respond to their market niche and budget constraints. Maintaining strong alumni ties

is a way to ensure such a mesh. However caution is needed when reviewing the results of alumni surveys. The WYAI-WYG (Who You Ask Is What You Get) principle is likely to play a role in the responses. This outcome helps explain some of the oft times contradictory results which these surveys uncover.

### AUTHORS'

#### BIOGRAPHIES

C. Randall Byers is an Associate Professor of Information Systems and Statistics at the University of Idaho. He currently is serving as head of the Department of Business. Dr. Byers received his Ph.D. from the University of Minnesota with a major in Quantitative Methods and a related area in MIS. His masters degree is in Statistics from the University of Wyoming and bachelors degree from the University of Idaho in Business. He has received several teaching awards at Idaho, and his current interests focus on teaching effectiveness related to computer usage in business schools.

Dr. Van Over is an Associate Professor of Management Information Systems in the College of Business and Economics at the University of Idaho. He teaches primarily in the areas of Management Information Systems and is Director of the Center for Decision Sciences and Technology Management. He has published and presented on group support

Page 44

systems, pedagogy in MIS, and decision support systems. Dr. Van Over also has extensive experience in Information Systems: he has been a systems designer, an IS consultant, and a Director of Information Systems for an international company.

#### REFERENCES

- 1 Goldratt, E. M. & Cox, J. THE GoAL, 2nd revised edition, North River Press, Croton-On-Hudson, N.Y.: 1992.
- 2 Longnecker, Jr., H. E., Feinstein, D. L., Cougar, J. D., Davis, G. G. & Gorgone, J. T. *Inflammation Systems* '95: A Summary of the Collaborative IS Curriculum Specification of the Joint DPMA, ACM, AIS Task Force, JOURNAL OF INFORMATION SYSTEMS EDUCATION, 6(4),174-186,1994-95.

- 3 Trauth, E. M., Farwell, D. W., & Lee, D. *The IS Expectation Gap: Industry Expectations Versus Academic Preparation*, MIS QUARTERLY, 17(3), 293-307, 1993.
- 4 Hunter, J. W. *Topics Employers Think Should be Included in CIS Courses*, THE JOURNAL OF COMPUTER INFORMATION SYSTEMS, 27, 23-26, 1987.
- 5 Cohen, E. B. *Evolving Trends in Information Systems Education*, JOURNAL OF INFORMATION SYSTEMS EDUCATION, 5(4), 14-17, 1993-94.
- 6 Becker, S. A., McGuire, E. G., & Medsker, L. R. *An Information Systems Instructional Model for Supporting the DPMA 1990 Guidelines*, JOURNAL OF INFORMATION SYSTEMS EDUCATION, 4(2), 21-26, 1992.
- 7 Longnecker Jr., H. E. & Feinstein, D. L. *A Comprehensive Survey of USA and Canadian Undergraduate Programs in Information Systems*, JOURNAL OF INFORMATION SYSTEMS EDUCATION, 3(1), 8-13, 1991.
- 8 Tavakolian, H. *The Role of IT in Business Core Curricula: A Survey of AACSB Accredited Business Schools*, IBS COMPUTING QUARTERLY, 5(4), 45-51, 1994.





Faint, illegible text or markings along the left edge of the page, possibly bleed-through from the reverse side.

Faint, illegible text or markings at the bottom left corner of the page.

9 Womble, M. N. *Graduates Assess Need Skills and Knowledge for an Information Systems Program in a SmaU College*, JOURNAL OF INFO RM ANoN SYSTEMS EDUC ANoN, 6(1), 12-17,1994.

10 Sass, C.J. & McGinnis, D. *Job Market Changes and its Effect on Curriculum Issues in IS in the '90s*, IBS COMPUnNG QUARTERLY, 6(3),53-58, 1995.

11 Todd, P. A., McKeen,J. D., & Gallupe, R. B. *The Evolution of IS Job Skills: A Content Analysis of IS Job Advertisementsfrom 1970-1990*, MIS QUARTERLY, 19(1),1-27,1995.

12 Seeborg, I. S. & Ma, C. S. *MIS Program Meets Reality: A Survey of Alumni from an Undergraduate Program*, INTERFACE: THE COMPUTER EDUC ANoN QUARTERLY, Winter, 51- 60, 1989.

13 Licker, P. S. & Miller, M. *How are DP/MIS Graduates Doing?*, JOURNAL OF S-MS MANAGEMENT, 40(4),35- 42, 1989.

14 Association for Computing Machinery. *ACM CURRICULA RECOMMENDATIONS FOR INFORMATION SYSTEMS* (Research report No. 201832) .New York: Author, 1982.

15 Lewis, D. A. & Ducharme, R. E. *The Education of Business Undergraduates: A Gap in Academic/practitioner Expectations?*, JOURNAL OF EDuCA NoN FOR BUSINESS, November/ December, 116-120, 1990.

16 Heiat, A., Heiat, N., & Spicer,J. *An Empirical Study of Practitioners ' and Academics ' Views of MIS Curricula*, INTERFACE: THE COMPUTER EDUCATION QUARTERLY, 15(3), 27-31, 1993. ,

17 Becker, S. A., Gibson, R., & McGuire, E. G. *A Plan for a Comprehensive and Integrated Information Systems Curriculum*, JOURNAL OF INFO RM ANoN SWTEMS EDUCATION, 6(1),18-21, 1994.

*Journal of Information Systems Education*

**Summer/Fall 1996**



### **STATEMENT OF PEER REVIEW INTEGRITY**

All papers published in the Journal of Information Systems Education have undergone rigorous peer review. This includes an initial editor screening and double-blind refereeing by three or more expert referees.

Copyright ©1996 by the Information Systems & Computing Academic Professionals, Inc. (ISCAP). Permission to make digital or hard copies of all or part of this journal for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial use. All copies must bear this notice and full citation. Permission from the Editor is required to post to servers, redistribute to lists, or utilize in a for-profit or commercial use. Permission requests should be sent to the Editor-in-Chief, Journal of Information Systems Education, [editor@jise.org](mailto:editor@jise.org).

ISSN 1055-3096